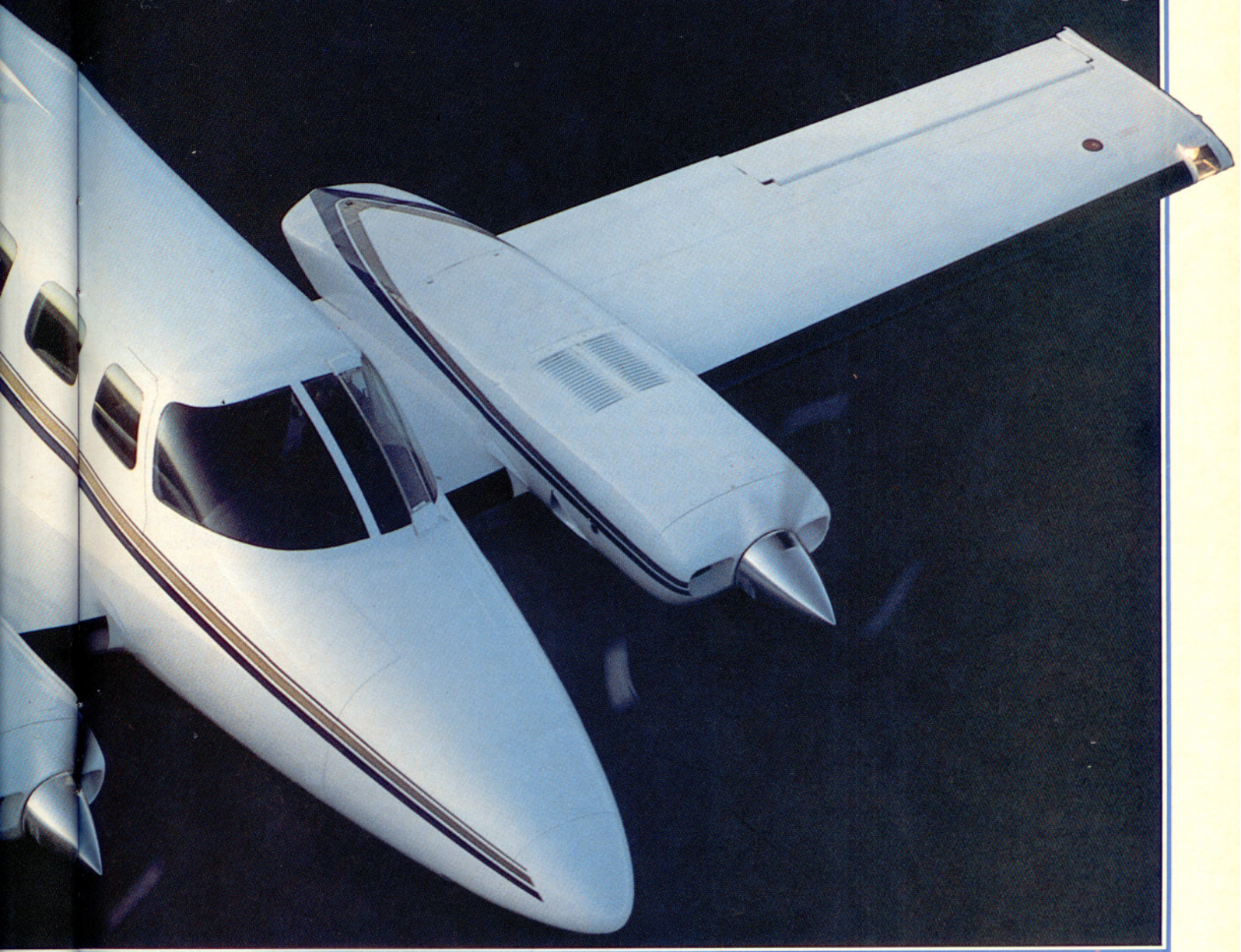
HANDSOME IS CESSNA T303 CRUSADER AS HANDSOME DOES.

BY EDWARD G. TRIPP

The most effective way I can think to describe what impact Cessna's newest twin has had on the aviation community is to relate an experience a friend recently had. He flies a variety of aircraft and rents space sufficient for a light twin in a large, commercial hangar to ensure that most of the aircraft he uses can be protected from the elements.

