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Operators Survey:

Daher-Socata TBM 850

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TBM 850

Speedy single-engine turboprop competes head-to-head with VLJs.

By Fred George

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There now are more than 245 TBM 850 single-engine turboprops in service and the fleet has amassed more than 120,000 flight hours. Operators say that the newest iteration of the Daher-Socata aircraft is fast, economical and well built, reliable, comfortable to fly and easy to maintain. It has block speeds on typical missions that are competitive with entry-level light jets, but it burns far less fuel.

Most operators fly average stage lengths that are just under 500 nm, according to fleet statistics. On average, operators only fly 182 hr. per year, so the fleet experiences relatively gentle use compared to many other types of turbine business aircraft.

A sizable number of operators fly missions of about 300 nm, an especially sweet spot in the aircraft's operating envelope when measured against comparable jets. Flying 300 nm from White Plains, N.Y., to Pittsburgh in a TBM 850, for example, takes 1 hr., 1 min. That's just 6 min. more time than in an Embraer Phenom 100, but the single-engine Socata turboprop burns 35% less fuel.

On longer trips, such as a 600-nm race with a Cessna Citation Mustang from Indianapolis to Oklahoma City, the Mustang lands just 3 min. ahead of the TBM 850, but it consumes 20% more fuel, according to our May 2011 *Purchase Planning Handbook*.

The TBM 850 actually can fly 1,000-nm trips — such as between Bend, Ore., and Tucson, Ariz.; Bozeman, Mont., and El Paso, Texas; or Fort Lauderdale, Fla., and

Pittsburgh — faster than the Citation Mustang and it also burns less fuel. The Phenom 100 can beat the TBM 850 on a 1,000-nm trip by 11 min., but it consumes almost one-third more Jet-A.

In everyday operations, though, the speed advantages of light twin-turbofan aircraft over the TBM 850 may further diminish because of ATC climb restrictions. Not climbing directly to optimum operating altitudes of FL 390 to FL 410 not only crimps cruise speed, it also hurts the fuel efficiency of competitive turbofan aircraft.

The TBM 850, in contrast, only needs to climb to FL 260 to FL 280 to make good on its speed and fuel economy promises. At FL 260, the single-engine Daher-Socata turboprop can cruise as fast as 315 KTAS while burning 436 pph at mid-weight. No twin turboprop or turbofan aircraft

offers that combination of speed and fuel efficiency.

When required, the TBM 850 also can fly four occupants up to 1,450 nm. But this requires a direct climb to FL 310, the aircraft's maximum cruise altitude, and slowing down to 250 KTAS, its long-range cruise speed. We've indeed flown a TBM 850 from San Diego to Atlanta with the help of mild to moderate tailwinds and landed with 45 min. worth of fuel remaining. Having such long legs enables the TBM 850 to beat entry-level light jets on trips longer than 1,200 nm because it can fly nonstop, whereas the turbofan aircraft have to stop en route for fuel.

Few operators, however, want to spend nearly 6 hr. in the aircraft to squeeze out 1,450 nm of range. Most bought the aircraft for speed, so they fly at over 300 KTAS for 4 hr. and plan legs no longer

than 1,100 nm to 1,200 nm.

Operators say that actual aircraft performance closely matches book performance predictions. But Daher-Socata quotes cruise performance numbers for aircraft that aren't equipped with the wing-mounted weather radar pod even though virtually all aircraft are fitted with it, and the pod knocks five or more knots off maximum cruise speed.

Operator Demographics

Although the TBM 850 is manufactured in Tarbes, France, more than three of every four aircraft are registered in the United States. A total of three are based in Canada, but there are none registered in Mexico. A large percentage of operators are small entrepreneurial firms, particularly construction companies with regional travel needs. Other small firms include automobile distributors and legal services, manufacturing, investment and industrial equipment companies. Most aircraft in the U.S. are owner-flown.

Europe ranks second in TBM 850 registrations, with over 40 aircraft mostly based in Germany, the U.K., France and the Netherlands. Others are registered in Luxembourg, Italy and Poland, plus Switzerland, Liechtenstein and Bulgaria, along with Austria, Cyprus, Guernsey and the Isle of Man. South America has the third most TBM 850 registrations, with the majority being based in Brazil.

