



TBM 700C2

# Heavy-duty



**W**ith 14 years of production and some 275 airplanes in service worldwide, EADS Socata's TBM 700 has secured a firm niche in the single-engine turboprop market. For many pilots, the TBM 700 represents the ultimate personal aircraft: fast, good-looking, and easy to fly. The latest iteration of the TBM 700—the TBM 700C2—boosts the airplane's appeal with a number of improvements.

**TBM 700C2**

## **Heavy-duty**cruiser

Hauling a load—quickly

**BY THOMAS A. HORNE**

The big news is the airplane's increased weights. The C2's maximum gross weight is up 815 pounds—to 7,394 pounds—from the B model's 6,579 pounds. Depending on your choices from the options list, its basic empty weight is 4,600 to 4,900 pounds, which is up to 785 pounds heavier than the B's. Bottom line: The C2 claims a maximum payload of 1,100 to 1,400 pounds. With full fuel, payloads range from 658 to 895

PHOTOGRAPHY BY MIKE FIZER



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pounds, enough for the sales types to claim you can fill five of the C2's six seats (assuming those five people don't have baggage, assuming one of those people is the pilot, and assuming all weigh the standard 170 pounds) and the fuel tanks, fly some 1,100 nm, and land with IFR fuel reserves. More realistic would be a pilot-plus-three-passenger load of 200-pounders, plus 50 pounds of bags, which the C2 can also accommodate with full fuel tanks.

The combination of full seats, full tanks, and a 1,000-nm range is the Holy Grail of light-airplane designers. But design trade-offs conspire against it. At the top of the list is gross weight. To make this payload and range target, the airplane structure must be strong enough to haul the load and withstand the stresses. That means a heavier airplane and, consequently, a higher stall speed. And there's the dilemma. Bust the magic 61-knot  $V_{SO}$  (stall speed in the landing

configuration) established by the FAA for single-engine airplanes and your hopes of certification under FAR Part 23 are doomed.

Because it weighs more than its predecessors, the C2 has a  $V_{SO}$  of 65 knots—four knots higher than previous TBM versions. To get around the 61-knot barrier, Socata used an exemption to the rule. The exemption allows Part 23 certification if manufacturers can demonstrate that passengers in newly designed crashworthy seats can safely withstand crashes involving 20-G decelerations. This exemption also has been successfully used by the Pilatus PC-12, another popular turboprop single. The goal behind the exemption is to try to guarantee that forced-landing crash decelerations in the heavier airplanes will be the same as those in lighter models.

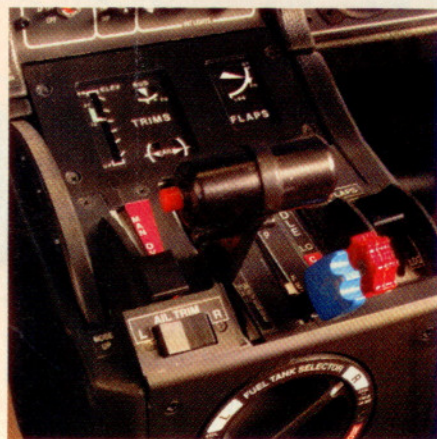
A visit to the EADS Socata factory in Tarbes, France, gave me the chance to scope out the C2's new seats. (EADS,

by the way, stands for European Aeronautic Defence and Space Company, the successor organization to Aero-spaciale, and under whose umbrella Airbus airliners and Eurocopter helicopters are also manufactured.) Tucked away in the shadow of the Pyrenees, the factory pumps out an average of two TBM 700s per month, and also does subcontract work for Dassault Falcon Jet and Airbus.

In the final assembly area, where airframes are completed and interiors installed, you can see some of the beef-ups that distinguish the C2. The wing attach points are massive, and there is additional structure that reinforces the wing against excessive fore and aft movements. Landing-gear attach points, wheels, and tires are sturdier than those of earlier models, and so are the aft-cabin baggage-net attach points. In all, there are more than 150 part changes in the C2.



A Honeywell EFIS package, a pair of Garmin 530s, and Honeywell's Integrated Hazard Awareness System (IHAS) fill out the standard panel. Trim position indicators take up prime real estate on the center pedestal, for good reason. Torque at high power settings requires hefty amounts of right-rudder trim for takeoff.



Naked of their upholstery, the new seats certainly look like serious hardware. A rather severe-looking metal seat-pan extends the length of the chair, and the tubular bracework is evocative of an ejection seat. Once completed and installed, however, the seats' leatherwork covers up the severity and promises all the plushness you'd expect of a \$2.6 million airplane.

