



Flying

The Piaggio P180 Avant

BY THOMAS

PHOTOGR



Remember the Avanti? The Italian design that debuted in the U.S. market in 1990, only to slide into oblivion by 1994? Well, it's attempting a comeback, under new management and with a more aggressive approach to service centers. Piaggio America Inc., located in Greenville, South Carolina, is the U.S. arm of the reconstituted Piaggio Aero Industries, a company that was beset by financial and other problems since its birth in 1986. Then the Avanti was born of a joint venture between Piaggio and Gates Learjet. The airplane was certified for single-pilot operations under FAR Part 23 in 1990 and then marketed in the United States under an arrangement between Piaggio and AMR Combs. That ended in 1993 when Avanti Aviation was formed and established in Wichita. Then Avanti Aviation went bust and that was pretty much that for the Avanti's U.S. presence.

Subsequently, the Italian government picked up the pieces, and bought and ran the Avanti project until 1998, when Piero Ferrari (son of Enzo, scion of the Ferrari automobile company) and a team of investors bought all the assets and formed Piaggio America.

Flying Ferrari

The Piaggio P180 Avanti—a turboprop twin with jet performance

BY THOMAS A. HORNE

PHOTOGRAPHY BY MIKE FIZER

What went wrong

Any discussion of the current Avanti must be prefaced by some analysis of its past misfortunes. After all, skeptics might say, if the Avanti couldn't make it 10 years ago, why should it succeed now?

A large part of the original Avanti's problems had to do with timing. Back in the early 1990s, the only other airplane that shared the Avanti's basic design was the Beech Starship—a notable failure in the marketplace. The Avanti's canard and twin-turboprop pusher configuration reminded prospects of the Starship—and probably scared more than a few off. Unconventional looks alone can jinx an airplane, but the Starship's reputation as heavy, loud, slow, and overpriced certainly didn't help the Avanti.

Then there was the service problem. The early Avanti didn't have an adequate



service center network, and maintenance issues sometimes weren't treated with the urgency that U.S. customers had come to expect. Factor in a then-steep price tag and a home office 3,000 miles away, and you had the recipe for a flop.

That was then

Although the Avanti hasn't changed during the intervening years, current economic conditions are making the airplane more attractive. According to Michael McMillan, Piaggio America's vice president of sales and marketing, many of the 16 to 18 airplanes to be delivered this year will be to former turboprop owners. The Avanti's combination of high speed (395 KTAS at maximum cruise power, 29,000 feet, and a 9,000-pound gross weight), large cabin (five feet, nine inches high; six feet wide; 14 feet, seven inches long—making it wider and taller than the Raytheon Premier I, Beech King Air 350, and Cessna Citation Bravo, to name a few), and comparatively low fuel burn make this twin turboprop a sensible alternative to business jets that can burn twice as much and have smaller cabins.