Reliability, speed and operating economy factored heavily into most purchase decisions. "I've had three TBMs during the last 16 years and I've never had to cancel a trip," says Stanley "Sandy" Rand III, who flies s.n. 363. "We wanted a new aircraft, one that was a lot more reliable than our [cabin-class piston-twin]," explains Chris Handevitd, chief pilot for Bevcomm, which flies s.n. 382.

Most operators tell us that they upgraded from a previous TBM 700 model, another single-engine turboprop or a piston-engine aircraft. For many, the TBM 850 is their first turbine aircraft. Stepping up into a \$3 million aircraft represented a major cash commitment compared to previous piston-engine aircraft they owned. In return, many said that having all-weather flying capabilities, especially flight into known icing conditions, made it well worth the investment.

Many said they looked at the Pilatus PC-12, but it was too expensive, too large and too slow for their needs, plus it burns more fuel than the TBM 850. The Piper Meridian, essentially being a turboprop conversion of the piston-engine Mirage, ranked a distant third because of its

piston-engine design roots and range/payload tradeoffs, operators said.

Twin turboprop or turbofan aircraft were not considered because of their greater purchase costs, initial training challenges and higher direct operating costs. Operators said that the TBM 850 is built as well as any transport category jet even though it was certified in accordance with FAR Part 23 normal category airplanes. It just happens to be powered by a single, and very reliable, Pratt & Whitney Canada PT6A turboprop engine rather than two jet engines, they say.

Notably, there have been no TBM 850 engine failures to date. "One PT6A beats two piston engines every day of the week," says Handevitd.

The TBM 850 has six seats, but most operators say they typically fly with one pilot and two or three passengers. Current production aircraft have a 633-lb. tanks-full payload, starting with s.n. 434 in 2008. The second-generation TBM 850 is about 80- to 100-lb. lighter in weight than legacy models because of avionics and systems upgrades. Older (and heavier) models have a 658-lb. tanks-full payload, but they carry 130 lb. less fuel so they actually have 50 nm less range.

"When needed, I can carry my wife and two children with full fuel," says new owner Jonathan Schmelz, who took delivery of s.n. 586 in July 2011.

Operators Evaluate Their Aircraft

The aircraft's 300-plus knots cruise speed usually tops operator's lists of their five favorite features. "We've flown it from Renton [Wash.] to Detroit with one fuel stop in 6 hr. It took 7+15 coming home against 90-kt. headwinds. That beats the airlines hands down," says Chuck Pepka, who operates s.n. 350, a 2005 TBM 850.

"It's incredibly reliable," says Pepka, whose aircraft was the fifth to enter service and has now logged 1,200 hr., making it one of the top-10 highest time TBM 850s.

Operating efficiency is another favorite trait. The aircraft should burn 480 lb. of fuel on a 300-nm trip. That's more than a Piper PA-46T Meridian, but less than a PC-12. But the TBM 850 has faster block speeds than any other single-engine turboprop. At high-speed cruise, it has a specific range of 0.625 to 0.699 nm per hour. Using the aircraft's gallons-per-hour fuel-flow gauge, that results in 9 to 10 nm per gallon.

Cabin space, passenger comfort and useful load also were favorites. For buyers of 2009 and newer aircraft, the five-year warranty and maintenance coverage package was an inducement.



Operators say that the 850-shp PT6A-66D is powerful and reliable. But, the cost of overhaul at the 3,000 hour TBO is estimated to be \$260,000 to \$280,000.

When TBM production began in Tarbes, Socata was a division of EADS, but the latter sold its interest to Daher, a large French aerospace and defense manufacturer, in 2008.

The change in control seems to have had no negative impact on the product whatsoever. In fact, build quality was frequently mentioned by TBM 850 owners as an asset. The Daher-Socata single's robust airframe received consistent "A" or "A-plus" grades. The aircraft has a 266 KIAS V_{mo} redline. "It's unbelievably well built," says Bruce Ravel, who flies s.n. 347, a 2005 model that was the second TBM 850 to enter service.

