EADS Socata TBM 850

Despite its one engine spinning a propeller, this long-ranging speedster is going head-to-head with the VLJs.

By Fred George
Photography by Paul Brou

Flying nonstop from San Diego to Atlanta isn't a typical mission for a TBM 850, but that's precisely what *B&CA* did in late February with the help of average 65-knot tailwinds. Departing San Diego-Montgomery Field at 7:46 a.m., we arrived at Atlanta's DeKalb-Peachtree Airport at 4:10 p.m. and landed with healthy VFR fuel reserves. That's a distance of 1,700-plus nm, using the most direct available ATC routing that day and accounting for vectoring by ATC in the Atlanta area. The trip also took 15 to 20 minutes longer than we anticipated due to an ATC-mandated early descent some 150 miles west of Atlanta. We actually could have touched down with much fatter fuel reserves had we flown the entire mission at high altitude, at long-range cruise and with more-direct routing.

Nicolas Chabbert, president of EADS Socata Aircraft, just smiled when he heard the news of our near-record-length flight. He didn't actually say, "I told you so!" But he could have. He is adamant that the TBM 850 is a strong competitor to the emerging class of VLJs and our true cross-country flight certainly helped support his position.

Chabbert loves to compare range, speed and payload performance between the TBM 850 and VLJs. He shows, for example, how you load the aircraft with a pilot, four passengers and 1,700 pounds of fuel. He then plots a 1,200-nm course between two airports, about the distance between Fort Lauderdale and Montreal or Tampa and Minneapolis, and says "Want to race me with your VLJ carrying five people?" No VLJ can carry such a large payload so long a distance.

Even if you shorten the race to 1,000 nm, the TBM 850 has enough fuel to cruise at high speed rather than at the lower long-range setting. Push up the power to maximum cruise and the TBM 850 only gets nosed out by a couple of minutes by a Cessna Citation Mustang on the 1,000-nm mission, an aircraft that has about the same overall cabin volume and two engines. The Eclipse 500, while being far speedier than the TBM 850, can only carry three passengers on a 1,000-nm trip. And the Eclipse 500 has far less cabin volume.

The TBM 850 is a far more capable aircraft than its predecessor TBM 700C2. While there's very little difference between the two airframes, there is considerable difference in what drives them. The newest TBM has a Pratt & Whitney Canada PT6A-66D engine with a 1,825 thermodynamic horsepower (thp) rating. This gives it much improved density altitude performance, compared with the TBM 700C2's -64 engine, which is rated at 1,583 thp. While both the TBM 700 and TBM 850 are limited to 700 shp for takeoff, as soon as the gear and flaps are retracted, the TBM 850, as the name implies, has up to 850 shp available. That's potentially on tap from sea-level at ISA+16°C to FL 260 at ISA. The TBM 850, departing a sea-level airport at MTOW, can climb to FL 260 in 15 minutes, or four minutes faster than its predecessor.

Once level at FL 260, the TBM 850's extra power enables it to cruise at 310 to 318 KTAS, depending upon weight, or up to 26 knots faster than the TBM 700. Mind you, the TBM 850's fuel flow also is 20 percent higher.

More fuel efficient, high-speed cruise favors a jet-like, steep vertical profile. Climb performance is the TBM 850's strong suit. At MTOW, it can climb directly to FL 310 in 20 minutes. That's nearly eight minutes faster than the TBM 700C2. Once established at that altitude, the new model can then cruise at 302 KTAS, a 34-knot speed advantage over the TBM 700. And as density altitude increases, the performance margin between the two aircraft becomes greater. The TBM 850 can climb to FL 310 almost 50 percent faster than the TBM 700C2 in ISA+20°C conditions. Level at FL 310 at ISA+20°C, the new model can cruise up to 56 knots faster than the earlier TBM.

If TBM 850 slows down to King Air cruise speeds, it can fly a pilot and four passengers nearly 1,400 nm and land with NBAA IFR reserves. That's slightly more range than a TBM 700C2 carrying the same payload. But few groups of five people will want to spend more than five and one-half hours together in a TBM. Think "sky cab," not "business jet."

The prop, windshields and pitot tubes are electrically heated for ice protection.

The fact is almost two-thirds of all TBM missions are 500 nm or less. Chabbert maintains that most missions in VLJs will be about the same length. He claims that the TBM 850 will be every bit as fast and considerably more fuel efficient than most VLJs on such milk runs because it's unlikely that ATC will let the VLJs climb into the higher flight levels on short hops. The Eclipse 500, in contrast, should burn at least 15 percent less fuel than the TBM 850 on a 500-mile trip flown at FL 260, plus it's considerably faster.

However, there's much more to a comparison between the TBM 850 and the new generation of VLJs than just performance numbers, as you will read in this report.

A swing-down boarding ladder and a sturdy handrail make it easy to climb aboard the aircraft.

