Photography by Paul Bowen

Could the Citation Ultra be related to the "Sensible Citation" Cessna introduced 26 years ago? There's a strong family resemblance, especially in the nose, un-swept wings and cruciform tail. The fuselage cross section is the same. Pratt & Whitney Canada JT15D turbofans still provide the thrust. As always, the short landing gear seem to make it hug the ramp.

In reality, the Ultra has about as much in common with the original Citation 500 as a racehorse does with a farm horse. But that doesn't mean that the Ultra has lost the Citation 500's everyday utility. It still offers better short-field performance than virtually any other turbofan aircraft with the same number of seats. Its slow-speed handling traits probably are as forgiving as those of any current production airplane with two engines. But that's where the similarity ends between the Ultra and its early ancestor. For this year, Cessna is adding avionics features that further enhance the Ultra's capabilities. (See avionics sidebar.)

This straight wing Citation is a performer. The Ultra, loaded to maximum takeoff weight, can depart from a 3,200-foot runway, climb to FL 410 in 23 minutes and fly more than 1,400 nm at 400-plus knots. Slow down to 370 KTAS, and it will fly between virtually any two points in the United States with one fuel stop—against the most probable headwinds.

Speed, range and short field performance help to explain why one out of every five new turbofan aircraft sold during the last five years has been a Citation Ultra or its predecessor, the Citation V, according to Cessna's business jet sales tallies.

NON-TRADITIONAL PERFORMANCE

The Ultra, being the fastest straight-wing Citation yet produced, is close to 90 knots faster than the Citation 500 that made its debut in 1969. It takes a close look, however, to see how Cessna accomplished this considerable leap in performance.

The original Citation 500, I and II were fitted with NACA 23000-series airfoils, not unlike those used on Raytheon King Airs. The time-proven 23000-series airfoils have relatively benign stall characteristics, but compressibility drag rises sharply above cruising speeds of 0.65 to 0.67 Mach. At 0.70 Mach, the 23000-series airfoil runs into a virtual drag wall.

This wasn't a problem in early Citations because Pratt & Whitney Canada's first-generation JT15D turbofans only produced enough thrust to push them to 335 to 375 knots. As a result, the wing and the engines actually were quite well matched.

As Pratt & Whitney developed higher thrust versions of the JT15D engine, however, Cessna recognized the need to develop a wing with a higher cruise speed.

Ultra's 17.4-foot-long cabin provides ample room for double club seats or, as shown here, a center club with three to four additional seats at the ends of the cabin.

Fitting the Citation with a clean-sheet wing was out of the question. Cessna's customers would have balked at the price increase. Instead, Cessna's aerodynamicist collaborated with NASA's Richard T. Whitcomb, father of the supercritical wing, to develop a modified wing that would use the existing wing spars.

While not a true supercritical wing, the new airfoil incorporates a larger leading-edge radius and a relatively flat upper surface. Airflow over the top of the wing is accelerated more mildly than with the 23000-series wing, and lift is distributed over a longer chord section. The result in less compressibility drag.

The tangible result for operators, claims Cessna's aerodynamicists, is a 0.08 Mach increase in maximum cruise speed. The modified wing has a maximum cruise speed of 0.73 to 0.75 Mach—equivalent to about 420 to 430 knots, depending on cruise altitude.

The wing also features a cuffed, tapered inboard section with a longer chord adjacent to the fuselage. This effectively reduces the thickness-to-chord ratio at the wing root, thereby resulting in an even milder pressure distribution where the wing joins the fuselage. This design feature reduces wing-to-fuselage interference drag.

Cessna equipped the modified high-speed wing with four-section Fowler flaps that actually reduce V-speeds up to 10 knots compared to the Citation II's wing that is fitted with two-section hinged flaps. As an added bonus, the new wing's greater internal volume holds about 800 pounds more fuel.

The new wing first went into production on the Citation SII in 1984. The thrust output of its engines, though, limited its maximum cruise speed to just over 400 knots.

In 1988, the Citation V remedied that shortcoming. Its JT15D-5A engines pushed maximum cruise speed up to 427 knots. The Ultra, introduced in 1994, just ups the ante. Its -5D turbofans (see sidebar) enable it to climb faster to cruise altitude and, thus, reduce block times on trips of all lengths.

The Ultra almost, but not quite, closes the performance lead of the class-leading Learjet 31A, which is the quickest airplane in the light-jet class, according to B/CA's 1996 *Planning & Purchasing Handbook*. For example, on trips of 1,000 nm or less, the Ultra will arrive within 10 minutes or less of the Learjet 31A.

STRUCTURE AND SYSTEMS

In spite of the Ultra's impressive performance, it remains true to Cessna's goal of building a simple turbofan business airplane with straightforward systems.

