



Aircraft Comparison

Cessna Citation Mustang
versus
Eclipse 500

Sales Engineering, Citation Marketing
Cessna Aircraft Company
May, 2007

EXECUTIVE SUMMARY

This comparative analysis examines the benefits of owning and operating the Cessna Citation Mustang over the Eclipse 500. The Citation Mustang offers the better value for the following reasons:

PERFORMANCE: The Mustang offers better performance

- Better climb performance which serves to shorten total flight time
- Greater margins of safety during the critical takeoff and initial climb phase
- Fewer fuel stops due to its greater range capability in all payload conditions.
- Shorter landing distances for added safety on short runways

CABIN AND BAGGAGE: The Mustang is far more spacious and comfortable

- Taller cabin for more seated headroom and easier entry & exit
- Nearly 2½ feet longer cabin for added legroom
- Far more space for baggage storage
- Most luggage storage is outside the cabin to reduce inside clutter and save wear and tear on the interior.
- More standard interior features such as a lavatory, six seats, and food and beverage storage.

TECHNICAL EVALUATION: The Mustang offers tangible benefits

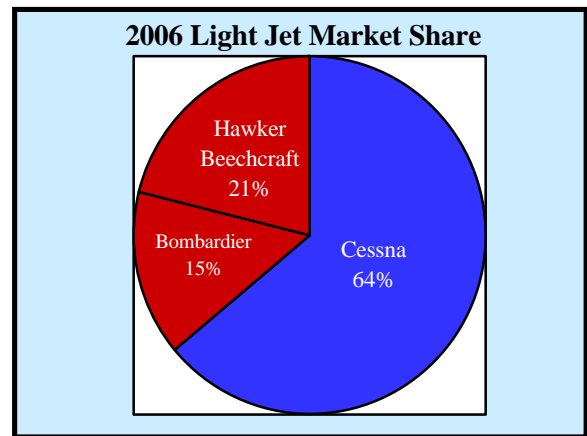
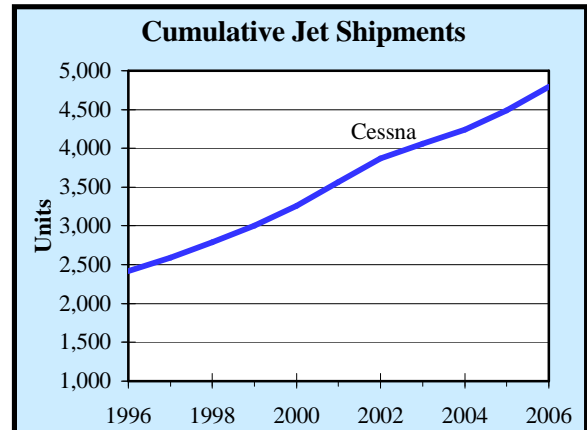
- Fully integrated, advanced, easy to use Garmin 1000 avionics suite
- Simpler systems design results in lower maintenance requirements
- Superior worldwide customer support

The following pages detail the greater value offered by the Cessna Citation Mustang.

CORPORATE OVERVIEW

Cessna's continued dedication to developing the right products for its customers ensures market leadership. The Citation fleet is the world's largest business jet fleet because Cessna delivers aircraft that truly meet customer needs.

- Acceptance of Citation aircraft is evidenced by the 4,800 aircraft that have been delivered since the original Citation entered service in 1972.
- Cessna has successfully introduced eight new Citations into the marketplace in just the last five years. Citations represent the most extensive and modern product line available.
- The dominant market share for Citations indicates strong demand for its products – nearly 64% of all light jet deliveries in 2006.
- Citations are the most diverse product-line offering of any manufacturer. Cessna customers can choose from nine models – from the most affordable, entry-level jet to the intercontinental Citation X.



- Eclipse Aviation is a new start-up company with a single product offering and a limited service and support organization.
- Eclipse is a private company whose business model is founded on volume manufacturing as a means to achieve low pricing. Their success and long term viability will be dependant on achieving volumes that are high by industry norms.

Citation is the Market Leader

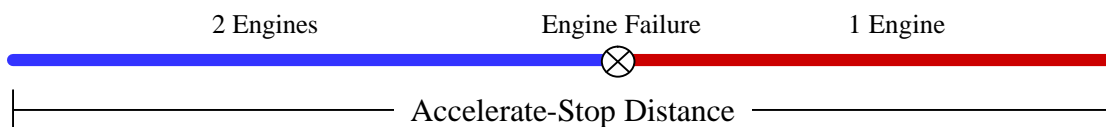
TAKEOFF PERFORMANCE

Both the Citation Mustang and Eclipse 500 are certified under 14 CFR Part 23 normal category rules. Cessna, however, elected to calculate all Mustang takeoff performance using Part 23 commuter category regulations. Commuter category rules provide a significant enhancement in the level of safety during takeoff when compared to the normal category.

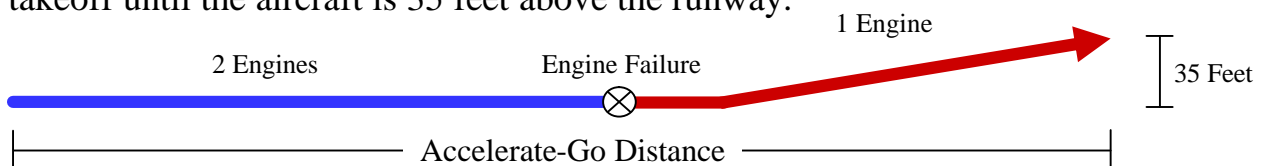
Part 23 Commuter Category Rules (§23.55 thru 23.59) – basis for Citation Mustang

Takeoff distance reported for the Mustang is the *greatest* of the following three criteria:

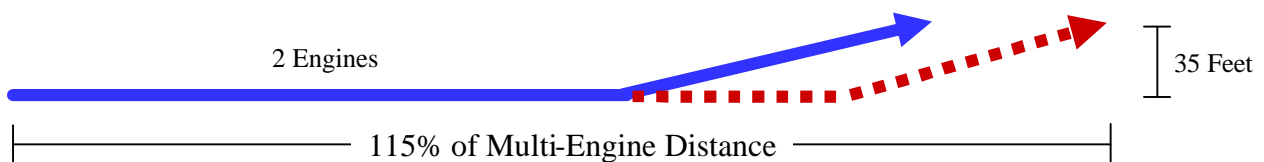
- Accelerate – Stop – The distance required to accelerate the aircraft with all engines operating to the takeoff decision speed (V_1), lose power in one engine, and then bring the aircraft to a complete stop on the runway.