Not too long ago, he entered a short-time lease on a Cessna Crusader to determine how well it fit his needs. One morning



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while preparing for a flight to a business meeting in the northeast, the line manager told him the owners of the facility wanted to see him.

They wanted to know, as it turned out, if he had bought the T303 or had it on a long-term lease. If so, one of them said, they were going to have to get more hangar rent. Their point was that it was a cabin-class twin, not a light twin. He maintained on the basis of gross weight and external dimensions, it was unquestionably a light twin. They maintained that on the basis of appearance and arrangement, it was cabin class. He went to the flight department and got a few light-twin operating manuals to compare external dimensions and weights. The light-twin versus cabin-class argument went on for quite a while, sounding increasingly like a beer commercial where the actors argue over "tastes great" and "less filling." (It was finally decided that the Crusader looks great but is still less filling than a cabin-class twin. Ergo, no increase in hangar rent.)

That is the principal reaction of AOPA staff members who had the chance to use a Crusader for a few weeks. Everyone who saw it was both impressed by its handsome appearance and fooled by it, thinking it was a much larger aircraft than it actually is.

Creative director Art Davis and I had gotten a brief exposure to the T303 and its features last winter (see February 1982 *Pilot*, p. 68). We had to wait more than a year to get one away from Wichita and to live with it for a while, flying it in the typical conditions and on typical missions that a noncommercial owner would experience.

In between the two Crusaders, the second and the 184th production aircraft, the model has received known-icing certification, a few structural and accessory changes have been made as a result of in-service experience, and a few more accessories and options have been added.

While I was at the factory to pick up N9527C, a cargo door option was announced. It increases the opening on the left rear side of the fuselage from the 24 inches of the airstair door to 56 inches. The aft cabin bulkhead is moved back to provide another 6.5 inches in cabin length and four cubic feet in cabin volume. The option adds 19.5 pounds to the basic empty weight of the aircraft and costs $2,600.

This certainly will add to the Crusader's utilitarian appeal, which already includes a large baggage bay in the nose, a nacelle locker behind each engine and reasonably good baggage space behind the rear seats. In fact, the aircraft already offers considerably more cubic space for people and objects than it does useful load. Total weight arranged among the various compartments (including the cabin—all five passenger seats can be removed quickly to load cargo), compliance with the zero-fuel weight of 4,850 pounds and the CG range of the aircraft must be considered carefully.

The known-icing certification adds to the utility of the aircraft, too. Anyone who bought the accessories in anticipation of certification can upgrade the aircraft with a kit that includes dual propeller boot timers, a larger heating element for the stall warning vane and some electrical system changes that include separate circuit breakers for the stall warning sensor and pitot heat. The good news is that Cessna will pay for labor and parts for any Crusader equipped with the known-icing package.

Other options added to the list are fuel pressure limiters, fuel totalizers, low-fuel warning lights, air conditioning, a heavy duty battery and right hand flight instruments with separate pitot and static sources.

Service experience has led to changes in the turbocharger mounting block (the AiResearch unit is added to the Continental engine by Cessna), main gear shock struts, the hinges on the right side crew door and other minor structural changes.

There is not a large number of service difficulty reports on the model yet. Most that have been reported reflect manufacturing errors, with the exception of the main gear and the crew door hinges.

When we reported on the Crusader

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Teledyne Continental developed special lightweight engines for the T303. The AiResearch turbochargers are added by Cessna.

last February, the most laudatory aspect of the design was that Cessna had lowered the ante for big aircraft systems design. The cockpit arrangement, dual bus electrical system and overall systems design demonstrate that lessons well learned on the Citations and applied to the 400 series were making their way to the company's Pawnee Division, where the light aircraft are designed and produced. The aircraft has quite a few aerodynamic features of interest, as well.