Aluminum is the primary structural material used in the airframe. Composites are used for some secondary structures, such as the ailerons and wing flaps. The fuselage has the familiar Citation circular cross section, and the wing structure uses a classic, rigid torque box formed by main and rear spars, ribs, skins and stiffeners.

The vault-design, forward entry door measures 50.7 inches high by a maximum 23.5 inches wide near the bottom. A folding ladder, hinged at the door sill, is used for passenger boarding. Cessna also offers an optional 35-inch wide, two-piece clamshell door for special missions.

On the right side of the fuselage, directly across from the entry door, is an FAA Type III plug-design emergency exit.

Systems simplicity is one of the Ultra's strongest selling points. The fuel system has left and right wing tanks that feed the left and right engines. Each wing tank is refueled through an over-wing filler port. As there are no fuel heaters, an anti-icing additive is required for fuels that are not pre-mixed.

Electrically driven fuel-boost pumps are used for engine starting, cross-feed and to back up the jet pumps during abnormal operations.

A 24-volt, 40-amp/hour NiCd battery supplies electric power for engine starting and emergencies. Each engine has a 300-amp starter-generator. DC electrical power is used for most electrical and avionics functions, except for vertical, directional and yaw rate gyros, which depend upon AC power. An emergency battery supplies power to the pilot's-side directional gyro, the standby attitude indicator and HSI,

ULTRA'S AVIONICS

Honeywell's Primus 1000 forms the basis for the Ultra's avionics package. Three, eight-by-seven-inch CRT displays, made up of left- and right-side primary flight displays (PFDs) plus a multifunction display (MFD) in the center, occupy the panel. New to this year's model are the formerly optional, now standard, equipment—left- and right-side Primus II radio management units that flank the MFD—indicating that Honeywell com/nav/ident radios have become standard equipment. (Collins Pro Line II radios were standard equipment in previous Ultra aircraft.)

Two Meggitt LCDs also are new to the Ultra's panel. The upper LCD is a standby EADI with air-data tapes, and the lower is a standby EHSI. These solid-state systems replace the electromechanical standby instruments that were used in older 560s.

The console now houses an AlliedSignal GNS-XL one-box FMS with a GPS approach capability, in place of the GNS-XES that lacked a TSO C129 GPS sensor. Ultra customers also can choose a Universal Avionics UNS-1Csp (a box that was certificated on the Ultra in mid 1996) as a standard option. The Primus 1000 EFIS software has been upgraded to provide for the automatic course deviation needle scaling required for GPS non-precision approaches.

Both the AlliedSignal and Universal FMSes offer a GPS non-precision approach capability, but the UNS-1Csp has more performance features, such as full SID/STAR guidance, all ARINC 424 procedure legs, multiple waypoint vertical navigation and coupled vertical path navigation on non-precision approaches.

Other standard avionics include the Primus 1000 digital flight-guidance system, dual Honeywell mechanical and vertical gyros, dual digital air-data systems, dual Primus II radio audio-control panels with digital audio buses, a Primus 650 weather radar and an AA 300 radio altimeter. A Loral/Fairchild CVR and an Artex ELT110-4 also are included in the standard package. Avionics options include AlliedSignal Global Wulfsberg AFIS, an HF transceiver, Coltech Selcal, AlliedSignal TCAS I, II and GPWS, and a Fairchild FDR.

Cabin options include a Hughes MagnaStar or AlliedSignal Global Wulfsberg Flitefone air-to-ground radiotelephone, an Airshow 400 cabin entertainment and real-time information system, and other airborne office equipment.

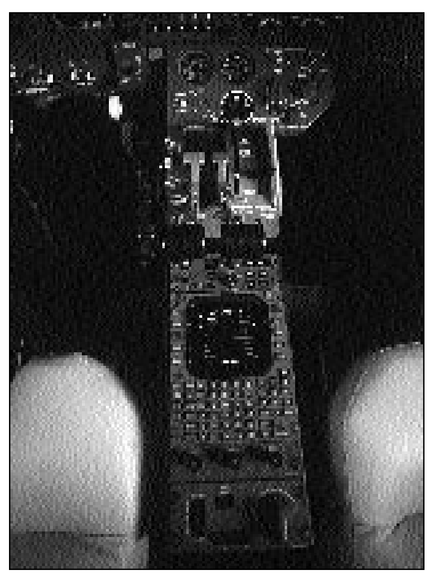
N1 fan speed tachometers, the com 1 and nav 2 radios, standby pitot and static heaters, both audio panels and the overhead flood lights.

Each wingtip has a landing light and a recognition light, plus each main landing gear strut has a taxi light. Logo lights illuminate the vertical fin.

The -5D engines produce enough surplus bleed air for cabin pressurization and air conditioning, plus engine inlet, inboard wing leading edge and windshield anti-ice. In contrast, Citations 500, I and II, lacking such bleed air output, used electrical heating elements for inboard wing leading edge anti-ice. The heating elements, nicknamed "waffle irons," occasionally malfunction, and they require 400-amp starter-generators.

