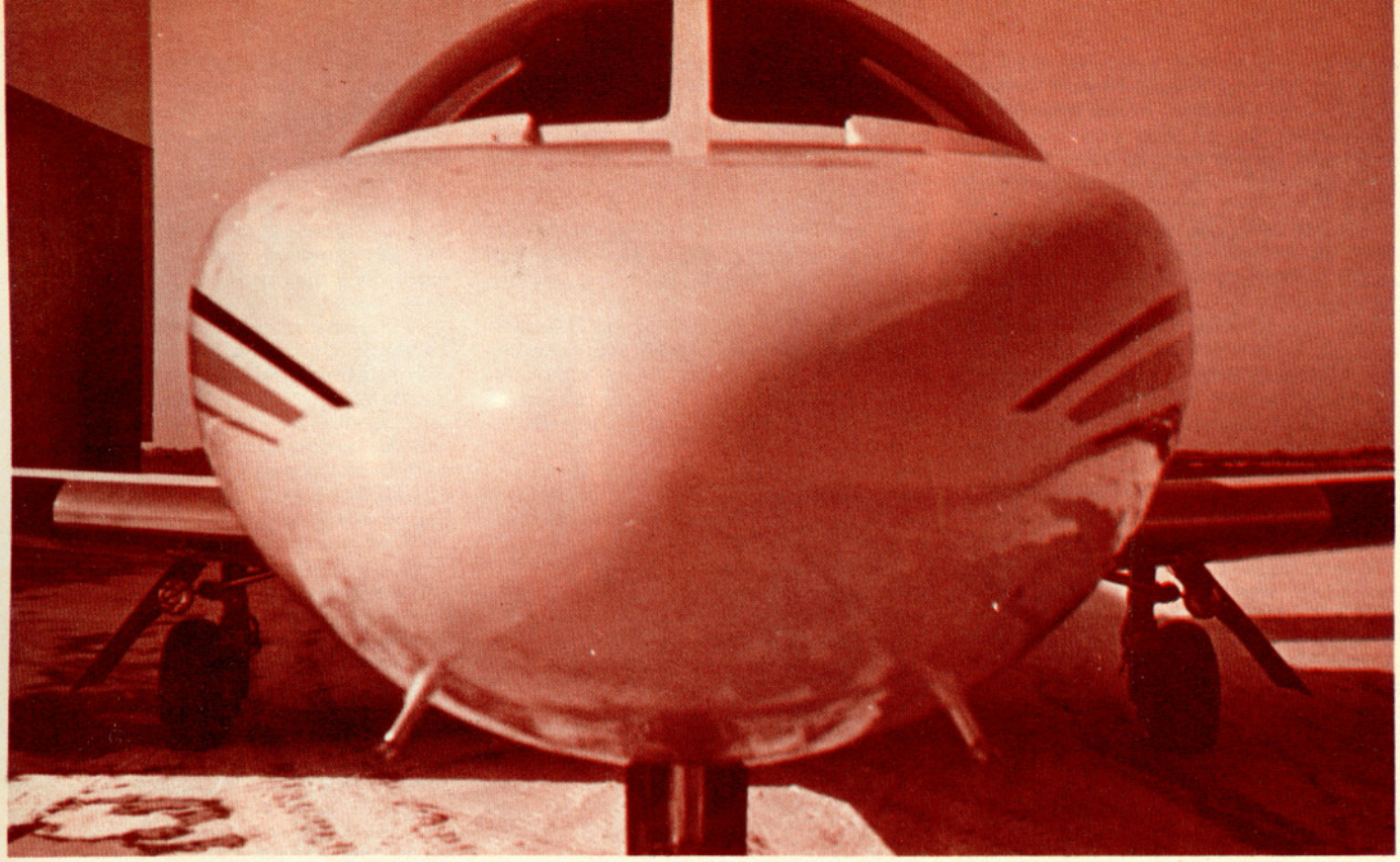


Pilot FLIGHT CHECK:

