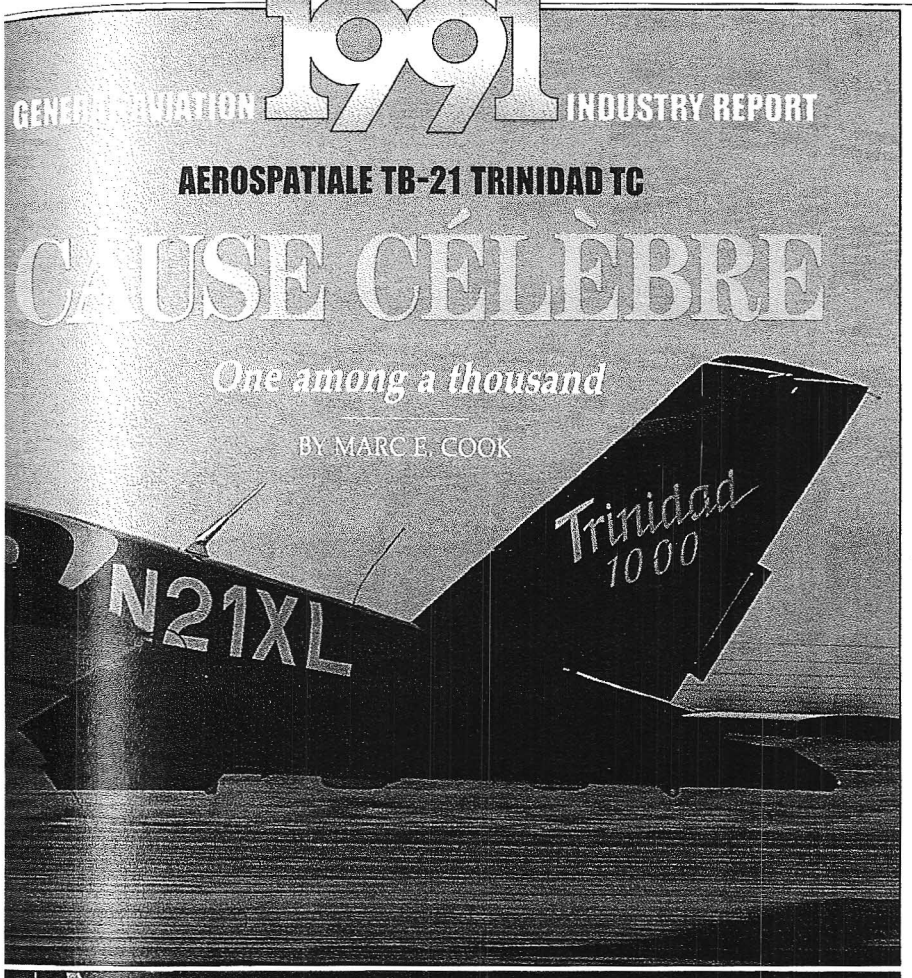
GENERAL AVIATION 1991 INDUSTRY REPORT

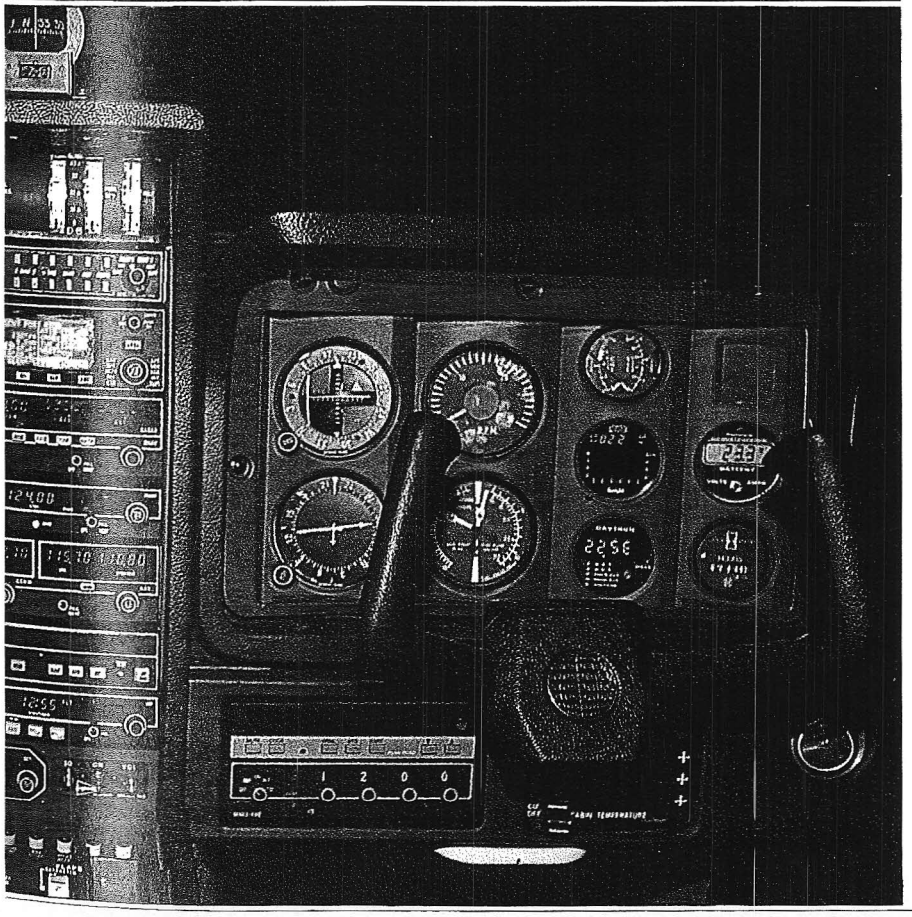
AEROSPATIALE TB-21 TRINIDAD TC

CAUSE CÉLÈBRE

One among a thousand

BY MARC E. COOK





Milestones are where you find them. For Milton Bradley, the corporate machine barely hiccups when the 1,000th puzzle piece goes out the door. But for airplanes—especially from a foreign manufacturer and in these times of limited production—the 1,000th aircraft certainly is cause for celebration. That's just what Aerospatiale's light airplane group, Socata, believes. The TB-21 Trinidad TC shown here is airplane number 1,000 in the TB line—at press time, Socata had rushed past serial number 1,200. Currently, the TB line includes four airplanes—the 160-horsepower, fixed-gear Tampico trainer; the 180-hp Tobago; the 250-hp, retractable-gear Trinidad; and its turbocharged brother, the 250-hp Trinidad TC. With the milestone Trinidad, the manufacturer has taken an already dapper airframe and dressed it in tux, tails, and top hat for its celebrity role.

Such a suit of clothes seems to have cleaved pilots into two groups: love it, hate it. To some eyes, the TC's distinctive shape cries out for something more than an ordinary paint job, and N21XL has it. What's more, many nonpilots pay attention to the airplane solely because of its wild exterior. This is an important point because many airplanes intended to appeal to an upscale pilot (or potential pilot) have landed wide of the mark because aesthetics played a minor role in the design of the airplane.