The 850-shp PT6A-66D also received strong marks. Operators laud its 150 extra shaft horsepower, reliability, smoothness and fuel efficiency. The 66D has an improved compressor and single-crystal

high-pressure turbine blades that have a 40C higher ITT limit than the 700-shp -64 that powers the TBM 700. Those are two prime reasons why the -66D boosts cruise speed by over 20 kt. at FL 260 and up to 34 kt. at FL 310, the aircraft's maximum operating altitude.

But since the -66D is a relatively new variant of the PT6A, Pratt & Whitney Canada set its initial hot-section inspection interval at 1,500 hr. and 3,000 hr. for TBO. P&WC and Daher-Socata want to check several engines during their first HSI to ensure that it's safe to extend HSI and TBO intervals to 1,750 hr. and 3,500 hr., respectively.

However, the high-time aircraft in the fleet won't need hot section inspections until 2012. Once P&WC and the airframer extend engine maintenance intervals, most



Daher-Socata worked with DRJ Technologies in Corona, Calif., to develop an overhaul program for the Messier-Dowty landing gear. Overhaul cost is one-third less than exchanging the components through Daher-Socata's own parts department. In addition, landing gear overhaul intervals have been extended to 5,000 cycles, thereby eliminating five- and seven-year calendar-based overhauls.

-66D engines won't need HSIs during the first nine and one-half years of operations, based upon current average fleet utilization. Flying the airplane 182 hr. per year means that TBO won't be reached until the aircraft has been in service for 19 years.

While virtually all operators praise the PT6A-66D for performance, many say it needs a full-function FADEC computer to provide carefree handling, including automatic torque and temperature limiting. Virtually all new turboprop engines are equipped with FADECs, as are turboprops fitted to regional aircraft. Almost all PT6A engines used in civil airplanes are equipped with legacy hydromechanical fuel control units, requiring careful engine monitoring and judicious throttle movements by pilots. With no viable competition in the light turboprop engine market, P&WC hasn't been compelled to upgrade civil aircraft versions of its PT6A engine with FADECs.

Operators gave the avionics mixed reviews. Aircraft s.n. 346 through s.n. 433, built from 2005 through mid-2007, were fitted with Honeywell KFC325 flight control systems and EFS-40 CRTs. Operators said the reliability of CRTs and symbol generators is decreasing and that exchange units are expensive. They also said that the twin Garmin GNS530A GPS/nav/comm radios have limited functionality by current standards.

Starting at s.n. 434 in mid-2007, the OEM upgraded the cockpits to Garmin G1000 avionics with a kit that's nearly identical to the G1000 package installed in the Citation Mustang. The G1000 package includes left- and right-side 10.4-in. LCDs with a center 15-in. MFD. The package adds new functionality, such as synthetic vision and 3-D display of proximate air traffic, plus it shaves about 80 to 100 lb. from aircraft empty weight, depending upon options. Operators gave the G1000 system considerably higher marks than the legacy Honeywell system.

For 2005 through 2007 legacy TBM 850 aircraft equipped with the Honeywell system, Camarillo, Calif.-based Avex is developing a G600 retrofit package, providing enhanced functionality, improved reliability and reduced weight. Avex also offers a GTN750 touch-screen navigator package to replace the Garmin GNS530A radios. The GTN750 offers almost double the screen display area of the GNS530A, plus it has virtually all the features of a current generation FMS.

The electromechanical standby attitude indicator also has suffered reliability issues. Some operators have replaced it



The authorized service center network is being expanded and MRO facilities are being encouraged to stock more spares in parts inventories. The goal is to provide maintenance slots for scheduled services with no more than 48 to 72 hr. of lead time.

with a solid-state L-3 Trilogi integrated standby instrument system that has no moving parts.

Airframe systems are very reliable for the most part, according to operators. However, the performance and reliability of the Honeywell Aerospace Secan (Societe d'Etudes et de Construction Aéronautique) vapor-cycle air conditioner fell below the expectations of many first-generation TBM 850 operators. It has caused a significant number of maintenance headaches and its cooling performance is marginal in hot weather, operators say.