CESSNA'S CITATION

by ED MACK MILLER

EDITOR'S NOTE: Single-pilot small jets are something that has always been "just around the corner" for the past several years. Along this line, conversation has rippled below the surface of the aviation public's awareness the past year on Cessna Aircraft Company's hoped-for certification of its Citation for single-pilot operations. Cessna officials, in a little-publicized move, have now withdrawn their formal attempts to have FAA certificate the Citation for single-pilot operations. Unspoken reasons for shelving the attempt, at least for the time being, reportedly involve an almost solid wall of opposition on the part of key FAA officials to the single-pilot small jet concept. Despite Cessna's understandable reluctance to discuss the matter too openly and FAA's reported opposition to the concept, feelings persist in some quarters that single-pilot small jet operations is an idea whose time has come.

Not satisfied with the meager reports to date on the single-pilot small jet concept, The PILOT *commissioned Ed Mack Miller, one of the nation's foremost jet pilots and jet aircraft instructors, to undertake a comprehensive* PILOT *Flight Check of the Citation and to provide an objective evaluation of its single-pilot operation potential. Miller has been flying for 34 years and has sat left-seat in just about everything, up to and including the "JumBoeing 747," in which he currently instructs United Air Lines' pilots. (He also instructs United's pilots in the DC-8, B-727, and B-720.) Miller's report follows. His views on the single-pilot potential for the Citation are presented along with, but separate from, his performance check of the aircraft.*

◄ *Nose bobbed. The Citation's original needle-nose has been changed (for more effective ice dispersal, less big globs in the engines) to this "duckbill" configuration. Photo by the author*

No vortex generators. No fences. No shakers or pushers. It's a simple plane that does a jet-size job and, author says, one pilot is sufficient to fly it, but regs still say no

■■ I went to Wichita, Kan., turned off.

From the time I first read of the Cessna Citation, my reaction was, "Who needs it?"

I had flown evaluation tests on the whole spectrum of bizjets, from the PD-808 to the Hansa. This is a great breed of plane, but was the market ripe for another entry . . . when those already in existence were scratching to stay alive?

Another bizjet? Designedly much slower? Cheez. And Cessna leaping with both feet into a comatose market in the middle of a recession, when everyone else was retrenching. Was this sheer insanity, or a combination of intelligence, guts and self-confidence?

So I went. Because I can't resist a new airplane.

And I came back chastened.

The secret was all in the name: Cessna.

Cessna doesn't make big mistakes. If it did, it wouldn't hold the place in the industry it does.

I should have known. At one time I was part owner (with two other guys . . . and a bank, of course) of 34 Cessnas. I know Cessnas.

Cessna builds fine airplanes.

The Citation is a fine airplane. Right now the FAA says it needs two pilots to fly it, while a turboprop about the same size can be flown with one.

The Citation has a magnificent autopilot. It doesn't need a two-man crew with that autopilot, with that airline instrumentation, with its totally simplified systems and fine handling at low airspeeds. For anyone who ever flew a military fighter or a T-bird, with one radio and birddog, it is sensuous luxury and sublime safety. And, on the other end of the spectrum, the Citation bridges the gap between puddle-jumpers and exotic jets better than anything you could imagine. Why? Because it is a Cessna. The Citation flies like a sky-loving Skymaster.

And at the American Airlines Citation School in Fort Worth, Tex., guys who never flew anything before that didn't have a prop on it are getting ratings in Citations with only two or three hours in the plane (plus a thorough ground school syllabus and simulator course).

Early stories on the Citation hit hard at the fact that the Citation wasn't really a jet—was really kind of a prop plane, with the propellers cowled . . . a slow Learjet.

I think the pitch was wrong.

What sold me on the Citation was the utter simplicity of systems and construction of the bird, plus its performance and price. Its block times compare favorably with the competition, as does its range. But it does it all without tip tanks, without Mach trim and stick-shakers and stick-pushers and all the sophisticated gingerbread you get into when you flirt with the speed of sound. At point seven Mach, the Citation gets you there quickly, comfortably—with an economic savings-plus that's hard to argue against (especially when the plane can pick you up at a tiny airport and deposit you at JFK).