Structure, Systems and Passenger Accommodations

The TBM 850 and current production VLJs all use conventional semi-monocoque aluminum airframes with small panel sizes and multiple load paths. The TBM 850, however, employs more composite materials than current production VLJs, using aluminum/nomex or aluminum/nomex/carbon fiber/fiberglass sandwich construction for the empennage, plus hybrid carbon/glass fiber or pure glass fiber and nomex composites for various fairings and the tail cone.

The main entry door is aft of the wing on the left side and it's considerably larger than that of any VLJ. It swings up and out of the way by means of counter springs, forming a canopy shelter while boarding the aircraft. The door measures 3.5 feet high by 3.9 feet wide, so it's easy to load outsized items into the cabin for cargo runs if the seats are removed. When all the seats are installed, the aft-most seats swing forward to provide easy access to the main internal baggage compartment through the main entry door or while inside the cabin. A battery-operated motor pulls down the entry door into the closed position, allowing it to be manually locked in place.

A swing-down boarding ladder and a sturdy handrail make it easy to climb aboard the aircraft and enter the center of the passenger area. A separate pilot entry door is available as a $75,000 option. While that feature is useful for some cargo operators, it's not a big seller with owner/operators who make up the large majority of TBM 850 operators.

EADS Socata TBM 850

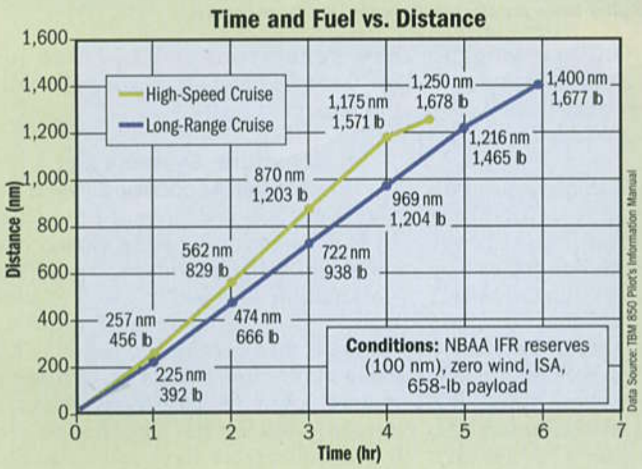
These graphs are designed to illustrate the performance of the TBM 850, the market name for the TBM 700 N, under a variety of range, payload, speed and density altitude conditions. Do not use these data for flight planning purposes because they are gross approximations of actual aircraft performance. Note well: Virtually all TBM 850 aircraft are delivered with the optional Honeywell RDR 2000. The drag from the radar pod on the left wing reduces book values by five knots at high-speed cruise and two knots at long-range cruise. Those corrections are reflected in *B&CA*'s charts.

Time and Fuel vs. Distance — This graph shows the relationship between distance flown, block time and fuel consumption for the TBM 850 with the optional radar pod installed. Depending upon altitude, high-speed cruise is flown at 280 to 315 KTAS and long-range cruise varies from 196 to 252 KTAS.

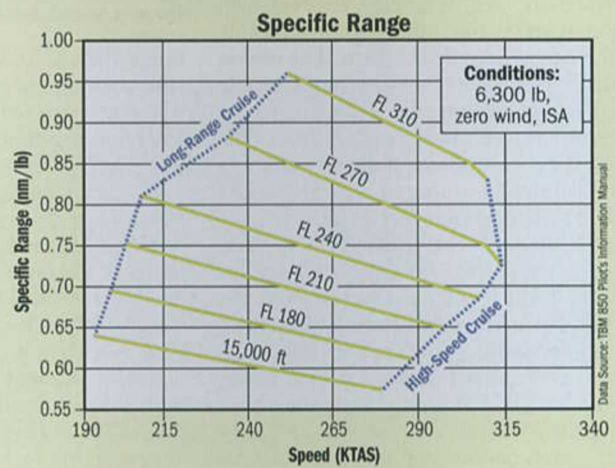
Specific Range (Mid-Range Weight, ISA) — This graph shows the relationship between cruise speed and fuel consumption for the TBM 850 at representative cruise altitudes for a 6,300-pound aircraft, according to the TBM 850 *Pilot's Information Manual. B&CA* believes Socata's performance estimates are accurate, based upon our demonstration flight observations.

Range/Payload Profile — The purpose of this graph is to provide simulations of various trips under a variety of payload and two airport density altitude conditions, with the goal of flying the longest distance at long-range cruise. Each of the four payload/range lines was plotted from only two data points by *B&CA*, ending at the maximum range for each payload condition. The graph illustrates that the TBM 850 can carry four passengers 1,324 miles and a maximum payload of 272 miles. FAR Part 23 50-foot obstacle takeoff field length distances are shown for sea-level standard day and for *B&CA*'s 5,000-foot elevation, ISA+20°C airport.