Conformal deice boots, inflated by low-pressure bleed air, protect the outboard wing and horizontal stabilizer leading edges against ice accumulation.

There is no APU. However, the right engine has a unique bleed-air ground feature. When selected, this triples the air flow from the right engine for heating or air conditioning, thereby improving temperature control. A high-capacity, electrically powered, vapor-cycle air conditioner, which has both front and rear evaporators, augments the air-cycle machine for cooling. The vapor-cycle air conditioner, which can be powered by a 28-volt GPU, can be used in flight up to



GNS-XL or UNS-1C FMSes, now fully integrated with the avionics suite, give the Ultra a GPS non-precision approach capability.

18,000 feet msl. There is a single-zone thermostat, but the air flow between the cockpit and the cabin can be varied to produce a comfortable temperature in each location.

The hydraulic system is an on-demand, open-center design in which engine-driven hydraulic pumps continuously circulate fluid at low pressure, thereby minimizing the potential for leaks. When hydraulic pressure is needed to power the landing gear, wing flaps, spoilers or reversers, a bypass valve in the return line closes, causing the pressure to increase to 1,500 psi. As soon as the desired action is complete, the bypass valve opens and the system returns to low pressure operation.

A separate electrically driven hydraulic pump charges the anti-skid, power brake accumulator. An emergency pneumatic brake system provides a back-up for the hydraulic power brakes.

The primary flight controls are manually operated with console-mounted trim wheels for all three axes. The electric pitch-trim system can be operated by a conventional split switch on the pilot's yoke.

Nosewheel steering is connected to the rudder pedals by means of spring links that provide +/-20 degrees of steering authority. Differential power and braking can be used for tighter turns.

The flaps have four detents: retracted, seven degrees (takeoff), 15 degrees (takeoff and approach) and 35 degrees (landing). The electrically controlled and hydraulically powered speed brakes have two positions—retracted or extended.

About five to 10 percent of Cessna's customers order the optional gravel runway kit. This option features a nose-wheel spin-up system that prevents debris from being kicked up into the engines when the nosewheel touches down on the runway, along with antenna guards and flap shields.

P&WC JT15D-5D

Twenty-five years ago, Pratt & Whitney Canada achieved certification on the first of a new family of JT15D light turbofan engines that has become one of the most reliable turbine powerplants ever designed.

The original -1 engine is a study in simplicity. The gas generator core consists of a single centrifugal flow compressor, combustor and single high-pressure turbine. Most of the exhaust energy is absorbed by a two-stage, low-pressure turbine that, by means of a concentric shaft, powers a simple bladed fan in the front of the engine. Because the fan produces most of the thrust, the bypass ratio is 3.3:1.

A relatively low overall pressure ratio, no flat-rating and the relatively high bypass ratio result in a comparatively high thrust-lapse rate for the -1 engines. They lose more than 80 percent of their takeoff thrust at high-altitude cruise.

P&WC started to remedy that shortcoming with the -4 engines. They are fitted with an additional low-pressure turbine stage and a single, axial-flow supercharger compressor on the N1 shaft aft of the fan.

This boosts the overall pressure ratio, but it also reduces the bypass ratio to 3:1. The result is slightly higher specific fuel consumption, but more high-altitude thrust. Internally, the -5 engines are similar to the -4 engines, but they also have the following features: a wide-chord fan, a more robust core, improvement in high-pressure compressor aerodynamics, a fine-tuned exhaust nozzle and a higher overall pressure ratio. These engines retain almost 25 percent of their thrust at high altitude. Notably, the -5 engines have the lowest bypass ratios in the JT15D family, but they also have the best thrust-specific fuel consumption at high altitude because of their higher pressure ratios.

The -5D is the most highly evolved of the -5 series, a 3,350-pound thermodynamic rated turbofan that is flat-rated at 3,045 pounds of thrust for takeoff to 27°C (80°F). The -5D uses integral blade rotors, machined from a single piece of metal, for the fan and axial supercharger compressor, plus it is fitted with high-temperature tolerant, single-crystal high-pressure turbine blades.

With the widest chord design in the -5 family, the fan is shrouded by a Kevlar belt for better sealing and lower weight. The result is five percent more thrust than the Citation V's -5A engines produce and a one-percent improvement in specific fuel consumption at high-altitude cruise. At 0.80 Mach, 40,000 feet (uninstalled), the -5D engine produces 737 pounds of thrust with a 0.868 lb/lb tsfc. (That's almost 98 percent of the high-altitude thrust output of the AlliedSignal TFE731-2 that powers 30-series Learjets.)