The result is a twin of considerable capability that will not tax the abilities of the average twin-rated pilot so long as everything is working. The basic design, the systems design and the operational flexibility provided by the extensive options list result in comparatively low pilot work load, fewer potential emergencies in the event of faults or failures and the opportunity to make more decisions related to continuing or

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One pilot said the T303 looks like a big airplane that was shrunk in the wash. Club seating and desks are options. The big airplane systems are for real.

aborting a flight. More capability means more responsibility for the pilot. This, in turn, means a requirement for more complete training in order to use what is available. For instance, many aircraft electrical systems are such that any failure is a problem. A failure during instrument flight is a probable emergency. The dual bus electrical and avionics systems in such aircraft as the T303 provide more choice, more opportunity for fault isolation and corrective action. But if you don't know the systems and their operations thoroughly, you might be worse off than in aircraft in which a problem means the earliest possible landing. Cessna has a school for the T303 that is highly recommended for any owner or operator. It is cheap insurance and will add to the utility of the airplane.

The article written last year spent a lot of time on the systems and the passenger appeal of the Crusader and to the careful attention to operational concerns that Cessna's designers displayed. Our flights in the second production aircraft were brief and were meant to provide a sample of the strong points of its behavior under the careful tutelage of a Cessna company pilot. Initial impressions included ease and simplicity of operation. Just as the design would appeal to passengers, it would to pilots, and it would require no tricks or superior skill.

The second encounter with a Crusader was to include a variety of missions, weather, loads and conditions to see how it did away from home. After a day of refamiliarization and checkflights, I was set free to leave the factory and the careful guidance and observation of company pilots.

In all, we flew the Crusader for about 40 hours of day, night, VFR, IFR, local, demonstration and cross-country operations. About the only condition we did not encounter was any significant amount of ice.

There were a few times during my flights in the aircraft that I felt like a company demonstration salesman, since I encountered a lot of people who had never seen a T303 and wanted to look it over and ask questions about it. There were also quite a few controllers who had never heard of one and kept asking for verification of the make and model. The weather was wet for most of the time we had the aircraft, and the optional cabin carpet ($2,575) had its baby-blue color tinged with mud, snow and water as people wriggled through on their way to the cockpit. Our unintended sample of pilots, charter operators and linemen was overwhelmingly favorably impressed by the appearance and features of the aircraft.

As was mentioned in last February's issue of *Pilot*, Cessna paid a lot of attention to maintenance accessibility of the airplane. We left it at a shop to have the oil and filters changed with instructions that the manual was right at the cabin entrance. A mechanic uncowled one engine before he realized there is an access door on the bottom of each nacelle to make such regular maintenance less time consuming.

Aside from the already mentioned caveats about learning the systems, the Crusader is a very simple and pleasant aircraft to operate. Preflight is easy with the exception of checking the tail surfaces (unless you either are more than seven feet tall or keep a ladder handy). Fuel sampling and engine, oil, gear and airframe checking keep getting gas, oil and other detritus on your cuffs and up your arm to a minimum.

Weight and balance calculations should be a go/no-go part of preflight,

particularly if three or more people, some baggage and maximum fuel are part of your plan. Cessna has taken a cue from Piper and developed a weight and balance plotter that simplifies the calculations. With just two people in the cockpit and full fuel, CG is toward the forward limit, so equipment and baggage loads in the nose must be evaluated carefully. CG change with fuel burn is minimal.

The zero fuel weight is not a large factor in typically equipped Crusaders, since it is 300 pounds lower than maximum takeoff weight, but it must be considered. Aircraft without the heavy duty wheels, brakes and tires have a maximum landing weight of 5,000 pounds.

The loading options that all the baggage locations provide probably will tempt some pilots to fill the spaces without much consideration of weight and balance. For them, there are two things to suggest: Fly the airplane at gross weight loaded to the aft CG limit on a turbulent day, then consider what it would be like to fly out of CG; and remember that loaded to more than gross weight, with the aircraft cleaned up, single-engine performance will be a zero to minus figure.

Cessna's operating manuals are quite complete, with the exception of any calculation of accelerate/go data. In the emergency procedures section, there are three pages dealing with engine failure that include some vital considerations for the pilot. We lecture and preach about knowledge, training and proficiency in *Pilot* perhaps more than some readers like. But a pilot without those three essentials has cast himself adrift if something goes wrong.

Just consider an engine failure at gross during takeoff in a T303 or any other light or medium twin. Knowledge of the performance of the aircraft, critical speeds and the available decisions should be put in the life-or-death column. The book says an alert, proficient pilot who recognizes an engine failure at 77 KIAS can stop the aircraft in 3,185 feet at sea level on a standard temperature day. At a density altitude of 6,000 feet, it takes 4,330 feet.