Time and Fuel vs. Distance

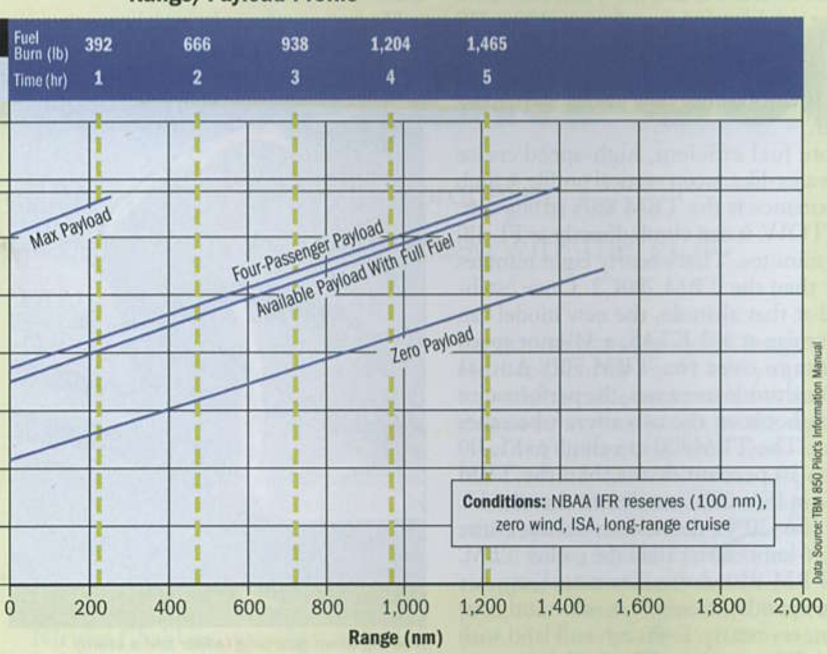


Specific Range



Range/Payload Profile

Takeoff Field Length (ft) SL ISA	5,000 ft ISA+20°C	Gross Takeoff Weight (lb)
		8,000
2,840	4,283	7,500 / 7,394
2,498	3,735	7,000
2,093	6,094	6,500
1,893	2,744	6,000
1,590	2,395	5,500
NA	NA	5,000
NA	NA	4,500
NA	NA	4,000



As for cabin size, according to *B&CA*'s tape, it measures 13.3 feet in length, forward of the baggage area. Maximum cabin cross section is 4.0 feet tall and 3.9 feet wide. The cabin has two pilot seats and four passenger seats in club configuration. Most of the luggage is stored in the aft section of the cabin, behind the rear passenger seats, so it's easily accessible in flight. Power outlets in the cabin and cockpit supply 12 VDC for laptop computers and for charging cell phones.

The right side of the fuselage has an over-wing, plug-design, emergency exit with integral window. It's located abeam the right, aft-facing seat in the club section. The passenger seats measure 18 inches wide with 22-inch-high backrests. There are integral headrests. Each passenger seat has an overhead reading light and air outlet. There is a sturdy, fold-out 22.5-inch-wide by 21-inch-long worktable enclosed in a pocket on the right side of the club section. Cabin furnishings are top rate, as befits a $2.85 million business aircraft. The chairs are covered with durable leather and sidewalls have long-lasting fabric coverings. The wood-grain laminates on the overhead passenger service unit and other trim panels have a glass-smooth, high-gloss finish. Optional floor runners protect the wool carpeting.

The aft baggage compartment in the cabin can accommodate up to 220 pounds of luggage behind a restraining net. There also is a small aft, external compartment that will hold up to 77 pounds of baggage. A separate, forward compartment holds the collapsible tow bar and duct covers.

The TBM 850 has a 6.2 psid pressurization system. That results in a 9,350 foot cabin at FL 310, the aircraft's maximum cruise altitude. The 8.3 psid system in current production VLJs, in contrast, provides an 8,000-foot cabin at FL 410. Socata counters that single pilots of VLJs are required by FAR Part 91.211 to wear oxygen masks anytime they're flying above 35,000 feet, so the cabin pressure differential advantage is a moot point.

The TBM 850's RA 16-43 (root)/13.3-43 (tip) airfoil is part of the family of modified NACA 43000-series airfoils developed by Aerospatiale for use on the ATR regional aircraft and other platforms. It has a relatively high 8.2 aspect ratio to reduce induced drag, two degrees angle of incidence and no aerodynamic twist. Wing area is 193.8 square feet, resulting in no more than a 38.2 pounds/square foot wing loading. The internal wing structure is conventional, with two single-piece machined light alloy spars and a series of chord-wise ribs fastened to the exterior skins. The leading edge sections are composite, using hybrid carbon/glass fiber cloth bonded over nomex honeycomb. Deice boots cover the leading edge. Composites also are used for the wing flaps, ailerons and certain top wing surface panels.

Socata officials assert that since it's a single-engine turboprop the TBM 850 is easier to fly and to insure, than is, or will be, a VLJ. Really?