- Accelerate – Go – The distance required to accelerate to the takeoff decision speed (V_1) with all engines operating, lose power in one engine, and then continue the takeoff until the aircraft is 35 feet above the runway.

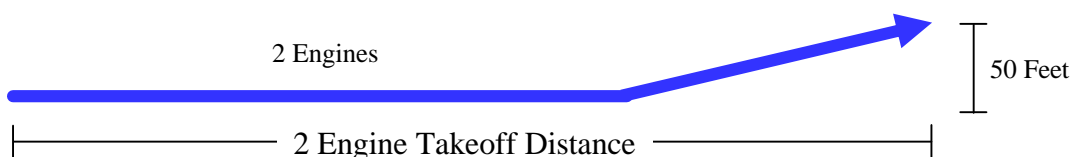


- 115% of Multi-Engine Takeoff Distance – The distance required to climb to 35 feet above the runway with all engines operating plus a 15% factor.



Part 23 Normal Category Rules (§23.53) – basis for Eclipse 500

Takeoff distance is equal to the distance required to climb to 50 feet above the runway with all engines operating. There is no requirement that an engine failure be included.



TAKEOFF PERFORMANCE

Differences between Part 23 normal and commuter categories also exist for the initial climb phase of the flight, immediately after takeoff. Commuter category rules require an aircraft to meet higher levels of performance that enhance safety during this critical phase of the flight. Again, Cessna elected to compute climb data for the Mustang based on the commuter category's higher level of safety.

Part 23 Normal vs Commuter Category Initial Climb Differences		
<u>Criteria</u>	<u>Normal Category</u> <small>(basis for Eclipse 500)</small>	<u>Commuter Category</u> <small>(basis for Citation Mustang)</small>
Climb – One Engine Inoperative (§23.67)		
- At runway elevation <small>(Remaining engine at takeoff power, landing gear extended, flaps in takeoff position)</small>	No requirement	Steady climb gradient that must be "measurably" positive
- At 400 feet above the runway <small>(Remaining engine at takeoff power, landing gear retracted, flaps in takeoff position)</small>	Steady climb gradient that must be " <u>measurably</u> " <u>positive</u>	Steady climb gradient that must <u>not be less than 2.0%</u>
- At 1,500 feet above the runway <small>(Remaining engine at maximum continuous power, landing gear retracted, flaps retracted)</small>	Steady climb gradient that must <u>not be less than .75%</u>	Steady climb gradient that must <u>not be less than 1.2%</u>

The Eclipse 500's performance does not contain the safety margins that are inherent in the Mustang's performance. For that reason, is not possible to directly compare takeoff distances and climb restrictions as presented in their respective Aircraft Flight Manuals. In some cases, normal category rules followed by the Eclipse could leave the operator in a serious predicament.

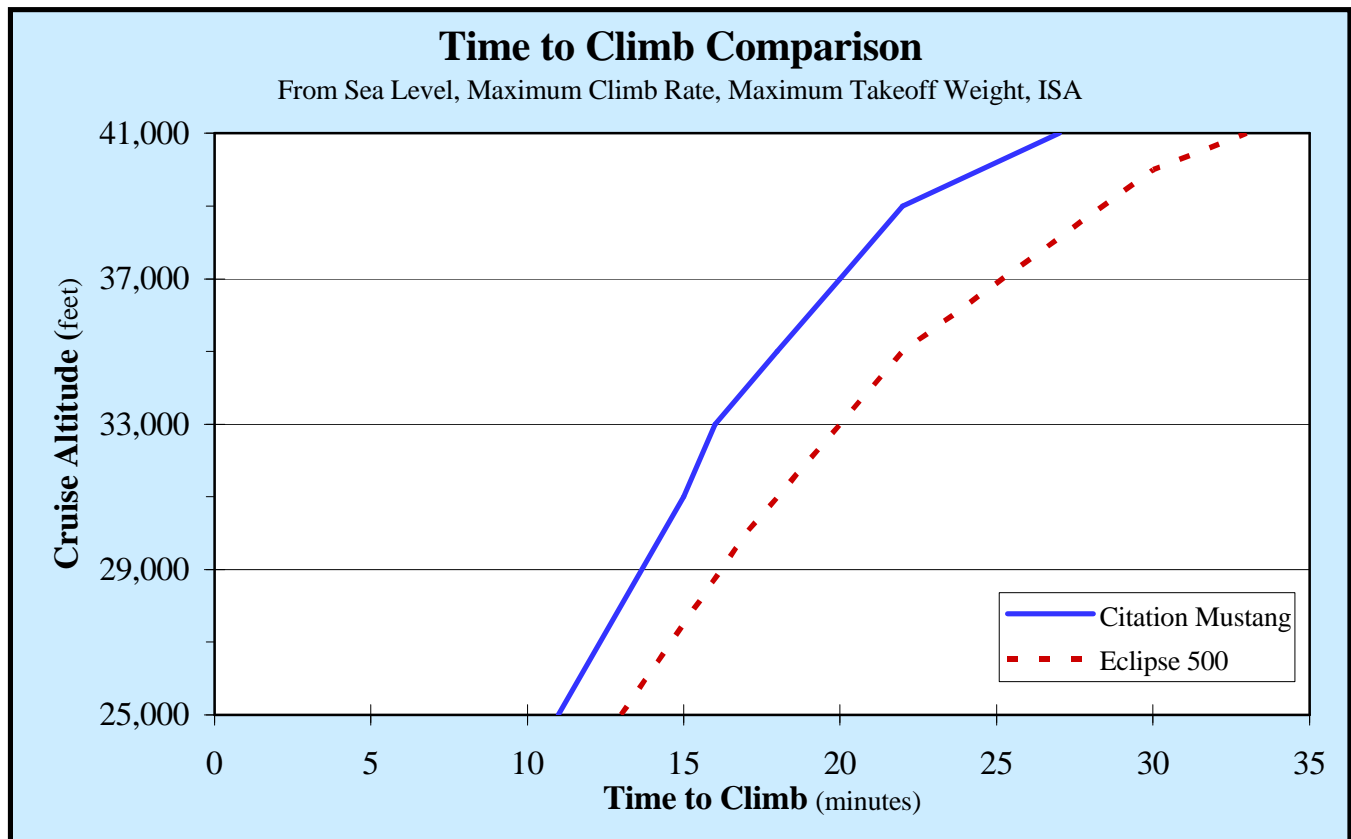
- **Cessna elected to calculate and publish Mustang takeoff and initial climb performance data using Part 23 commuter category standards so as to provide a higher level of operational safety. The Eclipse 500 follows the less stringent normal category rules of Part 23.**

CLIMB

The Citation Mustang will out climb the Eclipse 500 by a wide margin. The Mustang can climb direct to its certified ceiling of 41,000 feet in just 27 minutes versus 33 minutes for the Eclipse.