In the event of an engine failure shortly after takeoff, prompt decisions and actions and very precise flying is demanded. Single-engine rate of climb is 220 fpm on a standard day at sea level with the aircraft clean. If the gear is still down, this becomes a descent of 130 fpm if the aircraft is flown perfectly, 230 fpm down with full flaps and 30 fpm down with a windmilling propeller. 'Nough said.

Visibility from the cockpit is very good for a light twin. The nacelles are quite low in relation to the pilot's eye level (and each nacelle has a mirror mounted on the inboard side so nosegear position can be verified). The Crusader's nose slopes away to provide good forward visibility even in normal climb attitudes.

Engine start, taxi and pre-takeoff checks are basic and simple; the check list is well-organized. Ground handling is easy. By selecting the right options, the aircraft can be made very conspicuous on the ground and in the air. The wing-mounted landing lights (the right side is an option) double as recognition lights; there are top and bottom white flashing beacons; a three-light strobe system is a highly recommended option; the taxi light is mounted on the nose gear and swivels as you turn.

As has been mentioned, the cockpit is well designed and organized for single-pilot operation. All fuel and engine controls are mounted on the center pedestal. The fuel selectors (On, Off,

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Crossfeed) are mounted on the base with the fuel gauges directly above. There is three-axis trim, with the controls on the pedestal. The engine instruments are just above the pedestal, with the manifold pressure, tachometers, fuel-flow and exhaust gas temperature gauges on the center of the panel just below the glare shield and almost directly in line with their associated controls.

Circuit breakers, electrical switches and related accessories are mounted on a subpanel to the left of the pilot's seat.

There is plenty of space on the panel for a full-house avionics package (all ARC except for the radar, quite a bit of which, including the 400 series autopilot, is part of the basic equipment and base price of the Crusader). There is an annunciator panel directly in front of the pilot that includes warning lights for several principal systems, including engine temperature/fire warning. And an optional, right-side flight instrument package, with its own pitot/static system, can be installed.

Power management is simplified, too. Maximum rpm is 2,400; maximum manifold pressure is 32.5 inches. This setting is normally used just for initial takeoff. However, it is also the maximum continuous rated power and can be used for climb at the price of high fuel burn, high noise and increased wear and tear. Buried in the operating manual is an interim climb power setting of 2,400/27.5. The recommended cruise power setting is 2,400/24 at a total fuel flow of 190 pph. Maximum cruise power is also 2,400/24 at an average fuel flow of 160 to 170 pph. However, care must be taken since the maximum cruise power is 72 percent. At colder than standard temperatures, this rating can be exceeded at that power setting.

Ten degrees of flaps are suggested for takeoff to reduce the ground run and make rotation easier. Everyone with whom I flew the Crusader had an initial tendency to over rotate on the first few tries, but everyone adjusted quickly. The other little difference in flying the Crusader we noted was a corresponding tendency to pitch up too much on landing.

The only other area of concern we encountered was imaginary: Some of the pilots were certain they were flying a big, heavy twin.

Even loaded to gross, the Crusader is relatively light and responsive. Pitch and rudder input are the lightest; the ailerons are a trifle heavy, but response to control inputs are crisp and sure, even during slow flight.

The Crusader is a confidence-building aircraft in all flight regimes. A variety of stall series at gross and lighter weights demonstrate its basic good qualities. Even during abrupt entries, there is a reluctance to stall, and there is plenty of aerodynamic buffet to grab your attention, plus a variable audio warning horn that increases in intensity as you approach the stall. Power-on stalls require a very high deck angle. In abrupt-entry stalls, or when the aircraft is held in the stall, there is a tendency for a wing to drop. It can be picked up easily with rudder or with aileron.