You see, while some of P&WC's latest PT6 turboshaft engines for helicopters are equipped with FADECs, the -66D turboprop still has a basic, hydromechanical fuel control, with separate power, prop and condition levers. That means the pilot must make dozens of adjustments during the course of a flight. It's up to the pilot, for instance, to set takeoff power precisely, adjust it during climb, reduce it to avoid excess torque or ITT, change it when the intake inertia separator is

EADS Socata TBM 850

Price as Equipped	$2,850,000

Characteristics

Seating	1+5
Wing Loading	38.2
Power Loading	8.70
Noise (dB(A))	79.6

Dimensions (ft/m)

External	
See Three-View	
Internal	
Length	13.3/4.1
Height	4.0/1.2
Width (Maximum)	3.9/1.2

Power

Engine	P&WC PT6A-66D
Output (shp)	850
Flat Rating OAT°C	ISA+49°C
TBO (hr)	3,000

Weights (lb/kg)

Max Ramp	7,430/3,370
Max Takeoff	7,394/3,354
Max Landing	7,024/3,186
Zero Fuel	6,761/3,067b
BOW	4,885/2,216
Max Payload	1,876/851
Useful Load	2,545/1,154
Executive Payload	1,000/454
Max Fuel	1,887/856
Payload With Max Fuel	658/298
Fuel With Max Payload	669/303
Fuel With Executive Payload	1,545/701

Limits

VMO	270
PSI	6.2

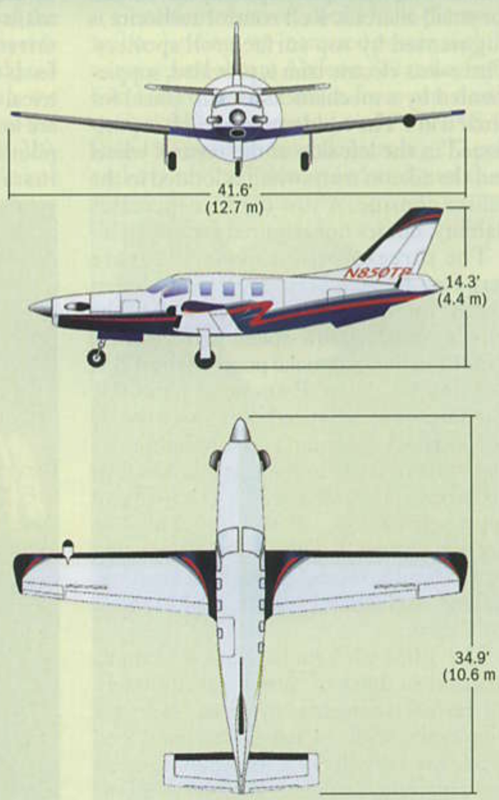
Climb

Time to FL 310	20 min.
FAR Part 25	
OEI Rate (fpm/mpm)	2,000/610
FAR Part 25	
OEI Gradient (ft/nm, m/km)	923/152

Ceilings (ft/m)

Certificated	31,000/9,449
Service	31,000/9,449
Sea Level Cabin	*Not Available*

Certification	FAR Part 23, 2006



The aft baggage compartment in the cabin can accommodate up to 220 pounds of luggage.

opened or closed and alter it for ram recovery effect. Adding to the workload, only torque settings for 2,000 prop rpm are published. If you want to use lower rpm in cruise, you must first set torque at 2,000 rpm and then pull back the prop lever to the desired rpm. Meanwhile, FADEC is standard among VLJs.

The TBM850 has conventional primary pitch, yaw and roll flight controls, operated by means of push-pull rods, cables and bell cranks. The wide span flaps only leave room for small ailerons. Roll control authority is augmented by top surface roll spoilers. Three-axis electric trim is provided, supplemented by a mechanical backup wheel for pitch trim. The rudder trim switch is positioned in the left side of the control wheel and the aileron trim switch is located in the center console. A yaw damper increases stability, but it's not required for dispatch.

The three-position fowler flaps are actuated by jack screws powered by an electric motor. They span 71 percent of the wing to improve low-speed performance, thereby helping to make possible the TBM 850's 65 KCAS stall speed at MTOW. Landing approach speed varies between 80 and 85 KIAS depending upon weight. The flap control lever in the console has four positions: Landing - 34°, takeoff and approach 10°, up - 0° and up / 850. The latter position disables the 110-percent torque limiter on the engine's fuel control, making available the -66D's full 850 shp at 2,000 rpm.

The TBM 850's fuel system is virtually identical to those of earlier TBM models. All the fuel is contained in left and right wet wing tanks, with the system having a total usable fuel capacity of 1,887 pounds. Over-the-wing refueling ports are used to fill the tanks. Anti-icing fuel additive is required. The aircraft has an automatic tank switching feature that alternates fuel supply from the left and right tanks to keep them in balance. In flight, if a left or right fuel level low light illuminates, the system automatically switches to the fuller tank and draws only from it. If both fuel level low lights come on, the system switches between the two tanks at rapid intervals to prevent fuel starvation from one tank.