Having a 2.1:1 bypass ratio has one unwanted side effect: The Ultra is one of the noisiest straight-wing Citations for airport neighbors. But that fact must be put into perspective; it still is one of the quietest turbofan aircraft on takeoff, especially when you are flying a noise-abatement departure profile. Cessna claims the Ultra can whisper over the airport neighbors at 67.1 dBA if the thrust is pulled back to 80.2 percent N1 during the initial climb.

PASSENGER AMENITIES

The Ultra has the longest cabin of any straight-wing Citation yet produced.

The cabin is 1.5 feet longer than the cabin of a Bravo and a full four feet longer than the original Citation 500.

A five-inch dropped aisle, which extends from just aft of the cockpit throughout most of the seating area, increases headroom to 55.3 inches.

The extra length allows the cabin to be configured in double club, with enough room left over for a full-width, aft lavatory. Pyramid cabinets in the center cabin, between the two club sections, provide most of the onboard storage for small stores.

However, at least half of the Ultras, including the demonstrator we flew for this report, are configured with a center club section, with three to four other seats facing into the club. This configuration permits the aft club seats to be mounted on seat tracks that allow them to be moved back an additional seven inches for greater legroom in the center club section.

The center club is flanked by a forward refreshment center on the left and an aft-facing chair adjacent to the right-front cabin bulkhead. Two forward-facing chairs are placed behind the club section and ahead of the lavatory bulkhead.

In our opinion, the interior quality is top notch. It's in keeping with the Ultra's $6-million price tag and the best we've seen in a 500-series Citation. The overhead and sidewalls are covered in seamless sheets of fabric, and indirect lighting makes the cabin seem larger than its measurements reveal.

The side rails, finished with wood laminates or optional veneers, have cup holders for each seat. The lower cabin sidewalls are covered in durable, embossed leather or a choice of other long-wearing fabrics. The wool carpet has a strong silk backing and is fireblocked.

Aircraft Modular Products of Miami builds the passenger chairs, which Cessna covers in a choice of leathers. They are equipped with lap and shoulder belts, they are adjustable in pitch, rake and track, and they have retractable headrests. They also swivel on their pedestals and contain small storage drawers in the pedestal bases.

Precision Pattern in Wichita builds the cabinetry, also first rate, which represents a radical improvement over the furnishings of early Citations. The refreshment center, for example, is made of strong, durable and lightweight hollow core composites covered with a choice of high-gloss-finished wood laminates. Wood veneers and inlays are available as extra cost options.

Inside the refreshment center is hot-

A full-width aft lav features sturdy privacy doors and an optional sink with running water. The toilet, though, is internally serviced.

and cold-beverage storage, a relatively large, stainless-steel ice bin, rolling racks for canned beverages, space to store miniatures, and a 16-inch-wide rollout drawer that holds small catering trays. It also has a generously sized, leakproof, stainless-steel waste container located in a deep pull-out drawer.

The aft lavatory's toilet has a removable waste container. An externally serviced lavatory is not available. Access to the lavatory is a little difficult, in our opinion, because the main wing spar transverses the aft cabin, more than seven inches above the floor level and a full foot above the dropped aisle. There is less than 49 inches of headroom in most of the lavatory, except for a small foot well.

Just aft of the cockpit, the refreshment center accommodates hot and cold beverages, a generous amount of ice and catering trays in 16-inch-wide drawers.

Cabin options include upgraded woods and leathers, additional cabinets for magazines and small stores, and a lavatory vanity cabinet with a sink providing fresh water. An Airshow cabin entertainment system with individual, full-color, flat-panel video screens and audio jacks is also an option.

The Ultra retains the straight-wing Citation's unique, nose external luggage compartment, which is carried over from its propeller-driven twins. It is ideal for briefcase missions because of its shallow floor, 15 cubic feet of volume, and accessibility by means of left and right baggage compartment doors.

A separate 28-cubic-foot aft external compartment holds 500 pounds of luggage. Inside the cabin, on the left side of the lavatory, is an additional 26 cubic feet of baggage volume that will hold 600 pounds.

FLYING IMPRESSIONS

The Ultra is one of those aircraft with which one immediately becomes comfortable. Once you've mastered the FMS, you're probably 90 percent assured of a successful checkride. On this flight, I was accompanied by Cessna Citation demonstration pilot Terry Lee.

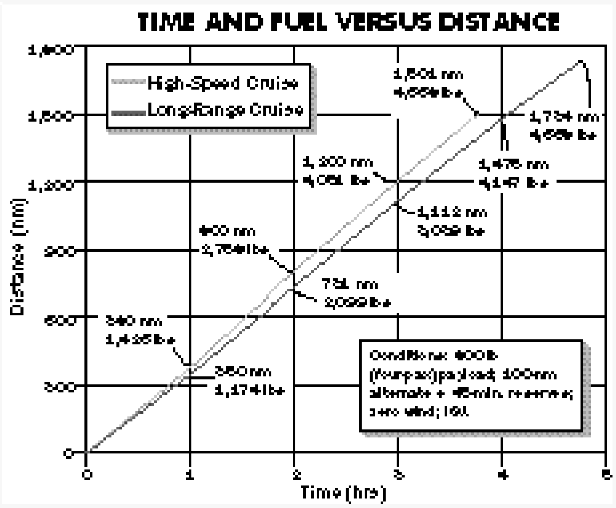
Preflight chores reflect the design of the systems: simple and straightforward. Everything is within easy reach, but the Ultra's low stance makes it a little tough to get to the fuel drains and brake-wear indicators.