Cessna wasn't blind stupid (as I had thought) to attack a market where all the salesmen were already lined up at the buyer's door, fighting with each other.

First, Dwane Wallace's people are looking at a number of big corporations who have never seriously considered jets, or any other type of aircraft, for executive transport.

And with the going price, plus all the rest Cessna has built into the package for less than $700,000 . . . I wouldn't bet against them.

The biggest thing going for Cessna is that it knows how to fabricate airplanes. It knows how to build them sturdily, economically. And it builds the whole plane, with practically no subcontracting.

It buys its avionics in hundred-plane lots and passes along the savings. Cessna can keep costs low by building a "simple bird" that's complete: interior, avionics, everything in one package. Of course, they're not nuts: If you want a flying shell to "gussie" up with an interior of Black Angus cowhide, they'll sell you one.

Cessna Citation

Seating capacity	7–8
Gross weight (lb)	11,000
Empty weight (lb)	6,350
Useful load (lb)	2,016
Wingspan (ft)	43.75
Length (ft)	43.50
Height (ft)	14.33
Fuel capacity (lb)	3,590
Cruise speed (mph, @ 30,000 ft)	402
Stall speed (mph, @ 9,900 lb)	92
Service ceiling (ft)	35,000
Range (sm, 5 on board, 45-min reserve)	1,322
Price	$695,000

But I'm getting ahead of my story.

James B. "Jim" Taylor (AOPA 11528) is the kind of man you'd expect to order an attack when everyone else is panicking to retreat. He's a tough, ex-Navy type who is well known throughout the industry for getting hard jobs done well . . . and for going first-class. Taylor's official title is vice president and general manager of Cessna's Commercial Jet Marketing Division.

He has assembled a top team (which includes a seemingly disproportionate number of ex-Marines), smart, hard-minded, clean-cut characters all. And there's no doubt that they mean to dominate the small-jet industry.

One of these ex-Marines, Brown Pinkston, an ex-Lockheed Jetstar type who is director of administration for the Commercial Jet Marketing Division, met me at Wichita Municipal Airport the night before one of the longest 14-hour days I've ever been involved in.

It started early the next morning. Jim Taylor's special ex-Marine briefing team of Bill Banta and Pete Ginocchio attacked me early: The facts, man. No nonsense. By noon I had seen every corner of the Cessna multi-engine and jet factory at Wichita Municipal Airport (single-engine construction is done at the "old" factory on the other side of town). I had run my recorder ragged and listened to the Citation story from every angle.

Now I was turned over to tall, handsome (ex-Marine) James E. "Jim" Markel (AOPA 389882), for the flight evaluation.

In his office in the "tower" in the specially built hexagonal Citation Sales and Service Center (Cessna will sell you one of these exotic complexes for only a little more than the price of a Citation), we briefed. I told him what I wanted to do in the bird: normal takeoff; normal climb to cruise; steep turns; stalls; normal ILS and landing; an engine failure on takeoff; a coupled ILS and missed approach; a single-engine ILS and landing; and a circling approach, if possible.

"Why not fly to Fort Worth?" Markel said. "Then we can 'fly' the Citation simulator at American Airlines' Flight Academy, do some emergencies in it, and get some of the things you need on the way down, some on the way back." As it turned out, we got in one local flight before we headed for Texas.

Accompanied by genial Jerry Kell,

"Five-oh-four Charlie-Charlie," Cessna Board Chairman Dwane Wallace's plane, was the aircraft flown for the accompanying PILOT Flight Check. Photo by the author

Cessna's public relations chief, we did a walk-around of N504 Charlie-Charlie, production Citation No. 4, the plane used by Cessna Board Chairman Dwane Wallace and other Cessna top management types. This graceful bird is a visual grabber— painted over-all white Alumigrip with "Empress Blue" and "Velvet Black" stripes.