The 28 VDC electrical system is centered around a common main bus, selectively fed by the lead-acid battery, external power, the main engine starter-generator or a belt-driven, secondary alternator. The main bus feeds three sub-buses that power most electrical equipment. All of the circuit breakers are located on a single panel outboard of the pilot's left leg. If the optional pilot door is installed, the circuit breaker panel is relocated to the right side of the cockpit.

The passenger seats measure 18 inches wide with 22-inch-high backrests.

In the event of a main starter/generator failure, the standby generator can carry most electrical loads, but there is no automatic load-shedding function. The vapor-cycle air-conditioner, autopilot, selected lights, windshield heating and various other equipment items must be switched off manually.

There also are two essential buses that can be fed either by the main bus or directly by the battery. The essential buses power "get home" equipment such as the No. 1 Garmin GNS 530, transponder, altitude encoder, fuel gauges and landing gear indicator.

The TBM 850 has a new pressurization system that uses both low- and high-pressure bleed ports from the engine compressor. The dual-bleed design taps off engine bleed air more efficiently, thereby contributing substantially to the -66D's improved density altitude performance. Bleed air is routed through a conventional sonic venturi for flow metering, then through a heat exchanger for initial cooling, and finally through an expansion turbine for additional cooling. The air-cycle machine works well for air-conditioning at altitude, but not at low altitudes or on the ground. A separate vapor-cycle air-conditioner, with an electrically powered compressor, provides supplemental cooling inside the cabin, with or without use of the air-cycle machine. Uncooled bleed air is used for heating.

Cabin pressurization is controlled by means of a manual pressurization controller that uses vacuum to modulate the action of the main and safety outflow values. Proper regulation of cabin pressure differential requires the pilot set takeoff field elevation, cruise altitude and landing field elevation. As with most older vintage pressurization controllers, the pilot must set the rate control to minimum before slowly adjusting the pressurization control to avoid uncomfortably rapid changes in cabin pressure. An electrically operated solenoid valve ports full vacuum pressure to the safety outflow valve on the ground to dump all cabin pressurization automatically.

A supplemental oxygen system, supplied by a 50.3-cubic-foot bottle, provides oxygen to crew and passengers, if needed. Quick donning masks are installed in the ceiling, just behind the pilot seats, for use by the crew. The four passenger oxygen masks automatically deploy if cabin altitude exceeds 14,000±750 feet. Oxygen is not used for normal operations because, as Chabbert noted, the aircraft's maximum cruise altitude is 31,000 feet. In addition, the aircraft can descend from FL 310 to 12,500 feet in about two minutes at VMO and idle power/2,000 rpm, thereby reducing the possibility that the crew would lose useful consciousness during an emergency descent if supplemental oxygen was unavailable.

Both anti-ice and deice systems are used for ice protection. The engine inlet, in keeping with standard PT6A design practice, is continuously heated by exhaust gases. An inertia separator, when activated, prevents ice or other FOD from entering the engine. Opening or closing the inertia separator causes engine torque to change by several percent, so special care must be taken not to exceed torque or ITT limits, depending upon density altitude. This also results in a substantial reduction of climb rate when attempting to climb above icing conditions.

The prop, windshields and pitot tubes are electrically heated for ice protection. As stated earlier, there are pneumatic deice boots on the leading edges of the wing and on the empennage as well, along with the elevator horns.

Flying From San Diego to Atlanta

Flight planning is not a precise task in the TBM 850. While the *Pilot's Information Manual* provides climb, cruise and descent tables, it doesn't provide data on fuel consumption for start, taxi and takeoff. In addition, fuel consumption tables are published in gallons, kilograms and liters, but not pounds. So both estimation and conversion are needed for flight planning.

Also, all published performance tables assume the optional radar pod is not installed. However, since virtually all TBM 700 and 850 aircraft delivered to owner/operators are equipped with radar, it's necessary to subtract two to five knots from published cruise speeds. The extra drag also reduces range by 1 or 2 percent.

Accompanied by Mike Sarsfield, Socata's eastern U.S. sales manager, we boarded TBM700N s.n. 390. With a full a complement of optional equipment, its single-pilot BOW was 4,880 pounds, five pounds less than the weight published in *B&CA*'s 2006 *Purchase Planning Handbook.* With two aboard and full fuel, the ramp weight was 6,967 pounds. Estimated takeoff distance was 2,500 feet, for the ISA-4°C, 423-foot field elevation conditions.

The TBM 850 has a useful clearance delivery radio feature that's available with all power switches off and radio master switch on. That activates only the number one Garmin GNS 530 radio. We retrieved our clearance, started the engine and commenced taxi to Runway 28R for takeoff. Sarsfield recommended opening the inertia separator for all ground operations and takeoff to reduce the possibility of FOD ingestion. That's good practice because liberal use of prop beta pitch is required during taxi to control taxi speed without resorting to frequent use of the brakes.

There is a small aft, external compartment that will hold up to 77 pounds of baggage.

