

COCKPITS AT WAR
RJ PILOTS VS. THE BIG BOYS

WAKE TURBULENCE
FLIPPED BY THE DRAGON'S TAIL

TECH AND JUDGMENT
THE MODERN PILOT'S DILEMMA

FLYING[®]



THE WORLD'S MOST
WIDELY READ AVIATION MAGAZINE
-JUNE 2014-

WEFLY

TBM 900

LOOK OUT, LIGHT JETS

p. 44

JUST
SuperSTOL
WE LEARN TO LEVITATE

Plus

DRONE
JOBS
NEXT GREAT "PILOT" MARKET

WEFLY

DAHER-SOCATA TBM 900

THE FASTEST SINGLE-ENGINE TURBOPROP JUST KEEPS GETTING BETTER.

When French company Socata launched the single-engine turboprop TBM 700 with Mooney in 1989, many observers wondered if the airplane would ever be anything more than an aerial oddity. That's before people began to operate it and realized the many benefits of having a single Pratt & Whitney PT6 up front. That first TBM was long on range and speed – around 290 knots at high cruise – and miserly on operating costs.



PHOTOS BY ROBERT GOYER

THE 900 HAS A NEW CFD-DESIGNED CARBON FIBER COWLING, AIR INLET AND EXHAUST TO CUT DRAG AND BOOST PERFORMANCE.



That formula hasn't changed in the past 25 years, but the TBM has, going through as many as nine iterations (depending on how one counts the model changes) and improving with every one. Up to now, the move to the TBM 850, a 2006 *Flying* Editor's Choice Award winner, was arguably the model that made the most significant improvement to the type, with increased

gross weight, top speed, safety features and interior refinements. I flew the airplane a couple of years ago soon after it got its Garmin G1000 panel and was happy that we saw a high-cruise airspeed of around 315 knots at 28,000 feet. That's fast for a single. Heck, it's fast for just about any turboprop.

With the 850, a lot of folks might have concluded that the company, despite its top-notch aerodynamicists and engineers, had reached the

design limit. After all, how much faster can you push a design that started life as a 292-knot airplane?

Apparently, a lot faster. Thanks to a host of ingenious improvements and technology advancements, the new TBM 900 can cruise at 28,000 feet under standard conditions at 330 knots. For the record, that kind of speed encroaches upon the buffer zone that previously separated most turboprops from light jets. It does it, let's remember, on around 60 gph

instead of at least twice that for light jets.

I've been doing a lot of TBM flying the past couple of months, first in a TBM 700 belonging to Hartzell Propeller, the company with the household name (at least in aviation households anyway) located in quiet Piqua, Ohio, that has become the most advanced propeller maker on the planet. The 700 I flew was outfitted with Hartzell's new five-blade prop designed expressly for the

yet-to-be announced TBM 900. The flight from sunny Austin, Texas, to snowy Piqua was great fun, and fast too. We were seeing better than 280 knots true from the old bird, an increase in 2 knots, said Wayman Luy, who has a couple of thousand hours in that particular airplane, so I'll take his word for it. Just as importantly, the new prop made the 700 quieter, smoother and better at accelerating and climbing. I'll let our readers debate the looks of the new mill.

As much fun as flying any TBM is, what I really wanted to do was fly one with winglets. I got my chance a week after Sun 'n Fun down in south Florida at Daher-Socata North America's headquarters at cozy North Perry Airport. Before I got to fly the 900, though, I had the blessing and the curse of having to/getting to photograph it on two

prop or the winglets. Some airplanes when they get winglets look as though they had them tacked on like an aftermarket spoiler on a cheap car. The TBM 900 looks like it was born with its new curled-up tips. It looks so good, in fact, that I'm betting some existing TBM owners put money down on a 900 just because it looks so great. It wouldn't be the first time such a thing has happened.

You don't get a 15- to 20-knot improvement in top-cruise speed by making an airplane prettier, however, and the truth is the company used a multiprong approach to dramatically improving the TBM's already impressive numbers.

NEW IN MANY WAYS

Very seldom are major aircraft manufacturers successful at keeping their secret programs secret, but in the case of the TBM 900, Daher-

THE NEW HARTZELL COMPOSITE FIVE-BLADE PROP GIVES THE TBM 900 GREATER ACCELERATION, IMPROVED CLIMB AND CRUISE, AND QUIETER OPERATION. IT'S AVAILABLE ON NEW AND EXISTING TBMS.

air-to-air missions, one in the evening and one early the next morning. I say it was a blessing because the airplane is very pretty to look at, especially from my vantage point peering at it through the barn-door-size opening where the Piper Seneca's back door usually resides, and I say curse because I had to watch someone else fly it that whole time instead of me.