The airplane is simplicity itself, clean lines and a minimum of exotics. Said Markel: "Hydraulic brakes, just like on your car. Chine tires on the nosewheel to keep slush out of the engines. Simple gear, just three wheels. If normal hydraulics won't put the gear down, a standby air bottle will."

A straight wing. No tip tanks (fuel specifics are so good, the plane didn't have to be designed around outsized fuel cells). One feature that struck me as being odd was the presence of boots on portions of the wing and tail. Seems the people moving up to a jet for the first time just can't believe boots aren't a necessity in jet flight—so, Cessna puts 'em on if the buyer desires, leaves 'em off for those who opt out. Especially impressive was something I hadn't seen on a bizjet before—lots of baggage room in the nose (350 lb/17 cu ft, allowed by miniaturization of avionics). Equally impressive was window size, especially the wrap-around pilot's greenhouse. The only optional equipment on 504CC was boots, radar altimeter, angle-of-attack indicators, and strobe lights.

Wichita weather was Kansas clear, temperature 40 degrees, wind north at 7, altimeter 30.14. Takeoff weight was 10,400 pounds and balanced field length, 2,610 feet. For takeoff, V_1 [go/no go speed] was 94 KIAS, V_R [rotation speed], 98, and V_2 [engine-failure speed], 108.

Entrance to a bizjet plane and its cockpit is always somewhat of a shock for a guy used to climbing a spiral staircase to the flight deck. Once installed in the left seat, however, I couldn't quibble over the comfort features: The pilots' seats are easily and fully adjustable, plush and comfortable. Visibility is great. The cockpit setup furnished a good framework for a systems briefing.

I had flown the Bendix "Bullseye" Flight Director on TWA's B-747 simulator (and feel it's the best there is); so the FGS-70 came as no shock to me, as it normally does to a first-time user.

The mode selector is cleverly combined with the flight progress display in the Citation, one of the nicest advances I've seen, with the following selections available (amber for armed, green for engaged): Flight Director, Heading, VOR/LOC, Turbulence, Back Course, Altitude Hold, and Glideslope.

Airspeed/machmeter, altimeter, instantaneous vertical speed indicator (IVSI), radio magnetic indicator (RMI), and radar altimeter were all familiar, which made the job easier. Somewhat more difficult for the pilot on any new plane is the problem of working your way through the myriad switches and selectors. But we made it. Jim Markel is a patient guy.

Engine instruments are easy-to-read, easy-to-line-up vertical display tapes. Avionics are straightforward, with some nice goodies—including the RCA AVQ-95 transponder, the AVQ-21 weather radar, and the AVQ-85 digital DME, a kind of "poor man's inertial nav," which gives not only distance but also groundspeed and time-to-station.

Taxiing to take off for the local flight, I was amazed at how much at home I felt. Nosewheel steering is through the pedals—simple, like on a Skyhawk. Worked great, especially if you added a touch of brake (an air bottle gives backup brake protection).

"Why don't I cut an engine on takeoff just to show you how easy it is to hold?" Markel said. He said it with a lot of confidence.

Usually I like one takeoff with everything running, but I was already so at home I wasn't averse to doing the takeoff with one cut back after V_1.

THE CITATION, ONE OR TWO PILOTS ?

■■ The industry has buzzed for a long time about Cessna's single-pilot certification (SPC) hopes for the Citation. SPC is a subject you can get a lot of heat on, instantly—and light, practically never. No one in the places that count really wants to talk too much about it. Everyone feels that it's the tab that pops the ejection lever on Pandora's box.

Cessna people? They're for it. The FAA? I suspect it's the old, "For God's sake don't rock the boat." A well-trained pilot? All for it. The chief pilot of a small corporation? No way! That would mean a layoff of pilots. Ditto the corporate drivers. But to a pilot who spent years attacking the golden triangle in a converted B-26 or C-45 with one ADF, what greater luxury could you have than a plane with an autopilot, all sorts of DME and transponder goodies and automatic everything? Why not allow just one pilot, especially when you can slow this bird down and maneuver at Skylane speed? Insurance companies aren't for SPC. "Forget it," is their attitude. And the extra premiums would compromise the savings in pilot salaries.