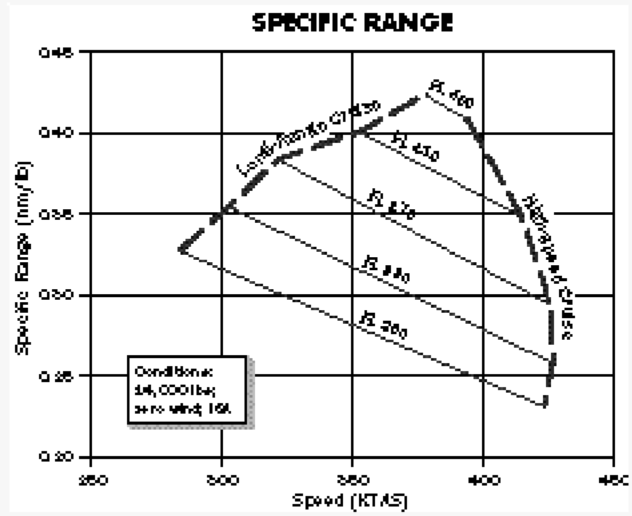
Starting an engine is easy. Turn on the battery and AC power switches, touch an engine-start button and wait for the N_2 turbine rpm gauge to read eight to 10 percent. At that point, just advance the thrust lever into the idle detent, and normally all other start functions, including the starter-to-generator transition, are automatic. (If you want to preheat or pre-cool the cabin, you may want to start the right engine first to take advantage of the triple-bleed-air flow rate of the bleed air ground feature.)

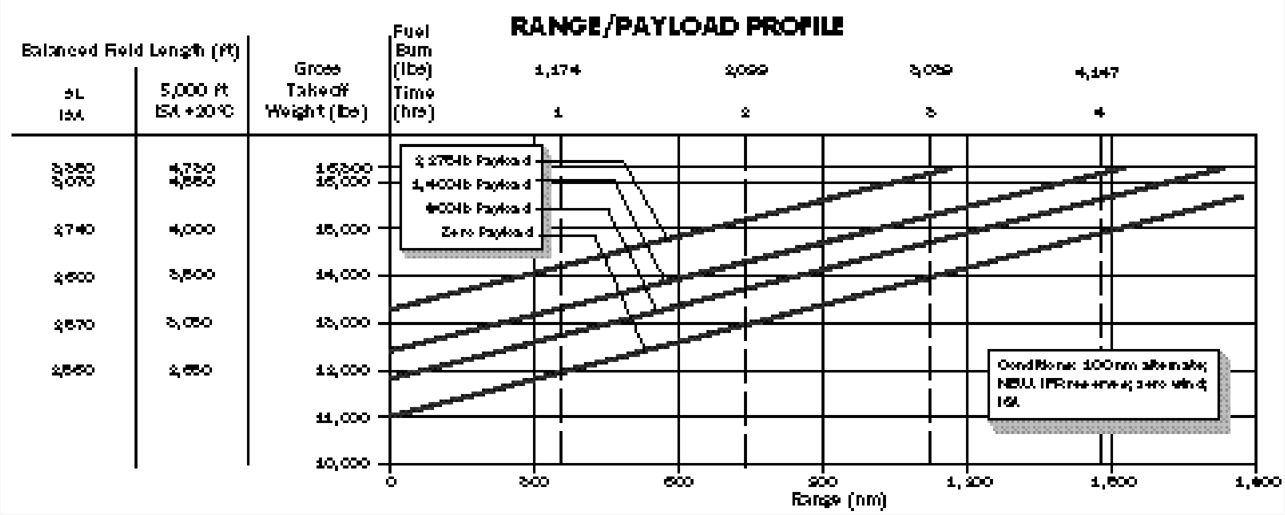
Citations use a generator-assisted cross start to help start the second engine when using battery power. Bump up the operating engine to precisely 52 percent N_2 turbine rpm, and you'll be assured that it supplies just the right amount of supplemental electrical current. Use more than 53 percent, though, and you can damage the generator drive.

In the Ultra, however, no longer do pilots have to fine-tune the high-speed idle for cross start. Flick the ground idle switch from normal to high, and the N2 rpm increases to exactly the required speed.