	<u>Citation Mustang</u>	<u>Eclipse 500</u>
Time to Climb to FL 310 *	15 min	18 min
Time to Climb to FL 350 *	18 min	22 min
Time to Climb to FL 410 *	27 min	33 min

* From Sea Level, Maximum Rate of Climb, Maximum Takeoff Weight, ISA



- **The Citation Mustang will reach fuel-efficient cruise altitudes faster and transition through weather quicker than the Eclipse 500.**

CRUISE SPEEDS

It is true the Eclipse 500 has a faster cruise speed than the Citation Mustang, but this difference is negligible. When total flight time from origin to final destination is examined, the Mustang will only arrive a couple of minutes behind the Eclipse.

The Mustang is able to close the speed gap because it can climb to its cruise altitude more quickly and therefore increase its speed in level flight before the Eclipse. So while the Eclipse is still striving to reach its final cruise altitude, the Mustang will already have arrived and be at its top cruising speed long before the Eclipse levels off.

Total Flight Time Comparison * (Minimal differences in flight time)			
Nautical Miles	Citation Mustang	Eclipse 500	Difference
200	0:40	0:40	0:00
400	1:17	1:15	0:02
600	1:55	1:52	0:03
800	2:32	2:28	0:04
1,000	3:16	Unable at HSC	---

* Assumes NBAA IFR Reserves (100 nm), Zero Wind, High Speed Cruise, Single Pilot, 3 Passengers at 200 Pounds Each, Optimal Cruise Altitudes.

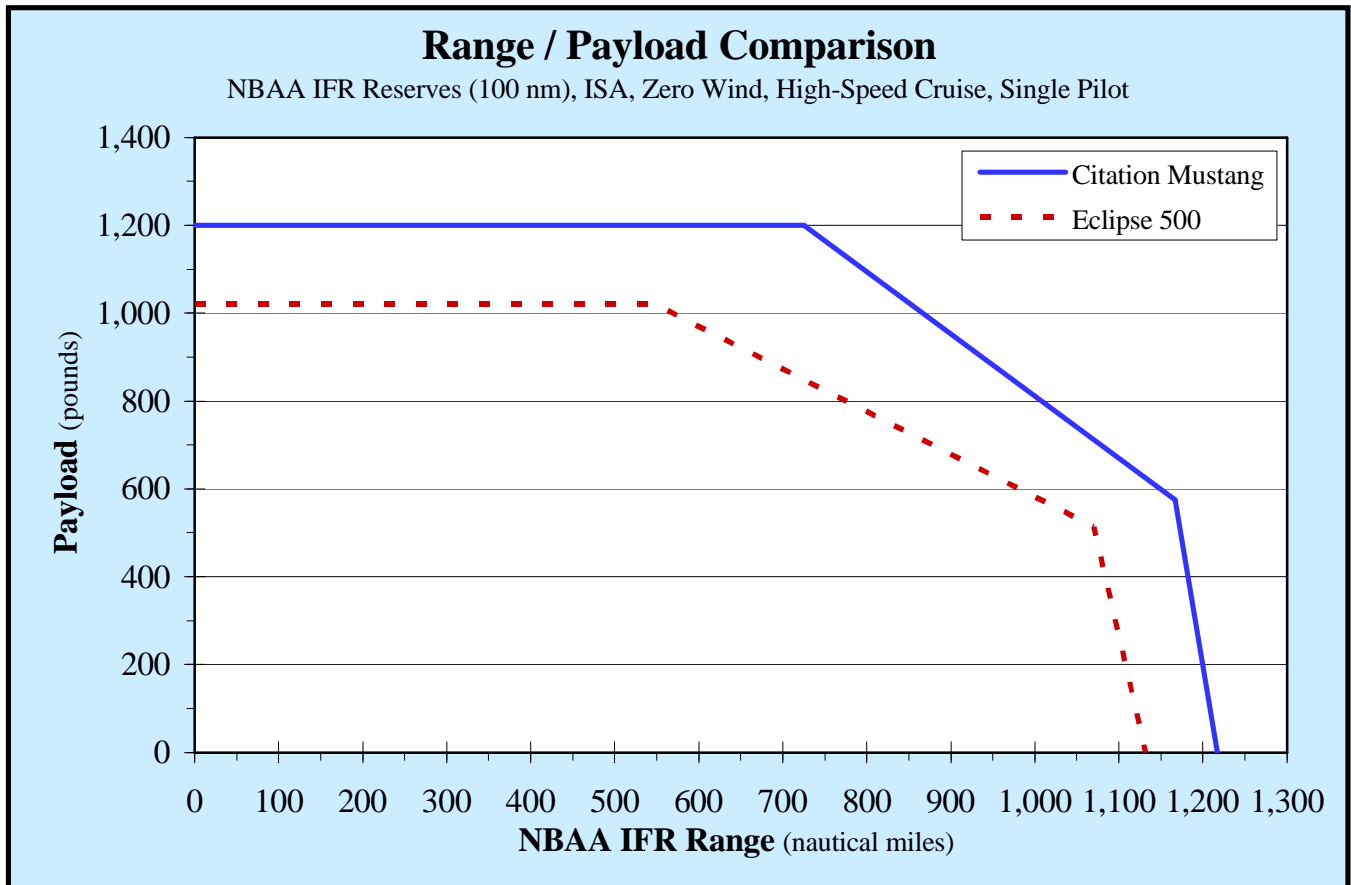
- **The cruise speed advantage of the Eclipse 500 is mostly negated by its slower climb performance.**
- **Total flight time for the Citation Mustang is just a couple of minutes behind that of the Eclipse 500.**

RANGE

The Citation Mustang offers greater range than the Eclipse 500. The Mustang's larger wing allows for greater fuel storage, hence greater range capability. The Mustang also has a higher, total payload capability than the Eclipse.