The basic task of flying the airplane was picked up quickly by everyone

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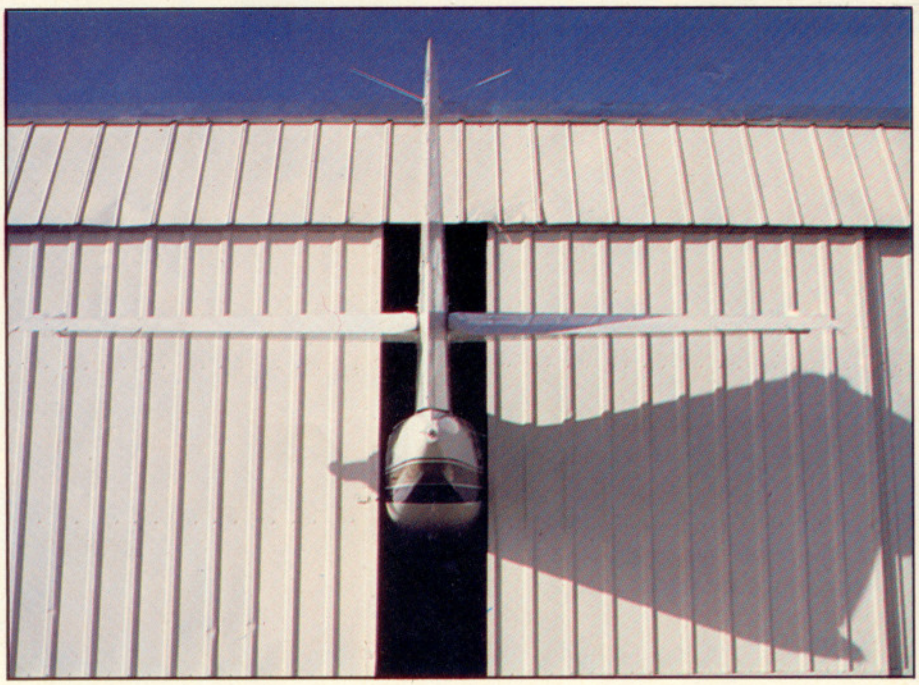
The T303 does not look like any other Cessna product, but it may be the shape of things to come from the company.



who had a chance to fly it. The excellent cockpit arrangement helped keep fumbling down to a minimum.

Speed management during descent and approach is easy. Profile management during descent, and slowing for approach speeds or entering landing patterns are simplified with the high gear and approach-flap speed of 175 KIAS. There is minimal pitch change with the extension or retraction of gear and flaps. It was tried several times and over a range of speed with the autopilot engaged with little effect.

The staff's experience with the Crusader ranged from long cross countries to brief local hops in VFR and IFR conditions, day and night. If there are handling vices anywhere in the normal flight envelope, none of us encountered them. Aside from achieving the proper technique for departure and landing, there are no special tricks to learn to fly it with satisfaction.

The only shortcomings we found are the yaw instability that is particularly noticeable in turbulence (anyone who buys one without the optional yaw damper will regret it), the large amount of reflection from cockpit lighting in the windows that can be annoying or even unsettling during night flight (a larger glare shield would help considerably) and the high noise level at high power settings.

Most of our flights were made at 2,400 rpm because of break-in procedures. After the first oil and filter change, we experimented with power settings throughout the range of from 2,100 to 2,400 rpm. Just coming back the first 100 rpm produced a welcome change in noise and vibration. The noise-generated fatigue I felt at 2,400 rpm disappeared when the aircraft was flown at slower revolutions.

Performance is quite satisfactory, particularly when the fuel burns at cruise are taken into account. Endurance with reserves is nearly five hours at 70 percent power at any selected altitude. At 60 percent, it is more than five and a half, and true airspeed is better than 165 knots average above 10,000 feet.

The only significant systems problem we encountered with the airplane was a repetitive failure of positive nose-gear lock after gear extension. Each time it occurred, one recycle of the gear cleared the fault. We have not yet learned whether the problem was in the gear downlock or the switch.

Practically everything we can say and everything we experienced with the Cessna Crusader was good. The tough part comes with the base and equipped prices of this little twin that looks and acts like a big one. When it was introduced, most people thought it really would give the industry's most successful twin, the Piper Seneca, a hard competitor. The edge in appeal, arrangement and systems, more modern aerodynamics and construction methods was blunted with the base and equipped prices.

The Crusader's base price includes many things that are usually options. That softens somewhat the nearly $100,000 spread between the base price of it and the Seneca. However, comparably equipped Senecas (with competitive performance) are still nearly $100,000 less than a Crusader. And price is more than ever an object.