Our computed takeoff was a svelte 13,800 pounds—2,500 pounds below MTOW. Computing V-speeds and takeoff field lengths is a snap in Citations. Cessna publishes all the data in tables, so there are no cumbersome charts to plot and no fat-finger errors. The takeoff V-speeds were 86 KIAS for the V1 takeoff decision speed, 94 KIAS for rotation and 106 KIAS for the V2 one engine inoperative (OEI) takeoff







Data source: Cessna Aircraft

CESSNA CITATION ULTRA

These three graphs are designed to be used together to provide a broad view of Citation Ultra performance. Do not use these data for flight planning. For a complete operational performance analysis, consult the Citation Ultra airplane flight manual and appropriate cruise performance data supplied by Cessna Aircraft.

Time and Fuel Versus Distance—This graph shows the performance of the Citation Ultra at long-range cruise and high-speed cruise. The numbers at the hour lines indicate cumulative miles and fuel burned for each of the two cruise profiles. The intermediate points are approximated from climb, cruise and descent data published in the Citation Ultra flight planning guide. Our experience flying the Ultra suggests that Cessna's published cruise performance numbers are conservative.

Specific Range—The specific range of the Citation Ultra, the ratio of nautical miles flown to pounds of fuel burned (nm/lb), is a measure of its fuel efficiency. This graph shows long-range cruise and high-speed cruise specific range values throughout the typical cruise altitude envelope of the Citation Ultra. Notably, the fuel efficiency of the Ultra drops off markedly at high-speed cruise, as shown by the steep slope of the specific range lines at each cruise altitude. The relatively narrow spread between maximum-range and high-speed cruise specific-range values at the top of the envelope indicates that both speed and fuel economy are optimized when cruising above FL 410.

Range/Payload Profile—The purpose of this graph is to provide rough simulations of trips under a variety of payload and airport density altitude conditions, with the goal of flying the longest distance at long-range cruise. The payload lines, which are intended for gross simulation purposes only, are valid only for the endpoints. The time and fuel burns shown at the top of the chart are plotted for four-passenger (800-pound payload) missions.

safety speed. The computed takeoff field length was 2,680 feet. (If we had departed at MTOW, the takeoff distance would have been 3,560 feet, and V2 would have been 112 KIAS.)

Once cleared for takeoff on Wichita's Runway 19R, I advanced the thrust levers, which Lee adjusted to 97.3 percent N1. The Ultra responded like Citation, sprinting out of the starting gate.

"Airspeed's alive cross check, V1, rotate, V2, positive rate," Lee announced almost in a continuous stream.

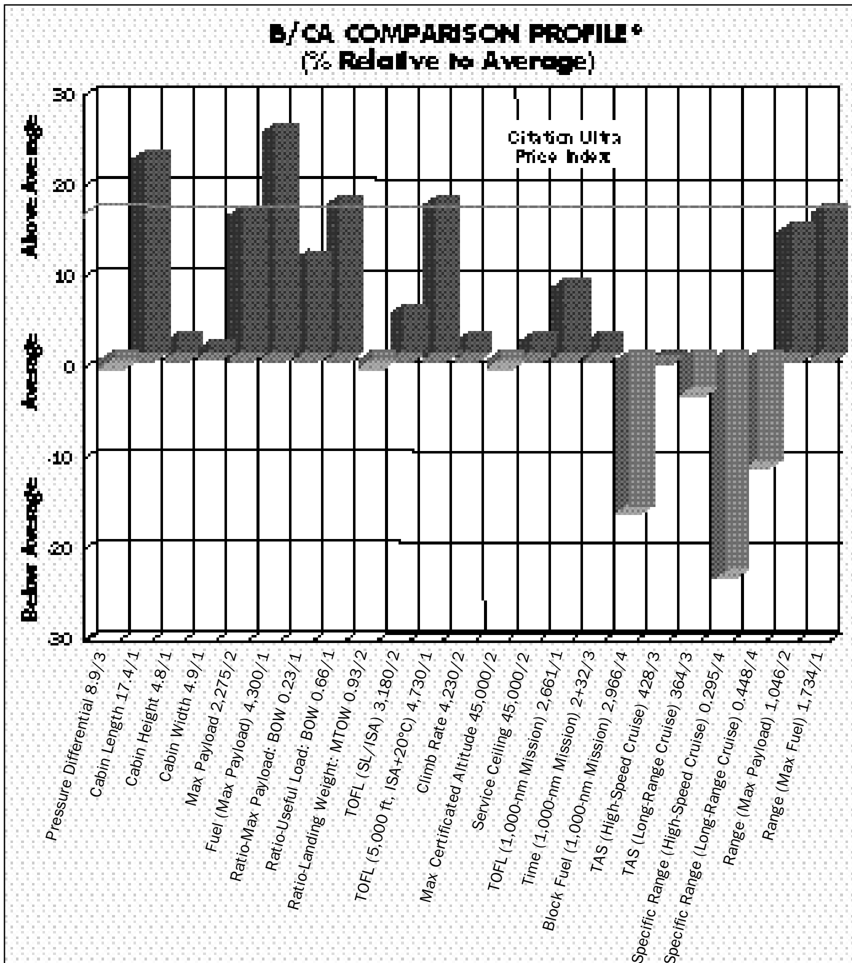
The pitch force at rotation was moderate. Our initial fuel flow on takeoff was 3,600 pph, and the initial climb rate was in excess of 5,000 fpm as we accelerated to the 200 KIAS Class D airspace speed limit.