Beginning at s.n. 434 in 2008, the airframer switched to a Liebherr air-conditioning system. Operators say it's 50% more powerful, more compact and more reliable than the Secan unit. The Liebherr system also features separate thermostats for cockpit and cabin zones, a first for this class of aircraft.

Product Support Solutions

TBM operators have griped about the high prices of exchange parts and limited parts inventories since the model was introduced into the U.S. in 1990. That shortcoming began to be remedied quickly when Nicolas Chabbert assumed duties as president of Socata North America in April 2006, just after the TBM 850 reached full-rate production. Chabbert is now senior vice president of Daher-Socata's airplane division.

Operators say that Chabbert sought inputs from all stakeholders, including the TBM Owners and Pilots Association (TBMOPA), service centers and parts vendors. This process accelerated about three and one-half years ago when Socata North America hired Charlie Holomek as vice president of customer support.

Operators say that Chabbert and Holomek have made commitments to bring down the cost of operating TBM aircraft.

"We're paying more attention to customer issues and we've increased our communications with customers. We started sending out periodic service information letters at the end of 2007. We're aware that parts prices are a concern for every operator of every aircraft. And we want to bring up our [customer support] ratings," Holomek says.

Andrew Knott, executive director of the TBMOPA, says that his organization has worked closely with Chabbert and Holomek to examine the cost of every part priced at more than \$5,000. In

response, Daher-Socata has partnered with several MRO facilities in the U.S. to develop repair and overhaul services for components, which eliminates the need to buy new or exchange replacement parts from the original equipment vendors.

"The real cost of parts has improved substantially," Knott says. "There are many more options to repair components instead of replacing them."

Starter-generators, for instance, now can be overhauled in North America by Thales Avionics in Edison, N.J. The 600-hr. brush replacement costs about \$2,000 and the 1,200-hr. brush and bearing replacement costs about \$3,000. In contrast, it costs



Distributors and operators say that Nicolas Chabbert, senior vice president of Daher-Socata's Airplane Division, has been instrumental in reducing cost of ownership by developing local MRO support for rotatable components. He's also credited for boosting parts inventories to prevent AOG flight cancellations.

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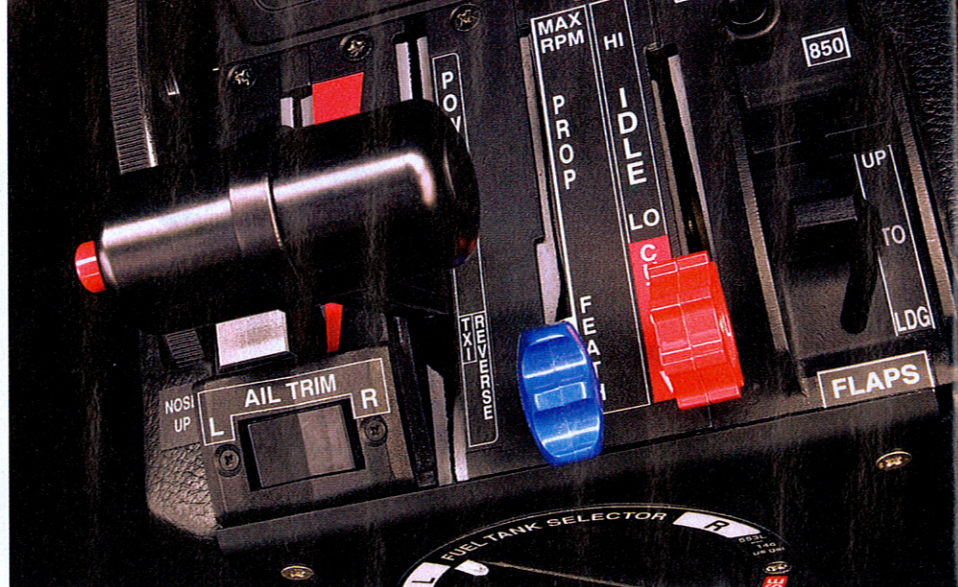
\$30,000 to purchase an exchange starter-generator, Knott says.