Once cleared for takeoff, we held the brakes and advanced the power to set 1,900 rpm for the prop overspeed governor check, then advanced the power to set 100-percent torque and began the takeoff roll. Using a rotation speed of 85 knots, the aircraft lifted off the runway in about 1,900 feet.

The TBM 850 is easy to hand fly, but we engaged the autopilot early in the flight so that we could pay close attention to power setting chores. It's quite easy to exceed the 850-shp torque limits when the inertia separator is closed unless power is reduced substantially. During the climbout, we noted that 850 shp is not available up to the ITT limits, and climbing through FL 220, power adjustments are needed to stay below them. Approximately 840 shp to 637 shp is available for climb between FL 230 and FL 310, assuming standard-day conditions and a best-rate-of-climb speed of 130 KIAS. Notably, Socata's published best-rate-of-climb speed doesn't change with differences in altitude or weight, so it may be possible to extract better climb performance out of the aircraft than what's published in the AFM.

After numerous intermediate level offs required by ATC, we arrived at FL 310 about 19 minutes after takeoff at a weight of 6,668 pounds. As we passed through FL 260, a prominent resonance could be heard in the cockpit. Sarsfield explained that it was probably a hiccup in the new high/low dual port bleed air system. The resonance was relatively constant with changes in rpm and it was much more prominent noise than the sound of the prop. It also was somewhat annoying in spite of the excellent sound suppression provided by the aircraft's standard Bose ANR headsets.

In ISA+4°C conditions with maximum cruise power set, the aircraft accelerated to 298 KTAS at a fuel flow of 340 pph. Published fuel flow was 365 pph and estimated cruise speed was 303 KTAS, accounting for the radar pod. Speed varied plus/minus five knots due to mountain wave in the lee to the east of the Laguna Mountains. Even though actual cruise speed was five knots less than book, specific range was about 5 percent better than forecast.

The mountain wave settled out by the time we flew over El Paso, Texas, one hour, 40 minutes after takeoff. Speed stabilized at 302 KTAS in ISA+10°C conditions at a weight of 6,353 pounds. That was just one knot slower than the book value, adjusted for the drag of the radar pod.

The 80- to 120-knot tailwind dropped to 40 knots or less as we approached a point abeam Lubbock about two hours 16 minutes and 770 nm into the mission. We elected to reduce power to conserve fuel. Fuel flow was 251 pph and cruise speed was 249 KTAS in near ISA conditions, very close to book values. Pulling back the power added about 10 to 15 gallons to our estimated fuel on board at DeKalb-Peachtree, providing good IFR fuel reserves. It also got rid of most of the bleed air system resonance. The aircraft's XM radio weather system said that the weather was severe clear at the destination and likely to remain that way for the remainder of the flight.

Confident that we would have plenty of fuel on landing, we increased power slightly as we passed abeam Abilene, 882 miles from San Diego and 777 miles from our destination. We accelerated to 264 KTAS in ISA+1°C conditions while burning 277 pph and maintained that speed and fuel flow

A separate, forward compartment holds the collapsible tow bar and duct covers.

until we were told to descend by ATC some 200 nm short of the destination. Once again we throttled back during the descent to conserve fuel. We used a 140- to 150-KIAS seat-of-the-pants descent profile because only high-speed descent profiles are published in the AFM.

At each intermediate level-off altitude, we stabilized the aircraft at long-range cruise. We held 150 KIAS until just before entering base leg for Runway 20L at DeKalb-Peachtree. We configured the aircraft for landing, slowed to 85 KIAS and landed with 215 pounds aboard, equivalent to about 35 minutes of long-range cruise endurance.

The five-hour, 24-minute flight was hardly a routine mission for the TBM 850, but it would have taken much longer in any VLJ because of the time required for a typical refueling pit stop en route. We also could have flown the mission nonstop with five occupants aboard the TBM. Such a payload may have required two en route refueling stops for current production VLJs.

Conclusion? The TBM 850's range/payload capabilities and cabin size make it quite competitive with the emerging class of VLJs.

Engine

The TBM 850 may have only one engine, but it's a Pratt & Whitney Canada PT6A 60-series turboprop, and thus a member of a family of powerplants renowned for their exceptional reliability. The -64 has proven to be one of the most reliable of the 60-series engines, perhaps because it's very under-stressed. It only uses 44 percent of its thermodynamic horsepower for takeoff. Similarly, the -66D only uses 47 percent of its capacity to produce 850 horsepower.

The PT6A-66D aboard the TBM 850 entered service with a 3,000-hour TBO. As fleet experience increases, Socata and P&WC look forward to increasing TBO to 3,500 hours, as the two firms did with the -64 on the TBM 700.

What's the biggest drawback to having a -66D engine up front? Like the -64, these high output PT6A engines streak the fuselage with exhaust soot. Bring along plenty of soft towels and liquid spray cleaner for postflight clean-up chores.