Once clear, we made the transition to a 250 KIAS/0.62 IMN climb schedule. Our fuel flow through 5,000 feet was 2,800 pph. The thrust levers have to be adjusted frequently during the climb because the hydromechanical fuel controls lack digital computer sophistication. In a scant 20 minutes, we reached FL 410, and we were still climbing at 1,000 fpm as we began the level-off at cruise altitude.

We set 98.1 percent N1 for high-speed cruise, making no effort to conserve fuel, which resulted in a fuel flow of 1,190 pph. The aircraft stabilized at 0.752 Mach—only 0.003 below redline. Our true airspeed was 433 knots, 14 knots faster than the book value for our weight and fuel flow. At lower weights, the Ultra will push through MMO at maximum cruise thrust, according to Lee.

A quick check of the yaw stability revealed that, because of its additional thrust, the Ultra is more mildly damped in yaw than earlier straight-wing Citations. Passengers will appreciate use of the yaw damper, but it is not required for dispatch.

In contrast, the Ultra is well damped in pitch and roll. On our descent from FL 410 to 15,000 feet for air work, we found that deploying the spoilers causes a mild nose-down pitching moment, resulting in an increase in airspeed. However, a combination of landing gear (VLO at 250 KIAS) and spoiler extension produces little nose-down pitching moment and descent rates in excess of 9,000 fpm when needed for emergency descents.



Tradeoffs are a reality of aircraft design, although aeronautical engineers attempt to give each model exceptional capabilities in all areas at an affordable price. The laws of physics, however, do not allow one aircraft model to do all missions with equal efficiency.

In order to obtain a feeling for the strengths and compromises of a particular aircraft, B/CA compares the subject aircraft's performance to the composite characteristics of the aircraft in its class. We average parameters of interest for the aircraft that are most likely to be considered as competitive with the subject of our analysis, and then compute the percentage differences between the parameters of the subject aircraft and the composite numbers of the competitive group as a whole. Those differences are presented in bar-graph form. We also include the absolute value of the parameter under consideration, along with its rank with respect to the composite.

For this Comparison Profile®, we present select parameters of the Cessna Citation Ultra in relation to a composite group consisting of the CitationJet, the Learjet 31A and the Raytheon Beechjet 400A. The Comparison Profile® is meant to illustrate the relative strengths and compromises of the subject aircraft; it is not a means of comparing specific aircraft to each other.

Source: 1996 B/CA Planning & Purchasing Handbook

The Ultra's stall behavior, as a result of the modified wing design, is not as gentle as in early Citations fitted with the 23000-series airfoils. A stick shaker warns of the impending stall, and the actual stall break is accompanied by noteworthy wing drop. When pressed beyond the initial stall break, the Ultra may exhibit a pronounced wing rock. However, if stall recovery is initiated at the first sign of stall buffet, there is little altitude loss and no loss of directional or roll control.

The four, large, trailing-edge, Fowler flaps produce a strong nose-down pitching moment when deployed, but as a pilot, you'd never know it. A flap/pitch trim interconnect compensator all but eliminates the pitching moment.

We headed for Hutchinson, Kansas for instrument approaches and landing-pattern work. We set the speed bug at 100 KIAS for VREF, based on a landing weight of 13,000 pounds.

Straight-wing Citations are not particularly slippery, so slowing down in the Ultra isn't a challenge. You can maintain 250 KIAS until you are close to the initial approach fix, and then you can use a combination of flaps, spoilers and landing gear to quickly decelerate to the desired approach speed.

We found that relatively low thrust settings will maintain VREF speed on final, because the four-section flaps produce plenty of lift and yet only moderate drag.

Over the threshold, we slowly pulled the thrust levers to idle and flattened the approach attitude in anticipation of the landing plunk. The Ultra's short-travel, straight-leg oleos offer very little cushion at touchdown, and consistently smooth landings require plenty of practice.

Simulated OEI takeoffs and landings aren't much of a challenge in the Ultra. The large rudder and relatively long fuselage offer excellent directional control, plus the engines are mounted close to the fuselage. As a result, there is no need for a rudder boost or bias system.

After the pattern work, we returned to Wichita for a final landing, accompanied by another minor plunk at touchdown. Our total fuel burn for the 1.7-hour flight was 2,200 pounds.