Inside the TC, attention to detail and aesthetics were obviously high priority. The TC's optional leather interior is nothing short of gorgeous. Buttery smooth and appropriately aromatic, the leather seats are not only beautiful but comfortable, the latter a hallmark of Trinidad models and a pleasant manifestation of Aerospatiale's attention to detail. Anyone arriving at the airport in a Lexus or Mercedes-Benz will not have to make excuses for the interior when the trip goes from wheels to wings.

Aerospatiale has stuffed this interior with enough amenities to ensure that pilot and passengers are well-coddled. Air conditioning, an in-flight telephone, and a full complement of Bose active noise-canceling headsets help make the TB-21 a most comfortable conveyance. Our back-seat passenger reports that a combination of low noise level, stretch-out room, and good visibility make the task of riding along, well, not a task at all. Although the fuselage begins to taper at the rear seats, there's still

PHOTOGRAPHY BY MIKE FIZER

enough elbow- and legroom to satisfy two average-size persons; those of great height will find headroom a bit limited, both up front and in back.

Passengers will take a back seat—literally and figuratively—to the pilot in this airplane, thanks to an instrument panel bristling with enough avionics to send even hard-core computer-chip junkies toward the tropopause. Even the ebullient U.S. Aerospatiale distributor admits that the avionics suite in 21XL is overkill; it exists to demonstrate what a capable platform and a four-star credit rating can do to make a piston single as well-equipped, electronically at least, as a Boeing 767.