	<u>Citation Mustang</u>	<u>Eclipse 500</u>
NBAA IFR Range with 2 Passengers*	1,180 nm	1,080 nm
NBAA IFR Range with 3 Passengers*	1,145 nm	980 nm
NBAA IFR Range with 4 Passengers*	1,005 nm	770 nm

* NBAA IFR Reserves (100 nm), ISA, Zero Wind, High-Speed Cruise, Single Pilot, 200 Pounds per Passenger



- **The Citation Mustang can eliminate fuel stops on long range missions that the Eclipse 500 might have to make.**

LANDING DISTANCES

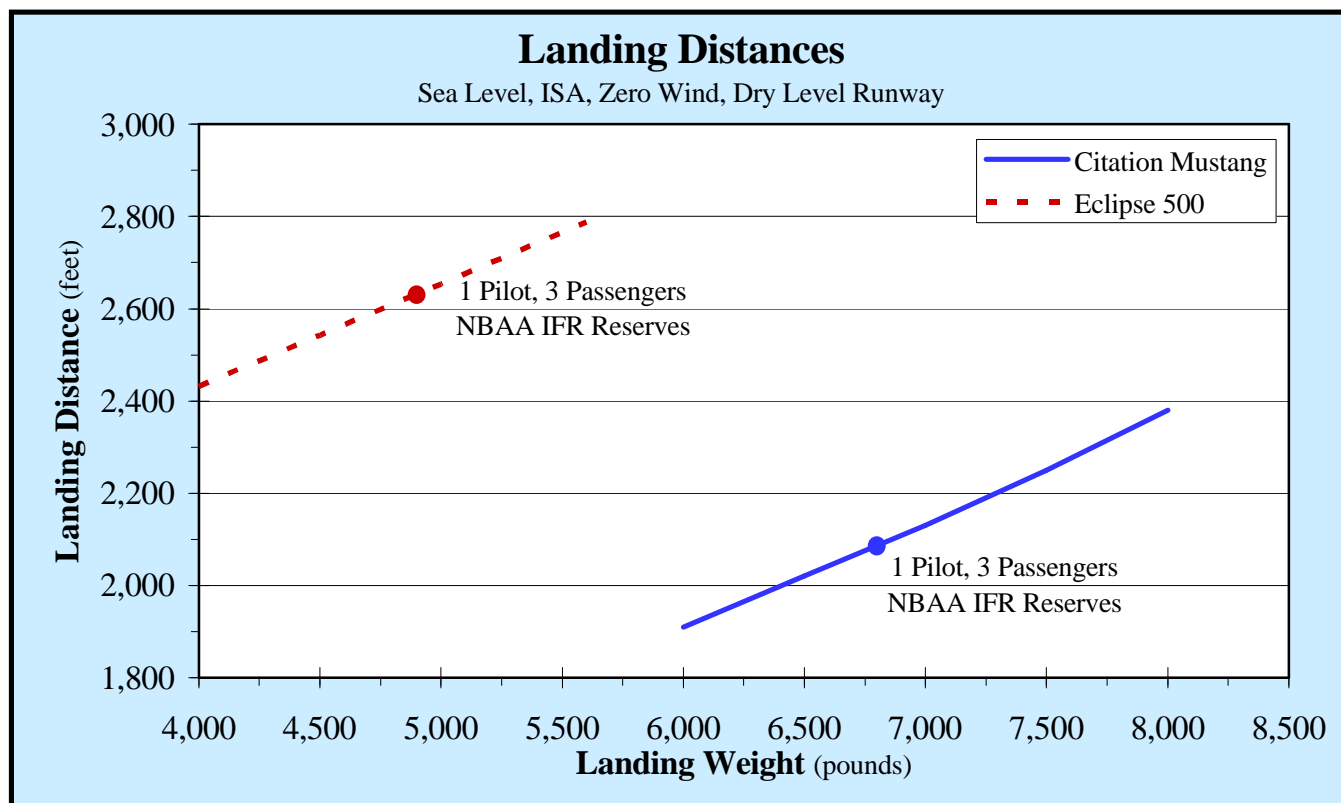
The Citation Mustang is able to land in a shorter distance than the Eclipse 500. At both maximum landing weight and at more typical landing weights, the Mustang will always require less runway to land.

It is noteworthy to emphasize that in many situations, the Eclipse 500's landing distances are actually greater than its takeoff distances. So in reality, landing distances can become the more limiting factor in choosing airports for the Eclipse.

	<u>Citation Mustang</u>	<u>Eclipse 500</u>
Landing Distance-Maximum Landing Weight *	2,380 ft	2,788 ft
Landing Distance-Typical Landing Weight *	2,085 ft (6,800 lb) **	2,630 ft (4,900 lb) **

* Sea Level, ISA, Zero Wind, Dry Level Runway

** NBAA IFR Reserves (100 nm), Single Pilot, 3 Passengers at 200 Pounds Each

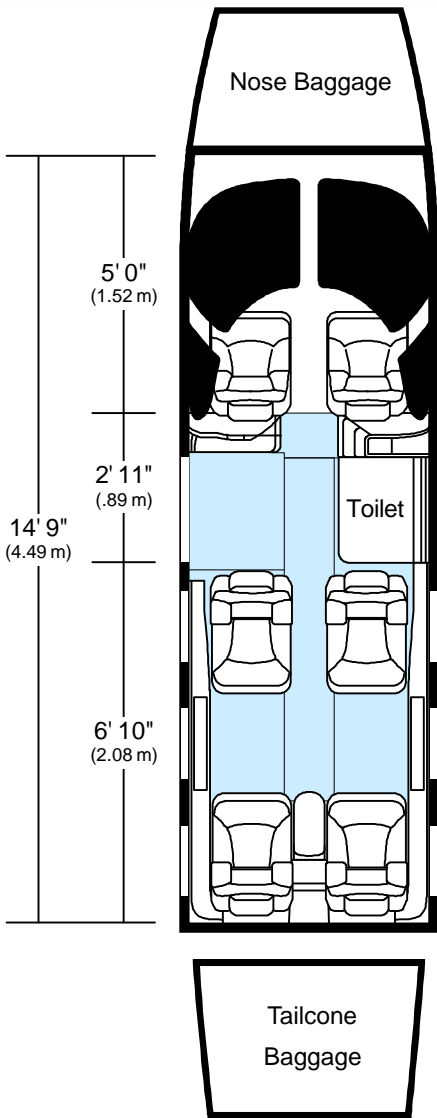


- **The Citation Mustang's shorter landing distances offer greater margins of safety during the landing phase of each mission.**

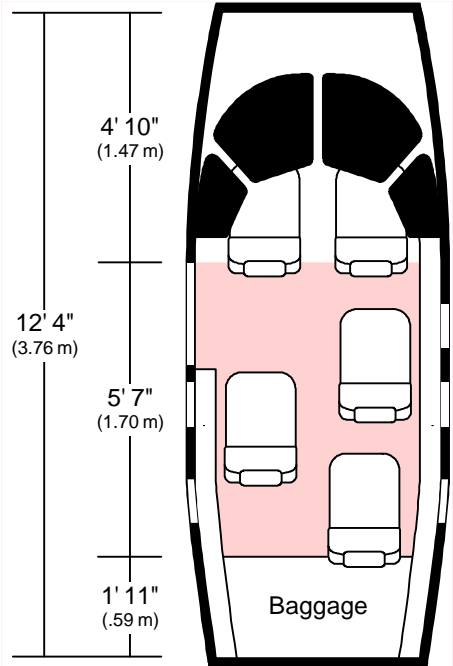
CABIN

The Citation Mustang offers a significantly larger cabin than the Eclipse 500. The Mustang's cabin is 4 inches taller for more seated headroom and easier entry and exit. Its total cabin length offers nearly 2½ feet more space for greater legroom. If you eliminate the Eclipse's rear cabin baggage area as unusable for passengers, then the Mustang's true length advantage is nearly 4½ feet.