PRICE AND VALUE

The Citation Ultra currently is the most expensive offering in the light-jet market, but that doesn't seem to be slowing its sales. Our B/CA Comparison Profile® may explain why. Ultra's cabin cross section is pretty much standard for the light-jet class, but it offers eight passengers considerably more length than its competitors do.

The Ultra offers strong range/payload performance in the light-jet class, as shown by the accompanying Range/Payload Profile. Only the Raytheon Beechjet 400A offers more payload—and then by only 15 pounds. But the Ultra can carry its maximum payload almost 250 miles farther than the Beechjet.

Runway performance is the Ultra's strongest performance asset. On 1,000-mile trips, it has the shortest takeoff field distance. When loaded to maximum takeoff weight on a standard day, the Ultra needs only 100 feet more runway than the class-leading CitationJet, an aircraft that offers close to one-third less range.

The Ultra's hot-and-high performance is clearly better than any other light jet's. Notably, when departing a 5,000-foot elevation airport, the Ultra doesn't run into a second-segment OEI climb limitation until the OAT reaches 33°C (91°F). This is largely due to the Ultra's relatively low wing loading.

Need even more climb performance? You can opt to depart at flaps seven degrees, instead of flaps 15 degrees. The takeoff field length increases to 5,050 feet—still the best in class—and you can depart at the full 16,300-pound MTOW at 40°C (104°F).

Most of the Ultra's below-average marks come from its relative fuel-thirstiness, as shown by some of the bars on the right side of the Comparison Profile®. This results from a blend of engine efficiency and aerodynamics. The JT15D-5D burns six to 12 percent more fuel than other turbofans in its thrust class.

The Ultra's wing aerodynamics, as indicated by its relatively low 0.755 MMO, impose a tangible drag penalty at high-speed cruise. In addition, the Ultra has more frontal and surface drag than its competitors because of its dimensions.

The Ultra, however, currently has the most cabin volume in the light-jet class, along with a clear advantage in runway performance and competitive block-to-block speed. Judging by the aircraft's sales success, light-jet buyers are looking for exactly those qualities.

Cessna's continuous-improvement program should assure the Ultra of a long and successful production run. With the 400th unit coming off the production line early this year, the Ultra, and its predecessor the Citation V, just might become Cessna's most popular Citation aircraft yet. ■

By Fred George

CITATION ULTRA SPECIFICATIONS

B/CA Equipped Price	$5,988,000
Characteristics	
Wing Loading	47.6
Power Loading	2.68
Noise (EPNdB)	
Takeoff/Approach	82.9/85.7
Seating	2 + 7/11
Dimensions (ft/m)	
External	
Length	48.9/14.9
Height	15.0/4.6
Width	52.2/15.9
Internal	
Length	17.4/5.3
Height	4.8/1.5
Width	4.9/1.5
Power	
Engine	2 P&WC JT15D-5D
Output	3,045 lbs ea.
TBO	3,500 hrs
Weights (lbs/kg)	
Max Ramp	16,500/7,484
Max Takeoff	16,300/7,394
Max Landing	15,200/6,895
ZFW	12,200/5,534
BOW	9,925/4,502
Max Payload	2,275/1,032
Useful Load	6,575/2,982
Executive Payload	1,400/635
Max Fuel	5,771/2,618
Payload—Max Fuel	804/365
Fuel—Max Payload	4,300/1,950
Fuel—Exec. Payload	5,175/2,347
Limits	
MMO	0.755
FL/VMO	FL 289/292
VFE (app.)	200
PSI	8.9
Climb (fpm/mpm)	
All Engine	4,230/1,289
Engine-Out Rate	1,185/361
Engine-Out Gradient	450/85
Ceilings (ft/m)	
Certificated	45,000/13,716
All-Engine Service	45,000/13,716
Engine-Out Service	26,000/7,925
Sea-Level Cabin	23,586/7,189
Certification	FAR 25, 1971/94

CITATION ULTRA OPERATING COSTS

Hourly Direct Costs:	
Fuel @ $2.00/Gallon	$388.00
Maintenance—Labor	69.60
Maintenance—Parts	77.45
Engine Reserves	217.70
Thrust Reverser Reserves*	10.00
Landing and Parking Fees*	10.00
Miscellaneous Crew Expense*	125.00
Small Supplies and Catering*	15.00
TOTAL	**$912.75**
Annual Fixed Costs:	
Captain	$63,000
Copilot	42,000
Benefits Package @25%*	28,750
Hangar	12,000
Insurance—Hull @ 0.3%	17,964
Insurance—Liability and Medical	3,000
Recurrent Training	17,250
Aircraft Refurbishment*	25,000
Navigation Chart Service	886
Computerized Maintenance Program*	1,250
Weather Services*	1,000
Fair Market Depreciation @ 6%*	359,280
TOTAL	**$571,380**

Source: Cessna Aircraft, Pratt & Whitney Canada and *B/CA estimates