The TB's center-panel console (the optional taller radio stack, actually) has been filled with Bendix/King gear, including a KLN 88 loran, KNS 81 area navigation receiver, and KFC 150 flight director/autopilot with altitude preselect. Such an avionics stack would please most of us, but Aerospatiale elected to go even farther and obtain the supplemental type certificate paperwork for installation of the Bendix/King EHI 40 electronic flight instrument system (EFIS) in the Trinidad.

You've read about the EFIS's considerable capabilities before, so suffice it to say that once you try one, you won't want to go back. So much information can be displayed on the tube—located where a traditional HSI or DG would be—that until you have some time with the unit, it borders on information overload. The EFIS and autopilot can be coupled to the loran, which not only provides you with a plethora of position information, but allows the KFC 150 to fly the airplane with the tact and smoothness of an English butler.

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This electronic lap of luxury goes beyond the EFIS, too. An Arnav FC10 fuel computer/totalizer has found a home in 21XL's panel, as has a Ryan TCAD collision-avoidance unit, Insight GEM six-cylinder CHT/EGT/TIT gauge, and a 2-inch, battery-powered backup attitude indicator. (The main ADI is vacuum powered, the EFIS electric; this airplane has no backup vacuum system.)

The predictable downside of all this electronic assistance is cost. The Aerospatiale demonstrator carries a bottom line of $343,743, against a base price for the TC of $178,900. (Airplanes beyond serial number 1,202 will sell for $187,900, sans avionics.)

That the airplane can consume this volume of avionics bears testament to the TB's generous panel. As with all the TB-series airplanes, the panel is divided into three sections—one directly in front of the pilot to hold flight instruments, a center radio stack, and an auxiliary panel to the right. All panels can be tilted forward for avionics work without disassembling the whole interior of the airplane—plus two external access panels further ease the task of avionics repair or replacement. Reports we've heard suggest that the system works for those mechanics familiar with it.

Simplicity of construction and maintenance was a driving force in the design of the TB airplanes. The constant-chord wing, for example, carries a one-piece spar (milled on the same equipment used by Aerospatiale for Airbus airliner parts) and a clever control scheme. Filling the trailing edge of each wing is a 4-foot-long aileron and an 8-foot-long flap; the upper and lower skins for each control are essentially the same (two joined side-by-side make up the flap), which helps reduce production costs. What's more, the underside of the TC is blessed with enough access panels for the space shuttle.