Cabin comfort is also addressed by a new environmental control system. C2s now come with a single high-power air-cycle machine that's capable of quickly drawing down heat-soaked cabins, even at idle power settings. Earlier-model TBMs had separate Freon/R134 air conditioners, which added weight and complexity.

Other signature design features are retained in the C2. There's the large cabin door, a legacy of the previous TBM 700B model (see "Turbine Pilot: Super-Size It!" September 2002 *Pilot*), and the

optional (\$49,950) pilot door that was introduced in 1999. Although it takes some contortions to maneuver yourself up the small folding ladder, over the wing leading edge, and past its smallish opening, the pilot door makes sense for operators who fly their TBMs on cargo missions (Quest Diagnostics, a medical-testing firm, uses six TBMs to shuttle samples around the country), or for pilots who don't want to squeeze past their passengers after securing the main cabin door from the inside.

The C2's panel isn't much different from earlier TBMs. There's a two-tube Honeywell EFIS 40 electronic horizontal situation indicator (EHSI) and electronic attitude director indicator, dual Garmin GNS 530 nav/com/GPS units, and Honeywell's IHAS 8000 system (which includes enhanced ground proximity warning, Goodrich SkyWatch traffic awareness, and on-board radar imagery functions), which plays on a sepa-

rate Honeywell KMD 850 multifunction display. The glareshield-mounted Bendix/King KFC 325 autopilot/flight control system includes altitude preselect, yaw damper, half-bank, and soft-ride features. Copilot instrumentation isn't shabby, either, what with a full set of flight instruments, a radar altimeter, and an HSI. Known-icing certified? Of course.

Quick-donning oxygen masks for the front-seaters—and drop-down masks for the passengers—make for safer flying when cruising deep in the flight levels. This system, which also includes bottled oxygen (as opposed to the chemically generated oxygen systems used in the first TBM 700s, the TBM 700A models), also lets C2 pilots fly as high as 31,000 feet. Before this system was installed, maximum operating altitude was 30,000 feet.

Flying the TBM 700C2 is a breeze—once you make peace with the systems

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The C2's new, 20-G seats are as comfortable as they are sturdy. Quick-donning oxygen masks for the pilots, and drop-down masks for passengers are signature cabin features of newer TBM 700s. These permit operations up to 31,000 feet.

and avionics. Those tasks should be easily mastered after taking SimCom's six-day-long pilot initial training course, which is included in the airplane's purchase price. Some V-speeds are up a few knots from the B models', and runway

requirements have also crept upward—something you'd expect from a heavier airplane.

There are few gotchas (one is to pay close attention to rudder trim—an important item in an airplane with 700

shaft horsepower worth of torque and p-factor), and pattern speeds are comparable to those of typical complex piston singles. Rotate at 85 knots, climb away at 140, and see a climb rate in the neighborhood of 2,000 feet per minute.



Cruising at max power in the mid-20s at standard temperatures (minus 26 degrees Celsius at FL260, for example), where TBMs make their best speeds, Socata says you can count on the C2 to turn in true airspeeds around the 290-knot mark at higher weights. You push the much-advertised 300-knot cruise speed with lighter payloads and colder-than-standard temperatures. Socata says that the extra weight of the C2 results in speed penalties only at the airplane's highest cruise altitudes. At FL290 and standard temperature (minus 32 degrees Celsius) the pilot's operating handbook (POH) claims a true airspeed of 282 knots with the airplane weighing

**Stronger landing gear assemblies and attach points help the C2 handle the extra loads imposed by the 815-pound gross-weight increase over previous models.**

## SPECSHEET

### EADS Socata TBM 700C2

Average equipped price: \$2.66 million

#### Specifications

Powerplant	Pratt & Whitney PT6A-64, 700 shp
Recommended TBO	3,500 hr
Recommended HSI	1,750 hr
Propeller	Hartzell four-blade, constant speed, full-feathering, reversible pitch, 91 in dia
Length	34 ft 11 in
Height	14 ft 4 in
Wingspan	41 ft 7 in
Wing area	193.7 sq ft
Wing loading	39.2 lb/sq ft
Power loading	10.5 lb/shp
Seats	1 + 5/6
Cabin length	13 ft 4 in
Cabin width	3 ft 11 in
Cabin height	4 ft
Standard empty weight	4,650 lb
Max ramp weight	7,430 lb
Max takeoff weight	7,394 lb
Max zero fuel weight	6,032 lb
Max useful load	2,780 lb
Max payload with full fuel	860 lb
Max landing weight	7,024 lb
Fuel capacity, std	290.6 gal (281.6 gal usable)
	1,938 lb (1,878 lb usable)
Baggage capacity, forward compartment	110 lb
Aft cabin	220 lb
Aft external	77 lb