Aviation is made up of so many people, each with some secret pride or phobia, that there are as many opinions on SPC as there are throttle-agitators.

A rich man will say, "I want one if I can fly it solo." But his opposite number will say, "Wouldn't I be better off with a copilot? What if I had a heart attack?" Or some corporate pilots will say, "I don't want to subject myself to intensive training like an airline pilot in a 'motion' simulator with 'visual' and all that. I'd probably blow it good . . . and my boss would fire me. Maybe I'd better talk him into buying a turboprop, where I can get the rating with just a half-dozen landings."

There's hardly any doubt that it's more difficult to fly a turboprop solo than a Citation . . . but that's Part 23 and okay to do. And so SPC is going to stay in a sort of limbo, a logical fly stuck in an ointment of odd ambivalences. I don't think Cessna will get SPC on its bird, not for now at least. But I'll go on record as saying it should have it. I'd for sure a lot rather fly the Citation into JFK on a dark and stormy night, alone (but with an autopilot), than a Beech 100, a Merlin III, an MU-2, or even a Baron, an Aztec or a 310. But they're legal for one pilot, and the Citation, so far, is not.

—Ed Mack Miller □

We were cleared. "No traffic on final. Check the windsock. Transponder on. Strobes on. Let's roll."

The get-up-and-go of the Citation is "a kick in the can." Man, it goes. It came off smoothly. Rudder was easy to hold, and Jim reminded me to add a little aileron, which it needs after you get off the ground. Overall, it was a piece of cake to control. (V_{MCG} [minimum control speed, gear down] is 55 knots, well below stall speed).

With the right engine cut at V_1, distance to liftoff was approximately 2,100 feet. Second-segment climb (on single engine) stabilized at 800 fpm rate of climb at V_2+10. At 400 feet we pulled the flaps up, which gave us 1,100 fpm at a V_{YSE} [single-engine speed for best rate of climb] of 141 knots.

Sensationally simple for a jet is the hydraulic system: It only operates the gear and the speed brakes. An "open" system, it idles at low pressure until called on, when it jumps to 1,500 pounds psi.

I didn't get any noticeable pitch change from gear retraction (or extension), flap usage or speed-board use. The latter look like rectangles of pierced steel planking, are positioned above and below the wing, and do a nice job of "ungreasing" the bird downhill.

Flight controls are simple as simple can be—stainless steel, corrosion-resistant cables for all systems. The control surfaces are metal-covered. You trim the elevator, not the stabilizer, but you have a B-707 look-alike trim system with a pickle switch on the yoke and a wheel at your right hand. Rudder and aileron tabs are conventionally placed on the rear of the pedestal. I could find things right off without looking for them, which I thought showed good design because how could they have anticipated a driver who is used to flying three-and four-engine Boeings and DC-8s?

I did steep turns and stalls. Controllability was great. All I could think of was that it felt and handled like all the other Cessnas I've ever flown. I was amazed at how smoothly the pressurization operated. The environmental system's pressurization panel is set just below the radarscope. Normal system pressure (7.6 psi, giving an 8,000-foot cabin at 35,000 feet; sea level at 18,500 feet) is supplied by bleed air from each engine through individually controlled valves. Electrical power is needed to close the valves; hence, a loss of electrical power to the valves results in normal pressurization function. The system is straightforward, with one nice feature. A "Ground Mode" is also provided, which supplies approximately three times the normal bleed flow from the right engine (during ground operation only). In extremely hot or cold weather, the pilot can start up just that one engine and precool or preheat the plane to a comfortable temperature before his passengers arrive. Air conditioning, generally, is conventional.