The experience of flying the 900 really is noticeably better than flying the 850, and some of the 900's enhancements come with the benefit of improved safety and utility. More dramatic are those improvements associated with performance. The 900 is faster, it's more fuel efficient, it climbs better, it uses less runway both coming and going, and did I mention how pretty it is?

I'm not sure what new feature I noticed first on the 900, but it's one of two things, the new five-blade

Socata kept the rumor-safe shut tight. The program, called the "Century Project" internally, has been in the works for a few years now and takes advantage of technologies not available to the company when the airplane was born a quarter of a century ago. Chief among these is computational fluid dynamics (CFD), which existed but was beyond the reach of a company like Socata at the time. In reworking the 900, Daher-Socata engineers made extensive use of CFD in order to minimize drag. While that sounds simple enough, nothing could be further from the truth. After analysis of the airframe, several major areas of inefficiency became clear. The cowling, now in carbon fiber, was extensively redesigned to cut drag and improve cooling, with a big inlet below the prop. The wings, while not redesigned, were given winglets, which did a few important



THE GARMIN G1000 COCKPIT IS UPDATED WITH NEW YOKES, ALL-NEW POWER QUADRANT AND A STYLISH HIGH-END DESIGN.

things. First, they kept the spanwise flow along the wing from spilling over, adding efficiency mostly by decreasing drag. They also increased the effective wingspan of the airplane, again increasing lift. Finally, they improved the handling of the ailerons, with some reporting smoother roll response and others greater control feel. To me, it felt as if both were true. That's a lot of bang for a pair of winglets.

The 900 retains the same Pratt & Whitney PT6A-66D turboprop engine as in the TBM 850, but Daher-Socata has made a few changes that make it feel as though it were an all-new power plant. For starters, the TBM can make use of 850 shp for takeoff thanks to a new torque limiter, so takeoff rolls are reduced. Takeoff at standard conditions at max weight requires only 2,380 feet over a 50-foot obstacle. That's impressive for a 7,394-pound airplane.

The operation of the engine is all new too. While you can't yet get a

fadec PT6, the TBM is the next best thing, with a power control unit that combines thrust, propeller and condition levers by using an ingenious all-mechanical mixer. Pilots use a single lever that after start-up slides to the left to serve as the thrust lever, making it impossible to grab the wrong lever at the wrong time. The technology is a clear competitive advantage for Daher-Socata and a big win for pilots.

The yokes have also been redesigned. They are more compact, nicer to handle and attractive. I didn't like how high the trim button rose from the end of the yoke horn. It was an awkward stretch for an action you need to perform almost constantly during departures and arrivals.

FLYING A FAST TURBOPROP

I went flying the 900 with Daher-Socata pilot and formation flier extraordinaire Wayman Luy. The plan

was to climb to 28,000 feet, get an idea of how the 900 does at altitude, descend for some airwork, and then go grab some seafood for lunch at Everglades City.

Another improvement for the 900 I'll mention now is the standard pilot door. While a door had been available previously, it is standard on the 900, and the construction of the door, milled aluminum substructure instead of built-up construction, is new as well. Having a pilot door makes life easier, as all you need to do is climb in, pull up the step and close the door instead of having to go through the process of opening and closing the big main passenger door before climbing through the cabin to the front seats. The addition of the pilot door as standard is huge.

The start sequence isn't different from that on previous TBMs, except that you use a single lever. After holding down the start switch for

three seconds, you bring the lever off the stop to introduce fuel and then monitor the temps just as you'd normally do. Once you've got a good start, you move the lever firmly to the left. It is now the thrust (and reverse thrust) lever. A separate emergency override lever gives the pilot fail-safe control.

Taxiing the 900 feels faster to me, though Wayman doesn't think it is. I think the five-blader gives the airplane a bit more thrust at idle. On the takeoff roll, the extra thrust from the 850 shp is an eye-opener. The TBM always seems to leap off the runway, but the 900 seems to accelerate much faster than the 850, an observation with which Wayman readily agrees.

Climb-out is fast. It was a very warm spring day, but at best rate of climb we were seeing a steady rate of 2,000 fpm. With three of us on board — photo ship pilot Bruce Moore came along for the trip — plus a good bit of gear and full fuel, we had a healthy load too.

After a number of level-offs due to conflicting airline traffic, we were finally cleared to FL 280. Daher-Socata says the 900 will get up to FL 310 in 18 minutes. I don't doubt it, but we didn't get to see it that day.

At 28,000 feet, the optimum altitude for the 900 compared with 26,000 feet for the 850, we saw 324 knots true airspeed at ISA+8, a single knot over book value, which lists 330 knots at ISA for that same altitude. At that level, we were burning around 60 gallons of jet-A per hour per engine, of which there is, of course, only one.

Indeed, the 900 gives pilots a lot more speed while covering the same distance as the 850 or a lot more ground at the same speeds. It's a win in either direction for the new kid. The range and speed profile is impressive. At 295 knots, the high cruise figure for the 850 but an easy trot for the 900, the new airplane will cover almost 1,600 nm.