#### Performance

Takeoff field length	2,840 ft
Takeoff field length, 5,000 ft @ 25 deg C/77 deg F	4,282 ft
Max demonstrated crosswind component	20 kt
Rate of climb, sea level	1,830 fpm
Cruise speed/max range w/NBAA fuel rsv, std fuel, std cond (fuel consumption)	

@ max cruise setting, 28,000 ft, 6,614 lb  
290 kt/1,015 nm  
(346 pph/51.6 gph)

@ normal cruise setting, 31,000 ft,  
7,275 lb 266 kt/1,315 nm  
(294 pph/43.9 gph)

Max operating altitude	31,000 ft
Service ceiling	31,000 ft
Sea-level cabin	14,390 ft
Landing distance over 50-ft obstacle, no reverse	2,430 ft
Landing distance, ground roll	1,840 ft

#### Limiting and Recommended Airspeeds

V <sub>R</sub> (rotation)	74-84 KIAS
V <sub>X</sub> (best angle of climb)	100 KIAS
V <sub>Y</sub> (best rate of climb)	124 KIAS
V <sub>MO</sub> (max operating speed)	266 KIAS
V <sub>A</sub> (design maneuvering)	158 KIAS
V <sub>FE</sub> (max flap extended)	178 KIAS
V <sub>LE</sub> (max gear extended)	178 KIAS
V <sub>LO</sub> (max gear operating)	
Extend	178 KIAS
Retract	128 KIAS
Approach speed, full flaps	85 KIAS
V <sub>S1</sub> (stall, clean)	81 KIAS
V <sub>S0</sub> (stall, in landing configuration)	65 KIAS

For more information, contact EADS Socata Aircraft, North Perry Airport, 7501 Pembroke Road, Pembroke Pines, Florida 33023; telephone 877/2-FLY-TBM or 954/893-1400; fax 954/964-0805; e-mail: info@socata.eads.net, or visit the Web site (www.socata.eads.net).

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.



**Believe me, if you have to cross the Atlantic in a single-engine airplane, the TBM 700 is a most civilized way to go.**

7,275 pounds. This weight represents an airplane that took off near maximum takeoff weight, then burned some 30 gallons of fuel in the 27-minute climb to altitude. B models under similar conditions can cruise at 293 knots, according to the POH.

I've been fortunate enough to fly TBMs on several transatlantic crossings. Believe me, if you have to cross the Atlantic in a single-engine airplane, the TBM 700 is a most civilized way to go. The most recent trip was in a brand-new C2—N700BK—bound for its proud owner in the United States. With me was Dominique Deschamps, a Socata test pilot and vice president of the aircraft division. My logbook shows that my leg from Wick, Scotland, to Reykjavik, Iceland, took a mere two and one-half hours. That translates into an average groundspeed of about 286 knots (light winds at our 28,000-foot cruising altitude, rare in these parts, certainly helped). Not bad at all.

For VFR landings, the C2 can be flown at 100 knots on downwind, then 85 knots on short final with full flaps. Those wide-span flaps, by the way, are the main reason why stall and approach speeds are so low. Once over the threshold, speed can be bled off just prior to touchdown, which the POH says should come at 78 knots. Then reverse thrust can be used to shorten the landing roll dramatically.

With a growing fleet and a far-ranging service network, Socata has come a long way since the TBM's early days. The company is fast outgrowing its North American headquarters at Fort Lauderdale's North Perry Airport, and the search is on for a bigger facility at a larger airport. A great deal of Socata's American market presence comes via the TBM 700—the company's biggest success story. The C2 proves that the airframe still has plenty of life left in it. **ACPA**

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Newly designed forward and aft external baggage compartments are also part of the C2's redesign. The towbar fits into a special housing in the forward compartment (right), which also holds exhaust plugs and other covers. The large main cabin door (below) is the same as the B-model's, and allows for graceful entries and exits.



**i** Links to additional information about the TBM 700 may be found on AOPA Online ([www.aopa.org/pilot/links.shtml](http://www.aopa.org/pilot/links.shtml)). Keyword search: TBM 700.