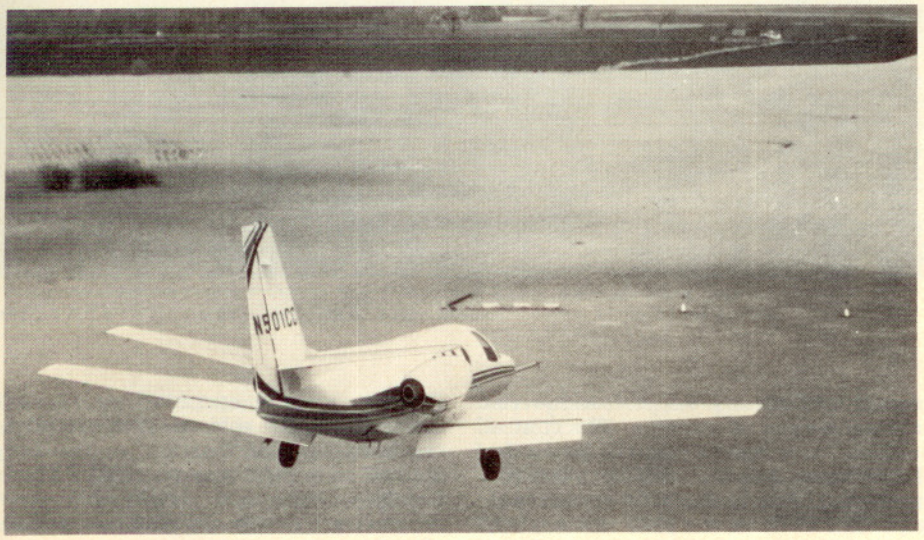
Bleed air from either or both engines drives the air-conditioning turbine. A mixing valve combines hot bleed air with conditioned air to regulate temperature. Overhead and underfloor ducts carry conditioned air to the cabin and flight deck outlets. A cabin thermostat provides sensing for automatic temperature control, and a selector on the forward instrument panel provides either automatic or manual control.

There's a little wedge of rubber on the deicer boot on each wing that is the simplest stall warning device you've ever seen. When the plane slows down, the wedge deflects the disrupted airflow over the horizontal stabilizer, causing a tail buffet. This is followed by the stall, a kind of damped porpoising maneuver.

Stalling it clean, straight ahead, she paid off at 93 knots; with 15° flaps in a 15° banked turn, at 90; and with "all the garbage out," at 83.

Dip the nose and goose the go-handles and you're back in business instanter. Those fans really bite. A slice of Devil's food. Engines are United Aircraft of

Author Ed Mack Miller, in left seat, registers approval of Citation's climb characteristics. Jim Markel (AOPA 389882), Cessna's chief pilot for the Citation program, is riding shotgun. Though taken at night while climbing through 28,900 feet, constant curve of windshield played tricks with camera's flash, giving impression it's daytime. *Photo by Jerry Kell*



The Citation is highly touted for its short- and soft-field capabilities. Takeoff balanced field length, at 10,350 pounds, is 2,760 feet. Landing field length, at 9,900 pounds, is 2,128 feet. *Cessna photo*

Canada's JT15D-1s, delivering 2,200 pounds of thrust at sea level (static, ISA [International Standard Atmosphere]). Excellent fuel specifics are being obtained from the tiny engine, which has a bypass ratio of 3.2 to 1. Although no engine is up to overhaul time at this writing, the FAA has given the engine a 1,500-hour TBO [time between overhauls] figure for starters.

I was impressed with the Citation's stall characteristics, but my first ILS was the start of a love affair. Coming down the string on the Runway 01 ILS at Wichita, I couldn't believe this wasn't a big airplane. Give it gear, flaps, trim, and sit there, flying the bullseye.

Flaps are electric (15 degrees for takeoff and maneuvering, 40 degrees . . . full . . . for landing). The electrical system is standard state-of-the-art. DC power is supplied by a 400-amp starter-generator unit on each engine, backed up by a 39-ampere-hour nicad battery. Ground starts are either external power or battery, and the second engine usually uses the generator from the engine already operating. Either generator alone can handle all the load you can cook up in flight.