That means that trips that require a fuel stop for an airplane like the Citation Mustang or the Phenom 100 will be easy pickings for the TBM 900, just as they were for the 850. Only with the 900, you get there a lot faster.



THE TBM 900'S NEW POWER QUADRANT MECHANICALLY COMBINES POWER, CONDITION AND PROP LEVERS, CREATING AN INGENIOUS SINGLE-LEVER SOLUTION.



STANDARD ON THE 900 IS A PILOT'S DOOR, WHICH WAS FORMERLY AN OPTION. THE DOOR LOOKS THE SAME BUT HAS BEEN STRUCTURALLY REDESIGNED TO BE MORE DURABLE AND EASIER TO OPERATE.



THE WINGLETS, NEW ON THE 900, IMPROVE THE TBM'S PERFORMANCE, CUTTING DRAG AND IMPROVING THE FEEL AND ACCURACY OF THE AILERONS.



A NEWLY DESIGNED VENTRAL FIN GIVES THE TBM GREATLY ENHANCED SLOW SPEED AND HIGH-POWER CONTROLLABILITY, ALLOWING THE AIRPLANE TO USE FAR GREATER TAKEOFF POWER.



2014 Daher-Socata TBM 900

The TBM 900 we flew for this piece was an early factory demonstrator. The TBM 900 sports winglets and a power control mixer and features the Garmin G1000 with dual 10.6-inch PFDs and a 15-inch MFD along with Garmin weather radar, SiriusXM datalink weather, Garmin GFC 700 automatic flight control system, approach charts, SafeTaxi utility, TAWS, traffic avoidance and awareness, ESP envelope protection and more.

APPROXIMATE PRICE, AS TESTED \$3.71 million	MAX ZERO FUEL WEIGHT 6,032 pounds
ENGINE Pratt & Whitney PT6A-66D	MAX USABLE FUEL 291 gallons
TBO 3,500 hours	PRESSURIZATION DIFFERENTIAL 6.2 psi
CABIN LENGTH 13.3 feet	8,000-FOOT CABIN @ FL 280
MAX CABIN WIDTH 3.9 feet	MAX RATE OF CLIMB 124 kias
MAX CABIN HEIGHT 4 feet	MANEUVERING SPEED 158 kias
SEATS 6	TAKEOFF, 50-FOOT OBSTACLE 1,385 feet
LENGTH 35.1 feet	LANDING, 50-FOOT OBSTACLE 2,430 feet
HEIGHT 14.3 feet	MAX CRUISE 330 ktas, 28,000 feet, ISA
WINGSPAN 42.1 feet	FUEL FLOW, MAX CRUISE 64.1 gph
WING LOADING 38.16 pounds per square foot	FUEL FLOW, LONG RANGE 39.1 gph, 244 ktas
POWER LOADING 8.7 pounds/shp	MAX OPERATING ALTITUDE 31,000 feet
MAX RAMP WEIGHT 7,430 pounds	MMO 271 kcas
MAX TAKEOFF WEIGHT 7,394 pounds	STALLING, MTOW 65 kias

The cabin is nice too. It's a standard club cabin, but Daher-Socata offers it in an easily convertible form as well. You can add a potty chair, but privacy is not ideal. It's a family or emergency affair. Then again, smaller airplanes, even transportation airplanes, are often compromised in this regard.

The increase in horsepower for the 900 wasn't a question of structure or power but of controllability at extremely slow speeds and extremely high power. The addition of the winglets and newly designed strakes, Daher-Socata's Michel De Villiers told me, went a long way toward proving the additional stability needed to pass that one critical test.

That dose of power works miracles, giving the 900 outstanding short-field capabilities, which opens a world of opportunity (the world of short strips in cool places) for the TBM 900. Everglades Airpark is only 2,400 feet long, but with my far less than elegant technique, I was able to get it down and stopped with a lot of room to spare. Getting out of town — after a tasty lunch of fried clams and shrimp and conch chowder at Triad downtown — was just as easy. I didn't even have to hold the brakes.

The final landing of the day, back at North Perry, was about as good as my first few efforts, through no fault of the airplane. I would have liked to have flown for a few more hours and done a dozen circuits or so, but I'd learned plenty about the airplane, and it was heading off anyway. Wayman was taking it to a prospect in central Florida. Like all of the sales guys at Daher-Socata, Wayman has been busy the last couple of months showing the 900 to very interested prospects, many of them current TBM owners.

It comes as no surprise to me. As has been the case with every new introduction to the TBM family, the latest, the TBM 900, is the best yet by a long shot. The gorgeous lines, the speed, the tech refinements and the improved performance across the board combine with all the strengths of a well-proven product to make the TBM 900 a tremendous success. 