Avionics

The TBM 850 provides virtually all the functionality pilots expect in a current-generation light turbine business aircraft cockpit. That's assuming you're willing to master the functions of several autonomous boxes, which almost begrudgingly work with each other. A half dozen different vendors supply components for the instrument panel. Each independent box has its own little electronic empire and it seemingly doesn't want to acknowledge the roles played by its neighbors in the panel. In short, the cockpit is a classic federation of independent components that just aren't designed to work as an integrated system, a cohesive team that supports the pilot. As a result, the pilot spends plenty of time head down, searching for information that's in plain sight with an integrated system having large-format, flat-panel displays, such as one finds in today's VLJs.

The fuel management system, for example, can display fuel flow, fuel remaining or fuel on board at the destination. But it can't provide all those data simultaneously. Each fuel system value must be called up by twisting and clicking through a series of menu pages. Cabin pressurization manually must be set by the pilot for departure airport, cruise altitude and destination pressure altitude. The GMX200 MFD, while having a very-high-resolution, high-contrast display, has excessive chart minutia, intended for the benefit, and possibly the entertainment, of little airplane flyers.

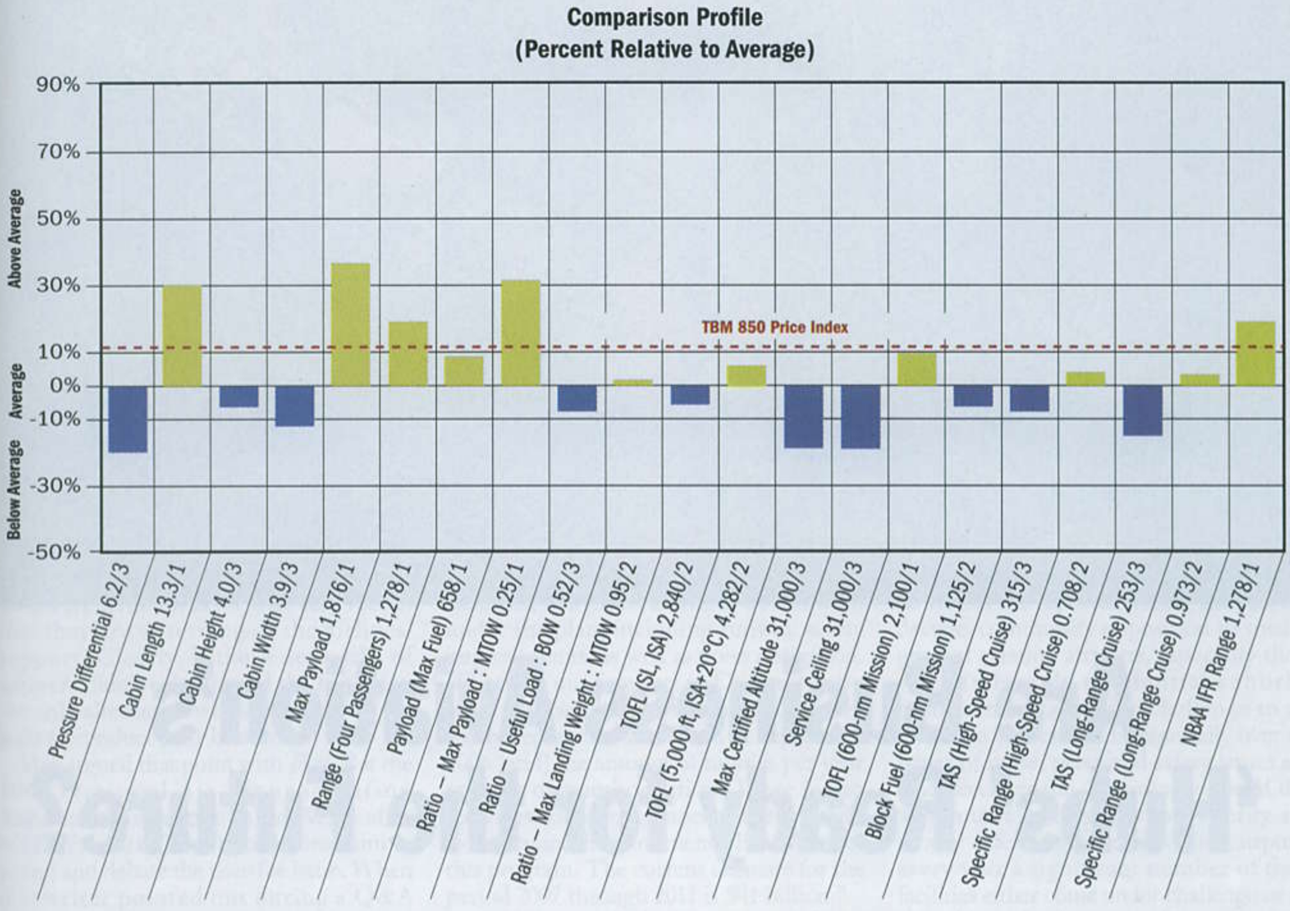
Socata officials say that a fully integrated avionics system, with large-format displays, is under development.