Citation Mustang ¹



Eclipse 500 ¹



- **The Citation Mustang offers a far more spacious and comfortable cabin environment for its passengers than the Eclipse 500.**

1. Illustrations denote standard interiors.

CABIN

The standard cabin in the Citation Mustang offers many more features and amenities than those in the Eclipse 500.

- The Mustang comes with a standard toilet that is located across from the entry door.
- A toilet is available for the Eclipse, but it is an option.
- The Mustang offers a total of six seats including the two crew seats. The four rear passenger seats are organized in a club arrangement.
- The standard Eclipse offers just 5 seats, including the two crew seats. A sixth seat is available as an option. All seats are forward-facing.
- The Mustang's cabin has forward storage cabinets and an aft center console. The right hand forward storage unit has space for an ice drawer, beverage holder, cups, and food storage.
- The Eclipse has no standard cabinetry. A refreshment center is available as an option.

It is important to note that the Eclipse's lavatory, sixth seat and refreshment center options are mutual exclusive – you can only have one installed in the aircraft at a time. They all occupy the same space in the left rear of the cabin. It should be further noted that the installation of any of these options will intrude into the only baggage storage area on the aircraft, limiting its capacity. In the Mustang, you have it all – lavatory, seating for six, and storage area for refreshments, at no extra cost.

- **The Citation Mustang offers far more cabin features in its standard price than in the Eclipse 500. The Eclipse cabin will never contain all of the features available in the standard Mustang cabin.**

BAGGAGE

The Citation Mustang offers much greater luggage capacity than the Eclipse 500. The Mustang can haul 175% more pounds of luggage and has nearly 300% more storage volume. The Eclipse was not designed for overnight flights or extensive journeys but more for day trips as evidenced by its small storage capacity.

The Citation Mustang offers easier baggage loading as well. Its large tailcone baggage compartment holds most of the large and bulky items. There is also additional storage capacity in the nose baggage compartment. These outside storage areas avoid the need to haul baggage through the passenger door and placing it in the rear of the cabin as in the Eclipse. The Eclipse's rear cabin is the only allocated storage area in the aircraft.

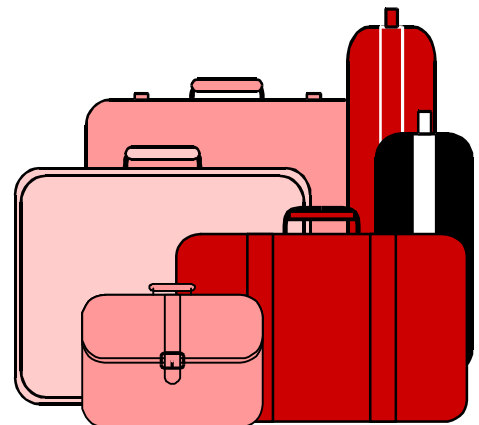
Citation Mustang

718 pounds capacity
63 cubic feet available



Eclipse 500

260 pounds capacity
16 cubic feet available



- **When planning extended-stay trips or when a full load of passengers is expected, the Citation Mustang will have far fewer limitations on the amount of baggage the passengers can bring.**

OPERATING COST

Detailed below is the relative costs of operating each aircraft.

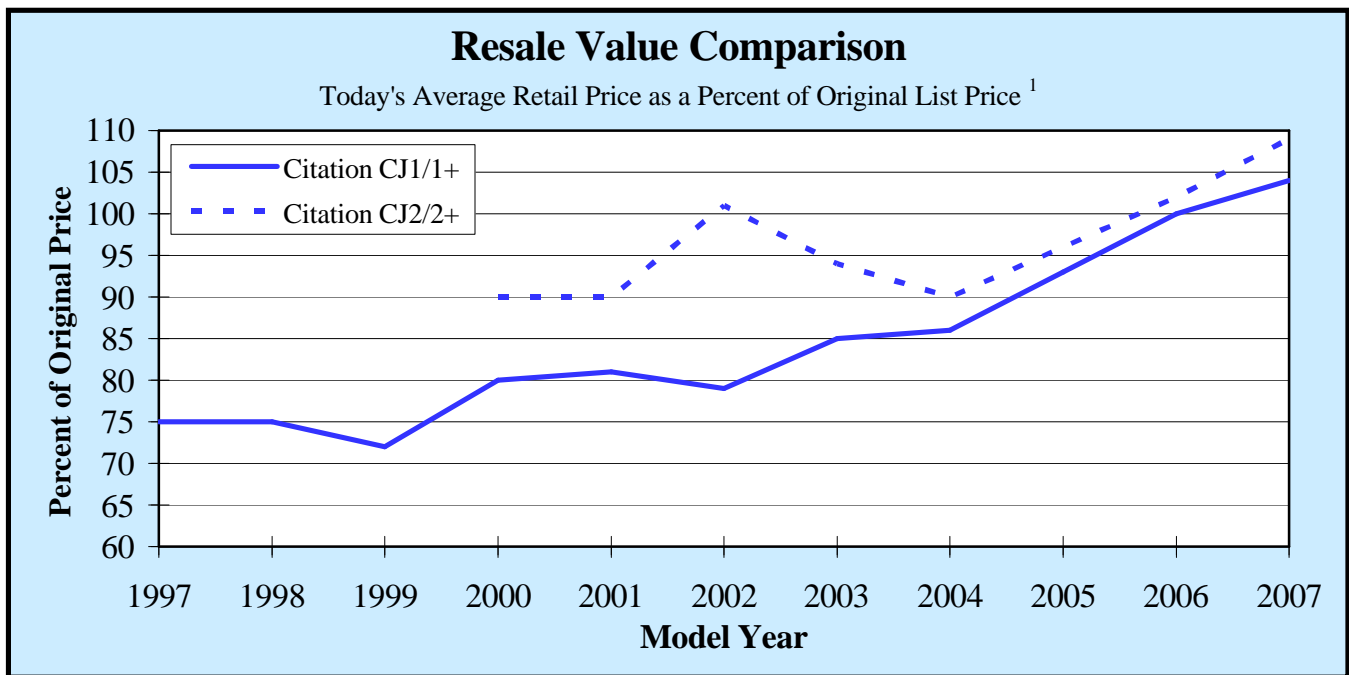
Estimated Operating Cost For a Typical 500 Nautical Mile Trip		
	<u>Citation Mustang</u>	<u>Eclipse 500</u>
Average Speed (knots) ¹	309	319
Average Fuel Flow (gallons/hour) ¹	89	65
Labor Hours (per flight hour) ²	0.65	0.55
<u>Operating Cost per Flight Hour</u>		
Fuel (\$4.00 per gallon)	\$ 356.00	\$ 260.00
Maintenance: ²		
- Labor (\$84.00 per hour)	\$ 54.60	\$ 46.20
- Parts	\$ 50.00	\$ 44.60
Engine Reserves ³	\$ 125.00	\$ 113.72
APU Reserves ⁴	\$ 0.00	\$ 0.00
Total Cost per Flight Hour	\$ 585.60	\$ 464.52
Cost per Nautical Mile	\$ 1.90	\$ 1.46