If maximum use of electrical power is needed in conjunction with anti-ice loads, it may be necessary to utilize windshield bleed air instead of electric anti-ice for one or both windshields if a generator fails. AC power is provided by two 600-watt solid-state inverters. The flight director inverter powers instruments, radios, flight director and autopilot, and the radar inverter powers the radar and radio altimeter—with a backup crossover to allow the latter to power the instruments, flight director and autopilot if their inverter fails.

Came now my first landing.

But, send for help!

I leveled off first at 747 height, then stair-stepped to eye level on a Stretch 8, then to flare level of a short 727 . . . then flubbed to where you squeeze off a D-18 . . . and finally wobbled onto the ground, with Markel convulsing beside me.

It's a lovely, loving machine. With such a lousy approach, I didn't even hit hard, and there I was looking for reversers (none!) and Jim was saying, "Stand on 'em. It won't hurt." I'm a natural brake-saver, so I didn't, although to get into those 828 short fields Cessna advertises, you'd have to. (Incidentally, an option on the Citation is a skid-warning system).

I taxied back in like a hotshot "spam-can" driver and parked with a flourish. I was ready to take on the FAA and get a rating, (if I could find ground level!).

Instead we had brown-bag lunches in Jim Markel's office and filed for Fort Worth.

Over lunch I got more of a rundown on this fine airplane:

Fuel is in integral wing tanks, with overwing fueling ports. A crossfeed capability allows both engines to draw from either wing. Fuel tanks are coated to provide maximum protection against microorganism propagation.

"Prist" additive prevents ice formation in the fuel system. Engine bleed air is used for inlet anti-ice; pitots, static ports and windshields are electrically anti-iced, and the flight compartment windshield defogged by circulating warm air. The wing leading-edge "veranda" in front of the engine is electrically anti-iced.

Fire detection and warning are furnished by a continuous loop system, extinguishing taken care of by a dual bottle lash-up.

Oxygen is about like the system on an airliner, with standard protections.

Then we were back into Zero Four Charlie-Charlie again. It was surprising how easy it was to get it rolling the second time.

Temperature, wind and local conditions were practically the same as before lunch, and we rocketed, on two engines this time, to FL330 in a neat 15 minutes, consuming only 350 pounds of fuel. Winds at altitude were forecast to be 250/106 and, man, they were that. At one time we had a 40° crab. On level-off, cruise speed was .6 IMN/210 KIAS, with an indicated OAT of −35° C. TAS was computed at 347 knots; fuel flow was 900 lb/hr total.

Block time for the 305 nm trip from Wichita to Fort Worth was one hour and 22 minutes (including a coupled approach on one engine to minimums on ILS Runway 13 at Greater Southwest, with a pullup and circling on one engine to a landing on Runway 35). Weather at GSW was 1,500 scattered, 2,500 unbroken and 7 miles, with the wind from 010° at 9 knots.

Reference speed (1.3 V_S) at GSW was 101 KIAS. I found the one-engine, 600-foot circle a slab of angel food, taking gear on base and full drag with the field made. This time I flared closer to the

terrible firma. At the 8,900-pound landing weight, I could have stopped in 1,410 feet. I let it roll instead, in light of the fact that the hour was late and we still had lots to do.

Meeting us at the plane was M. C. Thomas, manager, flight contract training for American, a genial Texan, who really had things laid on for a tour of the airline's flight academy.

I wasn't too turned on for this, either, as I spend most of my life at United's training center in Denver. Postman's holiday!

But I couldn't help being impressed by American's approach to Citation training. The Cessna program at American is no country-cousin affair.

The Citation simulator, with three-axis motion and Redifon, full-color, closed-circuit TV visual (the only corporate simulator with such "goodies") is as fine a piece of hardware as anyone could desire. The use of this finely tuned instrument pays off in greatly reduced training time in the plane. The Citation crew gets exactly what American pilots who are in for transition get, be it the B-747, DC-10, or B-727.