Price and Value

B&CA's Comparison Profile compares the TBM 850 to a composite average including the Eclipse 500 and Cessna Citation Mustang. Other single and multi-engine turboprops were excluded from this Comparison Profile because Socata mainly is positioning the TBM 850 as an alternative to VLJs — not other turboprops — and we wanted to isolate that competition. The Comparison Profile shows that the TBM 850 fares well vs. the two VLJs in cabin size, maximum payload, maximum range and fuel efficiency at long-range cruise. Its strong suit is carrying bigger loads longer distances than the VLJs. That capability enables it to fly certain missions nonstop rather than having to make an en route refueling stop.

But the vast majority of missions in this class of aircraft are two hours or less. The TBM 850 isn't as fast as either of the VLJs, but its strong climb performance enables it to complete 600-mile missions within six to seven minutes of its turbofan competitors. The Comparison Profile, though, indicates that TBM 850 operators won't save any fuel compared with the average VLJ, assuming each aircraft can fly an optimum vertical profile.

Several aspects to aircraft operation aren't illustrated by the Comparison Profile. Chabbert, for instance, asserts that the TBM 850 will be easier to insure than a VLJ. In 2007, that's undoubtedly true. More than 390 TBM 700/850 aircraft have been delivered in the past 17 years. During that period, NTSB records indicate that only one engine-related accident occurred, and the cause was traced to improper maintenance. That history has provided the aviation insurance industry with considerable experience and stabilized accident rate records. Initial VLJ deliveries, in contrast, are just beginning this year. The aviation insurance industry needs about three years of operations in order to establish baseline



Trade-offs are a reality of aircraft design, although engineers attempt to optimize the blend of capabilities, performance and passenger comfort. In this Comparison Profile, B&/CA compared the TBM 850 to the composite characteristics of the Cessna Citation Mustang and Eclipse, computing the percentage differences for various parameters in order to portray TBM 850's relative strengths and weaknesses. We also included the absolute value of each parameter, along with the relative ranking, for the subject aircraft within the composite group. The Comparison Profile shows that the TBM 850's strengths are cabin length, max payload and NBAA IFR range. Maximum certified cruise altitude and service ceiling are typical for a turboprop, some 10,000 feet below the cruising altitude for the other two competing aircraft. Admittedly, this specific Comparison Profile is somewhat of an apples-and-onion comparison. Socata, however, frequently compares the TBM 850 to VLJs, so that's why we chose two VLJs as the basis for comparison.

accident rates, a critical part of determining appropriate insurance premiums. It's likely that the aviation insurance industry initially will err on the conservative side (meaning expensive) for VLJ insurance premiums. Depending upon the number of VLJ deliveries during the next 12 to 18 months, the accident record baseline for VLJs may be available in less than three years. Assuming a good safety showing, that should result in substantially lower insurance premiums for VLJ operators.

Both VLJs have two engines, so engine failure en route would be more of an abnormal event than an emergency procedure. NTSB records, though, don't show a single accident caused by a TBM 700 or TBM 850 engine failure. FAA records show only one TBM 700 incident attributable to engine failure. That resulted in a day VFR emergency landing at Champagne-Urbana airport in December 2002, ending with a runway overrun and two blown tires.

Highly improbable as it might be, if the engine were to quit aboard the TBM 850 at FL 310, it can glide at 120 KIAS for 70 miles using a descent rate of about 1,000 fpm. That gives the pilot more than half an hour to fly the aircraft to a landing facility. So, only having one engine aboard the TBM 850 doesn't appear to be a significant safety disadvantage compared with operating a twin-turbofan VLJ.

Cabin volume is another factor not included in the Comparison Profile. The TBM 850 has about the same cabin volume as the Mustang, but it's smaller in cross section and three and one-half feet longer from end to end. The Mustang is the only aircraft among the three that has a lavatory, albeit a forward cabin, occasional-use-only privy.

Interior noise levels also aren't included in the Comparison Profile. Based upon *B&CA*'s experience in all three airplanes, both VLJs have a substantial advantage over the TBM 850 in the 300-plus KTAS cruise speed range, even though it's one of the quietest turboprops we've yet flown.

Finally, there is the matter of price. The TBM 850 is 12.3-percent more expensive than the composite average of the three aircraft in the Comparison Profile. In a price-dependent comparison, the TBM 850 compares favorably to the VLJs in maximum payload capability and maximum range. But its $2.85 million price tag may be hard for some buyers to swallow in comparison to $1.49 million for the Eclipse 500 or $2.54 million for the Cessna Citation Mustang.

Still, the TBM series has a strong following of loyal repeat customers. This year EADS Socata is on track to deliver 51 to 52 TBM 850 aircraft. By the end of the fourth quarter, more than 400 TBM 700/850 series aircraft will be in service around the world. That's an excellent trend if you're the maker of the world's fastest production single-engine general aviation turboprop. **B&CA**