1. Developed from manufacturers' published flight performance data for the stage length shown. Average Speed includes the climb, cruise, and descent portions of the trip. Average Fuel Flow includes the climb, cruise, and descent portions plus an allowance for taxi fuel.
2. Conklin & deDecker's *The Aircraft Cost Evaluator* (Fall 2006). Conklin defines their maintenance costs as "...an average for a ten year period and are based on operator experience, the manufacturer's warranty, their guaranteed maintenance plan (if any), other manufacturer's data and surveys." These costs include both scheduled and unscheduled maintenance.
3. Conklin & deDecker's *The Aircraft Cost Evaluator* (Fall 2006). Conklin defines their engine restoration cost as "... average costs through one overhaul cycle and include the impact of lower in-warranty rates, if available." This cost includes both scheduled and unscheduled maintenance, airworthiness directives, service bulletins, and loaner engines.
4. Conklin & deDecker's *The Aircraft Cost Evaluator* (Fall 2006).

RESALE VALUE

The total life cycle costs of owning and operating an aircraft is largely determined by the residual value, or market value of the aircraft at the end of the ownership period. Cessna Citations are excellent at retaining value over their lifetime, and the Mustang will likely be no exception. If market acceptance of a new product like the Eclipse is not well received, owners could suffer a significant loss in their investment. This would increase the total ownership cost, possible exceeding any operating cost advantages.

	<u>Citation CJ1</u>	<u>Citation CJ2</u>
Original, Average-Equipped, List Price of a 2002 Model Year Aircraft	\$4,051,000	\$4,901,000
Today's Average Retail Sales Price in the Used Marketplace ¹	\$3,200,000	\$4,950,000
Resale Value Percentage ¹ (Today's Average Retail ÷ Original List Price)	79%	101%



- **Total life cycle cost is largely determined by future residual values. Cessna Citations have a proven track record of retaining a large percentage of their value. Market acceptance will ultimately determine the future values of the Eclipse.**

¹. *Vref Aircraft Value reference* (2007, Volume 1). The Citation CJ1 & CJ2 are the most comparable models to the Mustang.

SYSTEMS DESIGN

Cessna Aircraft follows an evolutionary approach to the design of its products. This assures that new technology is incorporated into our products when it is ready. Technology application must provide a tangible benefit to the customer in the form of reduced cost, improved functionality, or increased reliability. Technology for technology sake does not always benefit the customer.

Eclipse 500 has incorporated features into its aircraft that they term as revolutionary. One such application is the introduction of their AVIO NG system. AVIO NG is a centralized, redundant computer system that controls all aspects of the aircraft – landing gear, brakes, secondary flight controls, fuel, pressurization, electrical and de-ice systems, engines, as well as avionics. Everything that happens in the aircraft occurs through the AVIO NG system.

AVIO NG represents an intricate system of aircraft control. Such a new and complex system can impact the operator.

- Complex systems increase the difficulty in troubleshooting system problems.
- Since the Eclipse is so intensive in electrical systems, it takes more electronic expertise to troubleshoot and resolve system faults.
- The knowledge to repair an Eclipse may not be available at all Fixed Base Operators. Only authorized Eclipse service facilities may be able to work on the aircraft, and these are limited in number.
- With the heavy reliance on the AVIO NG as the only means to interface with system functioning, the pilot may spend too much time "head down" "communicating" with the system and not "flying" the aircraft. A visual sign of this concern is the standard keyboard that is attached to the Eclipse's panel.
- **Technology must provide real benefits to the customer in the form of increased productivity or lower costs. The complexity inherent in the systems design of the Eclipse 500 may not provide these benefits.**

AVIONICS

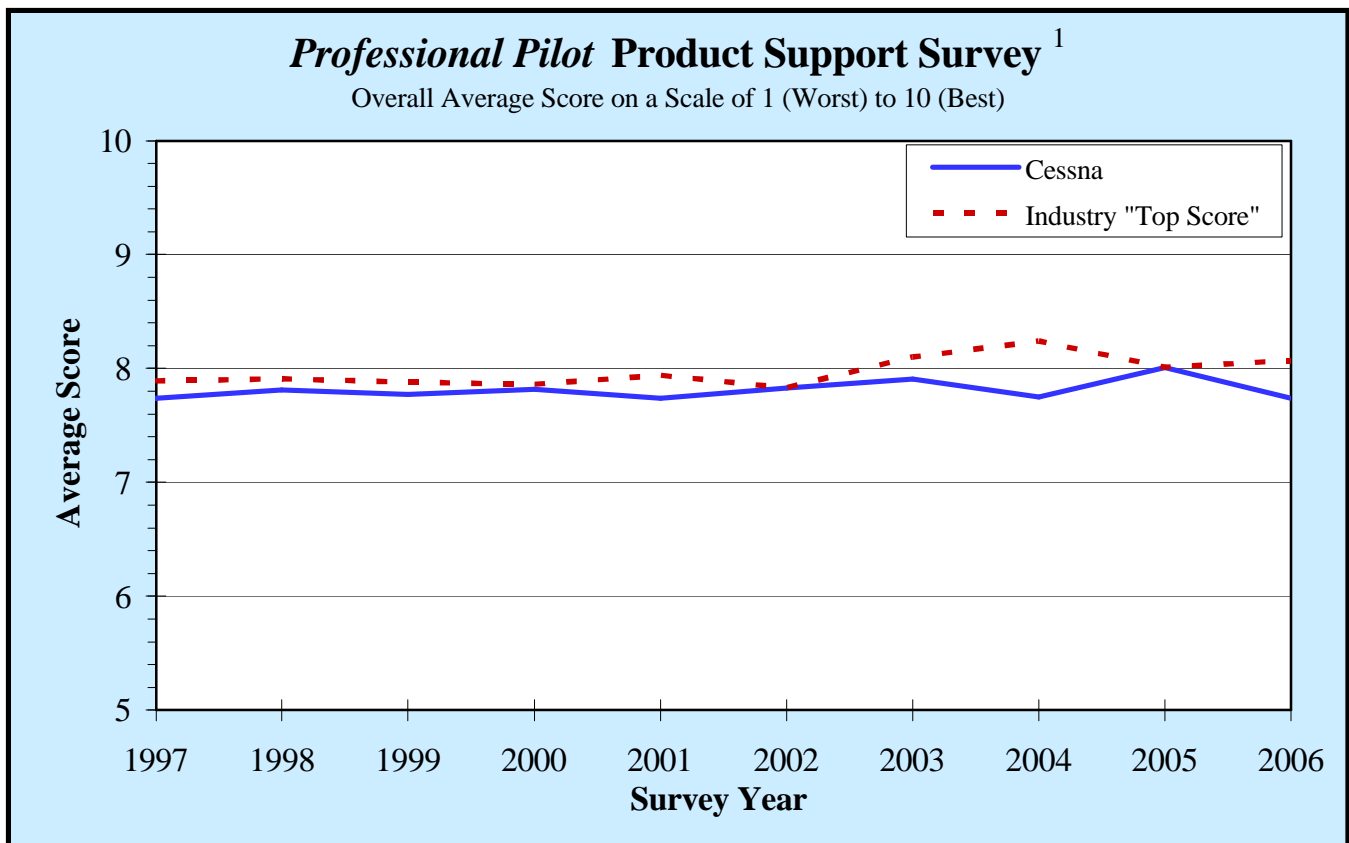
The avionics system in the Citation Mustang offers several benefits over the system installed in the Eclipse 500.