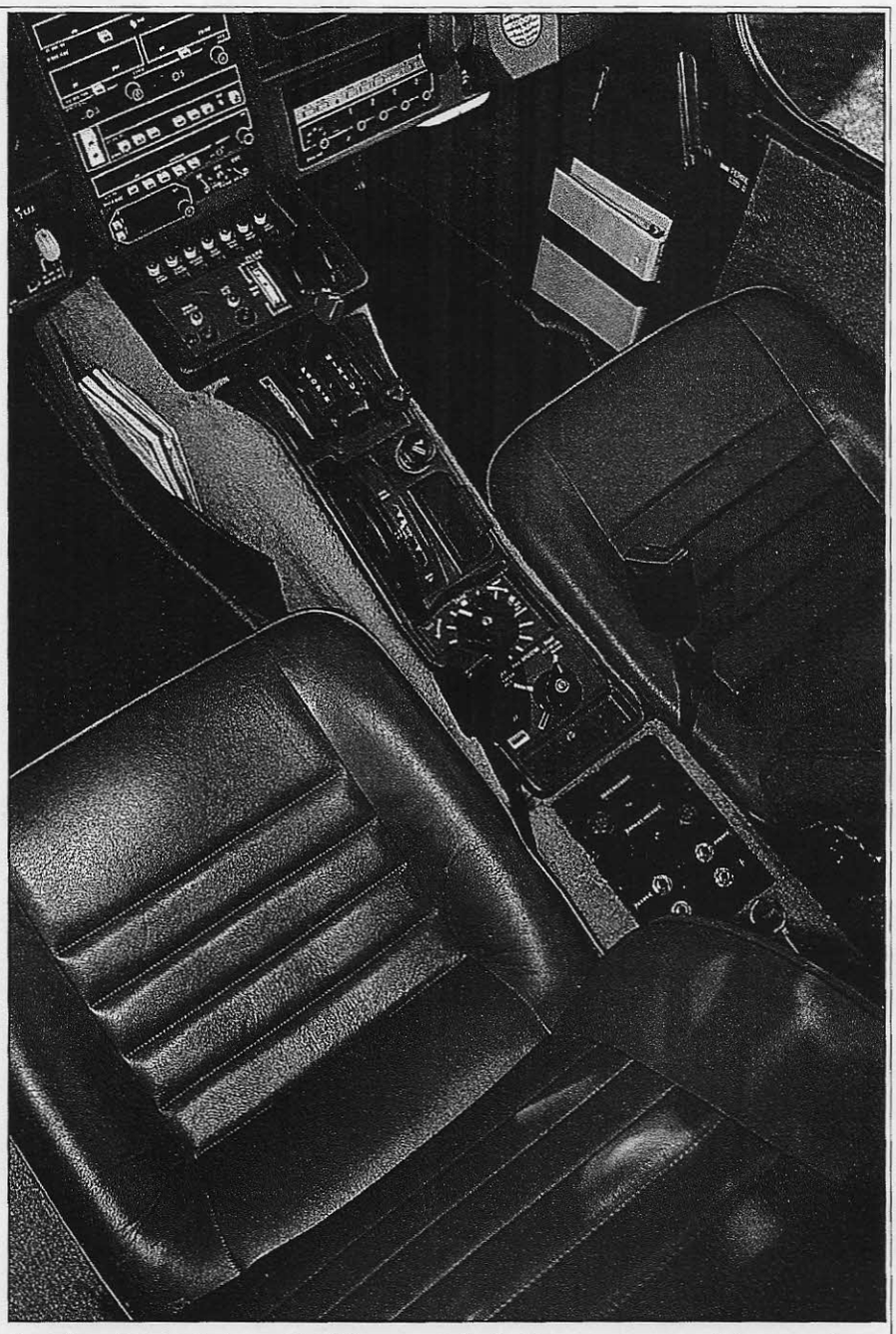
Otherwise, the TC's airframe is novel only in the ways it uses conventional concepts—there's no reinventing the wheel here. The wing is a traditional airfoil, for instance, but relatively small, with just 128 square feet of area—compared to the F33A Bonanza's 181 square feet or even a Piper Arrow's 170 square feet. The Trinidad's relatively low approach and stall speeds (75 knots works fine on final, and the airplane stalls at 59 knots in the landing configuration) are a result of generous flap area. The tail, notable for the forward placement of the outsized rudder and vertical stabilizer, employs a standard-issue stabilator. The vertical tail's placement, according to the company, aids in spin recovery (with some help from underbody strakes). An-

other advantage of the large rudder is a generous 25-knot demonstrated crosswind component. Our experience with a TB-10 Tobago, which uses the same airframe and carries the same crosswind component, suggests that Aerospatiale test pilots didn't have to perform superhuman feats to achieve that crosswind component.

The airframe also is a good weight lifter. With a typical equipped empty weight of 1,950 pounds, the Trinidad can carry full fuel (520 pounds) and 620 pounds of people and possessions. Maximum ramp weight is 3,097 pounds, and there is a landing limit of 2,943 pounds. The TC demonstrator, however, carries enough equipment to boost the empty weight to 2,117 pounds, leaving 463 in full-fuel payload.

With high wing loading, one might predict that the Trinidad rides turbulence well. One would be right. On the day we flew 21XL, the Los Angeles basin was under the influence of strong northwesterly winds, creating substantial turbulence on the lee side of the San Gabriel Mountains. At a variety of altitudes, the TC rode through both chop and occasional moderate turbulence with aplomb. Directional stability was excellent, as was yaw stability. The back-seater reported a comfortable ride, despite the bumps. Control authority in cruise was sufficient to make large, rolling bumps no real chore, although the TC's ailerons aren't feather light, and a whole day of tub-thumping turbulence would be a workout. Some pilots complain that the TB-21's aileron forces are uncomfortably high in cruise—and yes, they prove heavier than in the slower Tobago and Tampico models—but they are not unreasonably stiff. Pitch response was lighter—about average for this class of aircraft. Control authority in the low-speed regimes was substantial.

As control feel is a compromise of stability and maneuverability, cruise speed is a compromise of horsepower and drag—which is directly related to aircraft size. Here, the Trinidad trades sizzling speed for creature comforts. Using 75-percent power, cruise speeds run from 153 knots true at 1,000 feet to 187 knots at 25,000 feet, the airplane's maximum certified altitude. At low altitude, a Mooney 201 will show its tail strobe to the Trinidad, and Mooney's 270-hp TLS is fast enough to suck the landing lights out of the TC. But, Aerospatiale says, sheer speed is not the point. Indeed, the TC's cruise speeds are respectable given



the size of the airplane; the Mooney makes big-of-bone types and large families pay dearly for the speed.