Similarly, if the Honeywell Secan air conditioner, fitted to s.n. 346 through s.n. 433 aircraft, quits working, it costs about \$100,000 to replace. But repair parts kits now are being stocked by service centers in North and South America. Technicians at such facilities can repair or overhaul just the failed parts inside the Secan units at a much lower cost to operators.

Overhaul intervals on the Messier-Bugatti-Dowty landing gear struts have been extended to 5,000 cycles with no calendar life limit because of a new periodic inspection and field maintenance program. Landing gear overhaul by Messier-Bugatti-Dowty can cost between \$40,000 and \$42,000 for all three struts. Socata North America, however, helped DRJ Technologies in Corona, Calif., develop a factory-approved overhaul process. DRJ can overhaul all three gear for \$30,000. DRJ also offers seven-year overhauls for the landing gear actuators for \$15,000, reducing the cost by more than half compared to Messier-Bugatti-Dowty's price for exchange parts.

Socata North America also is expanding its service center network to provide additional support capacity for operators. Avex Aircraft, Columbia Aircraft, Elliott Aviation, Muncie Aviation and Northwest Aircraft, plus Socata's own service center at Pembroke Pines, Fla., form the core of the network. New authorized service centers in North and South America are being established. Atlantic Aero in Greensboro, N.C., was brought on board in 2009, Aero Servicio in Santiago, Chile, joined as a service center in 2010 and Total Air Group in Memphis and Tunica, Tenn., became an authorized service facility this year.

In parallel, Socata North America has



The TBM 850 has a modified throttle quadrant that allows power to be increased from 700 shp at takeoff to 850 shp for climb. This function could be performed automatically if the -66D were equipped with a FADEC, but P&WC has yet to see the business case for upgrading the engine.

invested \$3 million in its parts inventory that now includes 6,600 items. As a result, AOG fill rates have reached 90%, according to Holomek. "Our service centers are authorized to go directly to vendors and MRO shops. We try to influence the service providers to hold larger parts inventories. And we look at our own parts inventory in Pembroke Pines every month to spot shortages and improve fill rates."

Operators Have No Regrets

TBM 850 operators are among the most brand-loyal groups that we have contacted during our periodic operators surveys. No one we contacted has second thoughts about the decision to purchase the aircraft.

There is clear segmentation among single-engine turboprops, operators say. The Piper Meridian provides an affordable upgrade for people who want turbine power and who seldom fly with more than one passenger. The PC-12 is a large aircraft that has the capabilities of a single-engine Hawker Beechcraft King Air. The TBM

850 is the fastest single-engine turboprop and it's the most viable alternative to an entry-level light jet, according to operators. "The PC-12 is a great truck. The TBM 850 is a Ferrari," says Brett Youngans, who professionally crews s.n. 355 for Whyne Supply Co., a Caterpillar Equipment outfit in Louisville, Ky.

Owners are especially pleased with the distributor network, many mentioning Avex Aircraft as providing top-notch after-market support, maintenance and upgrade services. "You won't meet anybody nicer than the people at Avex," Pepka says.

Operators are impressed with Socata North America's efforts to reduce operating costs, to provide more service centers and to increase parts inventories. With fuel prices now triple what they were a few years ago, operators say they're feeling the pinch but they're glad they're flying TBM 850 single-engine turboprops and not light jets.

People also say they value Daher-Socata's continuing product improvement program for the aircraft. The second-generation TBM 850, introduced in mid-2007, for example, weighs less, carries more fuel, and has G1000 avionics and better systems than the first-generation model that made its debut in 2005.

Overall, those factors have generated high customer satisfaction. "The aircraft's speed and efficiency put it into a class by itself. It's smooth, easy to maintain and it has much improved parts support," says Youngans.

Schmelz says that he intends to keep his TBM 850 for 20 years, longer than any other aircraft he's owned. "It's still the plane of my dreams," Pepka exclaims. Operators advise potential buyers to talk with TBM 850 owners before making a purchase decision. Based upon what operators tell us, they could be Daher-Socata's most potent sales force. **BCA**



Starting at s.n. 434, standard equipment includes Garmin G1000, a fully integrated avionics system that adds impressive functionality and reduces aircraft empty weight by 100 lb. or more.