- The Mustang's avionics are based on the Garmin 1000 suite. It is a fully integrated system with all major components supplied by Garmin. With one integrated system from one supplier, issues with component compatibility and cross functionality are minimized. Avionics issues that may arise can be rectified more quickly and completely when dealing with just one vendor.
- The Eclipse's avionics system is built from a multitude of vendors; Innovative Solutions & Support (displays), Honeywell (radios), Garmin (transponder), Collins (DME), Chelton (FMS), Meggitt (autopilot), and PS Engineering (radio panel). With such a variety of vendors, concerns may arise. Will all of the functionality of a component be realized due to the way it must integrate with other components? Will the user interface for different components be dissimilar because each manufacture follows different design philosophies? When these situations arise, they can serve to increase pilot workload. If avionics issues do occur, will finger pointing between vendors emerge to the detriment of the customer seeking a quick solution?
- The Mustang comes standard with a Garmin Traffic Information System (TIS) and a Garmin Class B Terrain Avoidance Warning System (TAWS). No extra cost are incurred for these features.
- The standard Eclipse does not come with either a TIS or TAWS system. L3 Communications Skywatch HP and Honeywell Class B TAWs are available as options.
- **The Citation Mustang offers a more functional and seamless avionics suite through its completely integrated, one vendor design. Eclipse utilizes a host of vendors to build its avionics system.**
- **The standard avionics in the Citation Mustang provides more functionality than the Eclipse 500. You must spend extra money on the Eclipse in order to match the capabilities of the Mustang.**

PRODUCT SUPPORT

The need for a superior product support network available from the manufacturer is as important as the aircraft's performance capabilities. The productivity of an aircraft is only as great as the aircraft's availability.

Cessna has consistently demonstrated a high level of industry leadership in the customer support area. *Professional Pilot's* annual Product Support Survey of jet operators time and again shows that Cessna is a top-rated, if not the best, support organization in the business. At this point, there is no feedback on Eclipse's support programs due to a limited number of delivered units. Their produce support organization is in its infancy.¹



- **Having a consistently top-rated customer support organization ensures that Citation owners have maximum utilization of their investments.**
- **The allocation of resources by Cessna to its after-sales support function reflects the company's commitment to customer satisfaction and long-term relationships.**

1. *Professional Pilot* magazine, September, 2006.

PRODUCT SUPPORT

To support the Citation fleet, Cessna has constructed the largest product support organization of any General Aviation manufacturer. This includes a group of nine, factory-owned Service Centers within the continental United States, plus eight contracted facilities within North America. All factory-owned Service Centers are ISO 9002 certified and are open seven days a week for faster turnaround service.

Cessna Citation North America Service Facilities

◆ Factory Service Centers

* Authorized Service Centers



- Citation Factory Service Centers work only on Citation aircraft, thereby allowing maintenance personnel to specialize in just one type of aircraft. Specialization reduces troubleshooting which reduces overall maintenance costs.
- The large number of Citation Service Facilities ensures that experienced technicians are within one hour's flying time from any point in North America.



Cessna
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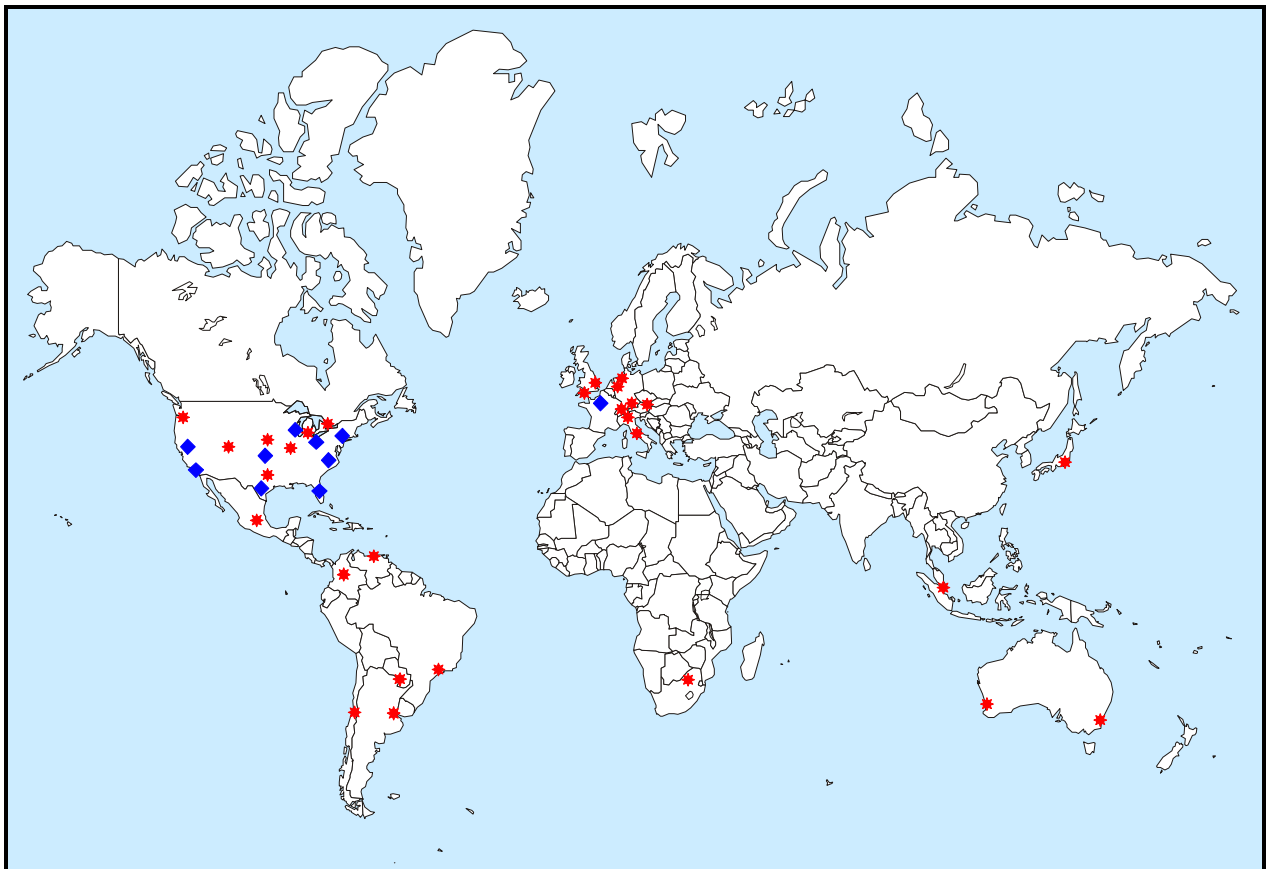
PRODUCT SUPPORT