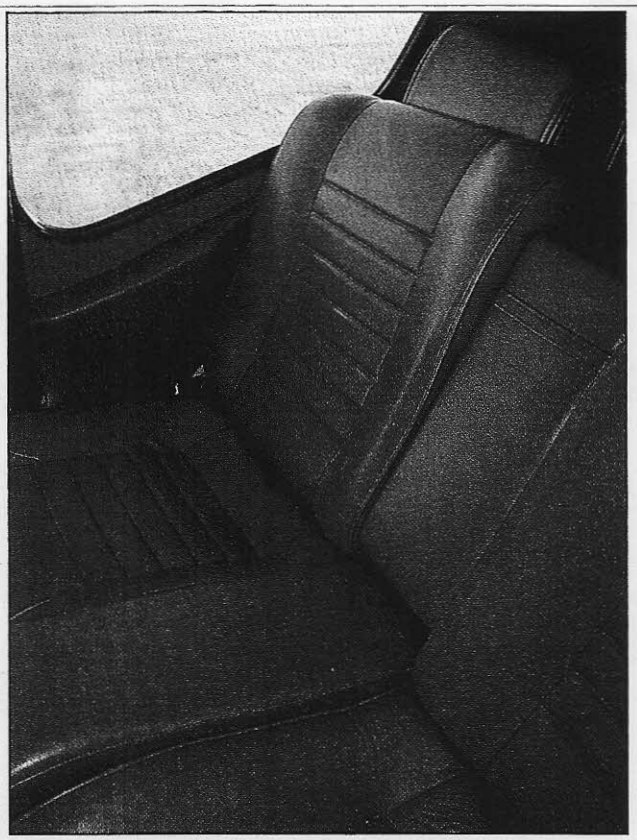
In other areas of performance, the Trinidad TC stacks up well. At a full-power climb (which seems to stress the engine and automatic wastegate turbo system not at all), the airplane is supposed to climb at 1,126 feet per minute at sea level, tapering to 276 fpm at 25,000 feet. We saw better than 1,000 fpm consistently up through 14,000 feet, despite flying at higher than best-rate airspeed. Climb performance like this usually comes at a price: fuel. The 250-hp Lycoming (derated from as much as 300 hp in other applications) consumed a prodigious 28 gallons per hour in the climb. There are no cowl flaps on the TC, and Aerospatiale recommends using full-rich mixture for full-power climbs. As a payback, the CHTs remained cool, and the oil temperature climbed two-thirds up the scale and stayed put. (Incidentally, having the precise temperature information and a slick display from the GEM make the Trinidad's standard-equipment "inexpensive and looks that way" vertical-scale engine instruments—which remain for oil temperature and pressure—appear all the worse.)

Settled down in cruise, the Lycoming can be leaned to 16.4 gph at 75 percent, a figure we matched exactly on our test flight. Given an 86-gallon fuel capacity,

the Trinidad can fly 4.2 hours with an hour's reserve. In a no-wind situation, you can plan for a range of 643 to 785 nautical miles with reserves. If you're in it for the long haul, you can back off the power to 55 percent, which reduces fuel consumption to 11.1 gph at nearly all altitudes and gives you 6.7 hours of endurance—far more than many pilots'. True airspeeds at 55 percent range from 133 knots at 1,000 feet to 141 knots at 17,000 feet. (Aerospatiale doesn't recommend using a setting as low as 55 percent above 17,000 feet.) In our cruise speed checks, 21XL was consistently 1 to 2 knots shy of book.

Coming down from cruise altitudes presents no difficulties. If you reduce power gradually, the engine shows no tendency to drop CHTs dramatically, and the 129-knot maneuvering speed is not a serious shortcoming if you use the landing gear as a speed brake for descending in rough air. The electrohydraulically actuated gear can come out at 130 knots and stay out to 140 knots.