What started out to be a short tour turned into two hours . . . because it was obvious that M. C. Thomas and a number of other people at American are in love with their establishment, have put a lot of hard work into "peaking up" their machines, and are proud like-to-burst of their flight academy.

We were impressed.

Both Cessna and American have gone all out on this program, to the tune of millions of dollars. In an era of cutback, this type of confidence in general aviation, in the future of aviation, is startling and stimulating, and I lay my bet that it pays off.

The purchase price of the Citation ($695,000) includes the training of two mechanics and two pilots at American's flight academy. One of the two pilots is type-rated as part of the package, and pilots can return to American for recurrent training, as well as physicals at the airline's ultramodern medical facility.

As I told Jim Taylor later, I had to let everything simmer for a few days just to make sure that this great plane and this heady program weren't just a mirage of master selling, manufactured by a gung-ho bunch of ex-Marines. A summary of the complete package, viewed in retrospect, is provided in chart form and accompanies this article.

The Citation isn't perfect. I'd have to teach myself to stand on those brakes. They're hard to get used to. There's some bothersome distortion in the windshield. The side windows on Charlie-Charlie fogged up at altitude . . . and it was continually cool on the left-window side of the cockpit at night. (I'd had the same problem on the Atlantic with a B-707, when I used to fly with a blanket over my left shoulder, like a serape.)

I went to Wichita jaundiced, skeptical, turned off about the Citation.

And I was wrong. All the way.

The Cessna Citation is a fine airplane —all around. And we'll see more and more of them—all around.

And that's not applesauce cake. The Citation—underwritten with lots of hard cash by two solid companies, Cessna and American—is here to stay, definitely as a two-pilot small jet, and hopefully, someday, as a single-pilot jet. □

Cessna Citation Evaluation

- The Citation is a common-sense machine—no piecemeal assembling of avionics and interiors. You get it all for a low price, made possible by mass purchasing, intelligent use of proven manufacturing methods and common-sense, nonexotic design.
- Fleet-wide common systems mean standardized training techniques, quick interchangeability, easier maintenance and repair.
- Cessna's computerized maintenance system (CESCOM) for the Citation should increase effectiveness and utilization—and save money.
- The plane comes with a hard-to-beat warranty: three years on airframe; two years (or 1,000 hours) on engines; everything else, one year.
- Cross-country service is available at Cessna Service Centers now in service at Wichita and planned on the East and West Coasts.
- A superior training package. Tops anything the bizjet milieu has bragged yet.
- Certification under Part 25, the same "rigid transport category rules" that are applied to modern jet transports, assures a solid plane. And, after taking the Citation training at Fort Worth, Tex., the pilot probably will be sharper than he's ever been in his life.
- Economical and simple operation is guaranteed by the second-generation fan engines and simple approach to systems and hardware.
- For a generation that is concerned, the Citation is an ecologically clean and quiet bird. (As far as noise is concerned, it ranks between light twins and a vacuum cleaner decibel-wise).
- Cessna has a lot of know-how on small planes and small jets (it has built more airplanes than anyone in the world, over 100,000, including over 1,500 military jets—the T-37 and A-37).
- Cessna will sell the Citation "direct" rather than through distributors and dealers.
- It fills a gap between the top turboprops (about $600,000) and the most economical jet (about $800,000).
- The Citation has a good range—up to 1,322 sm. Good, long legs. —EMM

THE AUTHOR

Ed Mack Miller has been a pilot for over 30 years, has flown everything from sailplanes to balloons, and is rated in just about every type of aircraft, including the B-747. He has been an instructor pilot for United Air Lines since 1955 and has check-flown almost every bizjet now flying, as well as a number that have since gone by the boards. Author of some 1,600 published articles and reports, plus four books, Miller is also a cartoonist and a monthly columnist for The PILOT*'s sister magazine, "Airport World." His latest book, "Wild Blue U, The Story Of The U.S. Air Force Academy," is scheduled to be published this month by Macmillan Company.*