Cessna Citation's worldwide product support network includes 10 factory-owned Service Centers plus a group of 21 Authorized Service Centers and 7 Authorized Service Stations approved for light maintenance.

Cessna Citation Worldwide Service Facilities

◆ Factory Service Centers

* Authorized Service Centers/Stations



- Extensive worldwide support ensures that authorized facilities are nearby no matter what part of the world you travel.



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SPECIFICATIONS

Basic Specifications		
	Citation Mustang	Eclipse 500
Certification Status	Part 23	Part 23
Engines		
Manufacturer	Pratt & Whitney	Pratt & Whitney
Model	PW615F	PW610F
Thrust per Engine (lb)	1,460	900
Time Between Overhaul (hr)	3,500	3,500
Exterior Dimensions (ft in)		
Length	40' 7"	33' 6"
Height	13' 5"	11' 0"
Wing Span	43' 2"	37' 11"
Internal Dimensions ¹		
Length - Overall (ft in)	14' 9"	12' 4"
- Passenger Cabin (ft in)	9' 9"	7' 6"
- Executive Seating Area (ft in)	6' 10"	5' 7"
Height (in)	54"	50"
Width (in)	55"	56"
Pressurization		
Differential (psi)	8.3	8.3
Certified Ceiling (ft)	41,000	41,000
Sea Level Cabin to (ft)	21,280	21,500
Accommodations		
Passenger Seating (standard - maximum)	5 - 5	4 - 5
Baggage Capacity - Internal (ft ³ /lb)	6 / 98	16 / 260
- External (ft ³ /lb)	57 / 620	0 / 0

1. All internal dimensions are with a typical interior installed.

SPECIFICATIONS

Performance Specifications		
	Citation Mustang	Eclipse 500
Airport Performance		
Takeoff Distance - Maximum Weight (ft) ¹		
- Sea Level, ISA	3,110	2,342 ⁸
- 5,000 ft, 25°C (77°F)	6,580	4,269 ⁸
- Takeoff Weight Restriction (lb)	None	None
Landing Distance - Sea Level, ISA (ft) ²		
- Maximum Landing Weight	2,380	2,788
- 4 Passengers, IFR Reserves	2,085	2,630
Critical Airspeeds (kt)		
Takeoff Decision Speed (V ₁) ³	89	91
Takeoff Safety Speed (V ₂) ³	97	103
Landing Reference Speed (V _{Ref}) ⁴		
- Maximum Landing Weight	94	94
- 4 Passengers, IFR Reserves	87	88
Climb Performance		
Rate of Climb - All Engines (ft/min)	3,010	3,424
- Engine Out (ft/min)	870	989
All Engine Service Ceiling (ft) ⁵	41,000	41,000
Engine Out Service Ceiling (ft) ⁵	26,900	25,000
Cruise & Range Performance		
Maximum Cruise Speed (kt) ⁶	340	370
Typical Cruising Altitudes (FL)	350 - 390	330 - 390
NBAA IFR Range - 4 Passengers (nm) ⁷	1,007	773
(alternate distance for fuel reserve, cruise power setting)	(100 nm, HSC, single pilot)	(100 nm, HSC, single pilot)

1. Total distance to 35 feet above the runway.
2. Total distance from 50 feet above the runway.
3. Airspeed at maximum takeoff weight, sea level, 15°C (59°F).
4. Airspeed at sea level, 15°C (59°F).
5. Maximum altitude at which the aircraft can maintain a climb rate of 100 ft/min (50 ft/min for an engine out).
6. Maximum speed at typical cruising altitudes, mid-cruise weight, and ISA conditions.
7. Cruise power setting: HSC = high-speed cruise.
8. Two engine takeoff distance.



SPECIFICATIONS

Weight Specifications		
	Citation Mustang	Eclipse 500
Weight Limitations (lb)		
Maximum Ramp Weight	8,730	6,029
Maximum Takeoff Weight	8,645	5,995
Maximum Landing Weight	8,000	5,600
Maximum Zero Fuel Weight	6,750	4,876
Usable Fuel Capacity	2,580	1,686
Usable Fuel Capacity (gal)	385	249
Weight Build-up (lb)		
Typically-Equipped Empty Weight ¹	5,350	3,630
Crew and Furnishings (200 lb each)	200	200
Basic Operating Weight (BOW)	5,550	3,830
Loading Capabilities (at Ramp Weight) (lb)		
Useful Load ²	3,180	2,199
Payload with Full Fuel ³	600	513
Fuel with Maximum Payload ⁴	1,980	1,153

1. Typically-equipped, empty weight includes aircraft avionics, typical options, interior, engine oil, trapped fluids, and unusable fuel.
2. Amount of fuel and payload available, over and above the crew.
3. Passengers and/or cargo capacity with full fuel on board.
4. Fuel capacity with the maximum amount of passengers and/or cargo on board.