Once in the traffic pattern or preparing for an instrument approach, the Trinidad proves stable and comfortable at lower airspeeds. Slow flight and stalls are decidedly undramatic, with the airplane tending toward a vigorous shake and shimmy before the actual stall break. In configuration changes, you'll notice little pitch change with gear extension and the application of approach flaps (10 degrees). Aerospatiale offers two types of flap systems for the Trinidad, either the standard infinitely adjustable setup or an optional three-position preselect (up, 10 degrees for takeoff, and 40 degrees for landing); 21XL has the latter. In some cases, the two flap extension settings can be labeled *not enough* and *too much*. Pilots who have flown both seem to prefer the standard arrangement better, if only because it's easier to manage the Trinidad's strong pitch-down tendency with application of full flaps.



Regardless of the type of flap switch, the Trinidad is a breeze to land. Stout trailing-link landing gear help a great deal here, as does good directional stability. Get the airplane near the ground; the gear will do the rest. A mention must be made about the airplane's interior ergonomics because they help make all phases of flight—landings especially—a treat. The throttle quadrant is located so naturally under the pilot's right hand that to go back to other airplanes is like moving from a 1991 Miata to a 1939 Chrysler: It just doesn't feel right.

Visibility, too, is excellent except right over the nose in climb. This trait is more noticeable in the lower powered Tobago and Tampico airplanes than in the Trinidad, but many pilots will want to cruise-climb to altitude to help ensure traffic separation. Which is easier said than done, at least on the ramp.

Although we've seen the Trinidad in the country for six years, it still is novel enough to draw a crowd, and the outrageously outfitted 1,000th airplane carries that experience to new heights. It is, for now at least, a significant airplane for Aerospatiale and a clear indicator that success comes not overnight—in one frenzied burst of sales and accolades—but through refinement and evolution and persistence. It is, naturally, the wherefore of milestones. □

Aerospatiale Socata TB-21 Trinidad TC
Base price: $186,900
Price, as tested: $343,743

Specifications

Powerplant	Textron Lycoming TIO-540-AB1AD, 250 hp at 2,575 rpm
Recommended TBO	2,000 hr
Propeller	Hartzell, constant-speed, 80-inch diameter
Length	25.3 ft
Height	9.3 ft
Wingspan	32.5 ft
Wing area	128 sq ft
Wing loading	24.2 lb/sq ft
Power loading	12.4 lb/hp
Seats	4
Cabin length	8.3 ft
Cabin width	4.2 ft
Cabin height	3.7 ft
Empty weight, standard	1,915 lb
Empty weight, as tested	2,117 lb
Max ramp weight	3,097 lb
Max takeoff weight	3,086 lb
Max landing weight	2,493 lb
Useful load	1,182 lb
Useful load, as tested	980 lb
Payload w/full fuel	665 lb
Payload w/full fuel, as tested	463 lb
Fuel capacity, std	88.8 gal (86.2 gal usable) 533 lb (517 lb usable)
Oil capacity	12 qt
Baggage capacity	143 lb

Performance

Takeoff distance, ground roll	822 ft
Takeoff distance over 50-ft obstacle	1,352 ft
Max demonstrated crosswind component	25 kt
Rate of climb, sea level	1,126 fpm
Max level speed, sea level	166 kt
Max level speed, 25,000 feet	200 kt
Cruise speed/endurance w/45-min rsv, std fuel (fuel consumption)	
@ 75% power, best economy	187 kt/4.5 hr
25,000 ft	(98.4 pph/16.4 gph)
@ 65% power, best economy	169 kt/6.2 hr
25,000 ft	(74.4 pph/12.4 gph)
@ 55% power, best economy	141 kt/7 hr
17,000 ft	(66.6 pph/11.1 gph)
Max operating altitude	25,000 ft
Service ceiling	25,000 ft
Landing distance over 50-ft obstacle	1,800 ft
Landing distance, ground roll	810 ft

Limiting and Recommended Airspeeds

Vx (best angle of climb)	81 KIAS
Vy (best rate of climb)	95 KIAS
Va (design maneuvering)	129 KIAS
Vfe (max flap extended)	103 KIAS
Vle (max gear extended)	139 KIAS
Vlo (max gear operating)	129 KIAS
Vno (max structural cruising)	150 KIAS
Vne (never exceed)	187 KIAS
Vr (rotation)	75 KIAS
Vs_1 (stall, clean)	70 KIAS
Vso (stall, in landing configuration)	59 KIAS

For more information, contact: Aerospatiale General Aviation, 2701 Forum Drive, Grand Prairie, Texas 75051; telephone 214/641-3614.

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