Handsome is and handsome does pretty well sums up a subjective reaction to the Crusader. It has a lot of appeal for many reasons. Whether that can overcome the price disparity, the market will determine.

The most impressive aspect of the aircraft to me is the careful thought and development work the Crusader exhibits. I hope that good work and commitment to product development and pilot work load will be extended to other light aircraft. □

Cessna T303 Crusader

Base price $260,250
Price as tested $330,290
AOPA Pilot Operations/Equipment Category*:
IFR $265,000 to $315,000 (est.)
All-weather $280,000 to $340,000 (est.)

Specifications

Powerplants	2 Teledyne Continental, turbocharged, fuel-injected, six cylinder, counter rotating, TSIO-520-AE and LTSIO-520-AE, 250 bhp @ 2,400 rpm/32.5 in
Recommended TBO	2,000 hr
Propellers	McCauley 3-blade, hydraulically activated, constant speed, full-feathering 74 in dia
Length	30 ft 5 in
Height	13 ft 4 in
Wingspan	39 ft 5 in
Wing area	189.2 sq ft
Wing loading	27.2 lb/sq ft
Power loading	10.3 lb/hp
Seats	6
Cabin length	13 ft 7 in
Cabin width	3 ft 11.8 in
Cabin height	3 ft 11.5 in
Empty weight	3,328 lb
Empty weight, as tested	3,628.9 lb
Max ramp weight	5,175 lb
Useful load	1,847 lb
Useful load, as tested	1,546.1 lb
Payload w/full fuel	929 lb
Payload w/full fuel, as tested	628.1 lb
Max takeoff weight	5,150 lb
Max landing weight (5,150 lb w/heavy-duty wheels, tires and brakes)	5,000 lb
Zero fuel weight	4,850 lb
Fuel capacity, std	930 lb (918 lb usable) 155 gal (153 gal usable)
Oil capacity, ea engine	9 qt
Baggage capacity	
aft	200 lb
nose	150 lb
wing lockers	120 lb ea

Performance

Takeoff distance, ground roll	1,275 ft
Takeoff distance over 50-ft obst	1,750 ft
Accelerate/stop distance	3,185 ft
Max demonstrated crosswind component	20 kt
Rate of climb, sea level	1,480 fpm
Single-engine ROC, sea level	220 fpm
Max level speed, 18,000 ft	216 kt
Cruise speed/Range w/45-min rsv, std fuel (fuel consumption, ea engine)	
@72% power, best economy	
10,000 ft	178 kt/850 nm (162 pph/27 gph)
20,000 ft	193 kt/890 nm (159 pph/26.5 gph)
@65% power, best economy	
10,000 ft	170 kt/920 nm (147 pph/24.5 gph)
20,000 ft	184 kt/930 nm (147 pph/24.5 gph)
@55% power, best economy	
10,000 ft	155 kt/960 nm (124 pph/20.7 gph)
20,000 ft	166 kt/935 nm (127 pph/21.2 gph)
Max operating altitude	25,000 ft
Single-engine service ceiling	13,000 ft
Critical altitude	15,000 ft
Landing distance over 50-ft obst	1,450 ft
Landing distance, ground roll	820 ft

Limiting and Recommended Airspeeds

Vmc (Air min control w/one engine inoperative)		65 KIAS
Vsse (Min intentional one-engine inoperative)		80 KIAS
Vx (Best angle of climb)		77 KIAS
Vy (Best rate of climb)		103 KIAS
Vxse (Best single-engine angle of climb)		93 KIAS
Vyse (Best single-engine rate of climb)		97 KIAS
Va (Design maneuvering)		148 KIAS
Vfe (Max flap extended)	10°	175 KIAS
	20°	150 KIAS
	30°	125 KIAS
Vle (Max gear extended)		210 KIAS
Vlo (Max gear operating)		
Extend		175 KIAS
Retract		150 KIAS
Vno (Max structural cruising)		175 KIAS
Vne (Never exceed)		210 KIAS
Vr (Rotation)		75 KIAS
Vs1 (Stall clean)		66 KIAS
Vso (Stall in landing configuration)		58 KIAS

All specifications are based on manufacturer's calculations. All performance figures are based on standard day, standard atmosphere, at sea level and gross weight, unless otherwise noted.