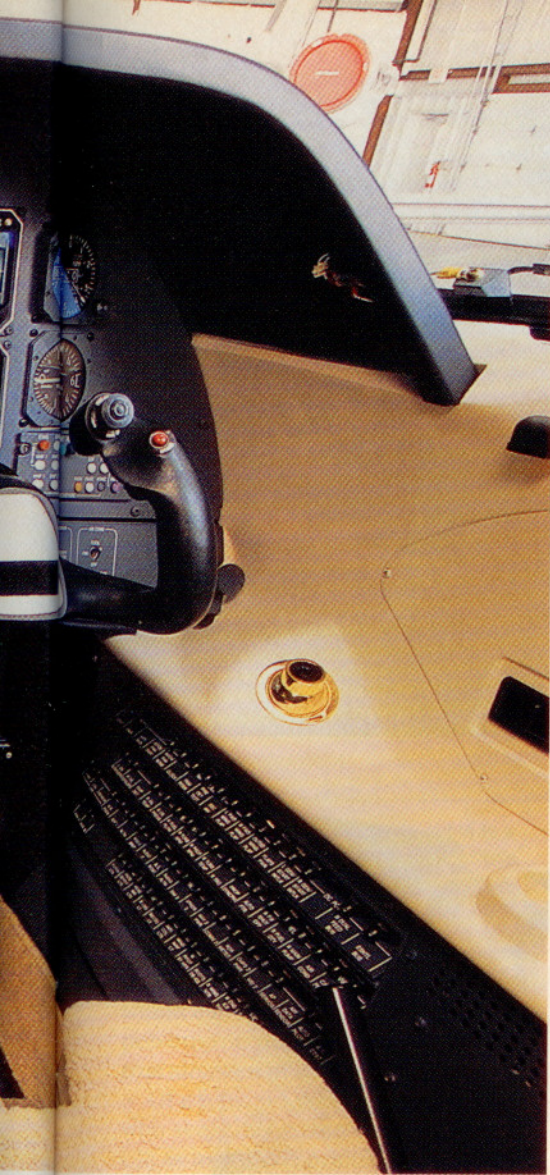
It's the Avanti's slippery lines that help give it a consistent advantage in fuel savings. In general, McMillan says, the P180 burns about 20 percent less fuel than other contemporary turboprop twins and 30 percent less fuel than many current entry-level turboprops.

Airframe

No doubt about it, the Avanti has distinctive looks. A few might say it looks weird, and around the office we used to call the Avanti "the catfish" because of its front view, which highlighted the fuselage's organic fish-body look; made the cockpit windows look sort of like eyes; and lent a spiky, well, catfish-barbell look to the nose. Then again, maybe our imaginations were a bit too active.

One might suspect aerodynamicist Burt Rutan's direct influence, what with the P180's swoopy fuselage lines, pusher propellers, and canard, but that would be wrong. Where Rutan's Starship was fabricated mostly of composites, the P180 is almost all aluminum. And as for the Avanti's canard, well, Piaggio says it isn't a canard at all. Canards, Avanti demonstration pilot Kevin McKamey explains, have all-movable control surfaces, like elevators. The Avanti instead has a forward wing, which is equipped with trailing-edge flaps. This is just one of the three lifting-surface design elements peculiar to the Avanti. The others are the main wing and the T-tail, elevator-equipped horizontal stabilizer. Together, Piaggio says, these three lifting forces give an extra margin of stability, drag reduction, and lift augmentation over conventional wing arrangements. Piaggio also says that laminar flow persists over 50 percent of these wings' chords.

This arrangement splits up the airplane's lifting force, and



The Avanti's avionics and instrumentation are the same as those used in the airplane's prior incarnation 10 years ago. The company is looking at replacing the old Collins displays and making a complete upgrade.

gives it a rather high (67.07 lb/sq ft.) wing loading. The forward wing produces about 25 percent of the airplane's lift. The main wing makes 45 percent of the lift, the horizontal stabilizer makes 10 percent of the lift (while producing zero down force), and the other 20 percent is produced by the fuselage's unique shape. Piaggio says that this lift setup splits the effects of turbulence over these three surfaces, and thus makes for a more solid ride in rough air. Aft-mounted, ventral delta fins improve directional stability.

The forward wing's ice protection system consists of electrical heating elements. The main wing's leading edges use engine bleed air—fed through piccolo tubes—to combat ice. In icing tests it was learned that the vertical and horizontal stabilizers don't accumulate enough ice to warrant ice protection.

An electrically powered, two-stage hydraulic system powers the landing gear and nosewheel steering. The main gear uses a single-wheel design, but the nosewheel has a double-wheel setup. In the nosewheel steering you'll find one of the Avanti's few true oddities. For taxiing there's a mode that gives the nosewheel 120 degrees of travel, which is nice for turning in tight spots. For takeoff the nosewheel's turning radius is limited to 70 to 90 degrees of travel, and there's a 7-degree "dead spot" in the rudder pedals' travel and feel (there's no dead spot in taxi mode).

The checklist calls for the pilot to switch from taxi to take-

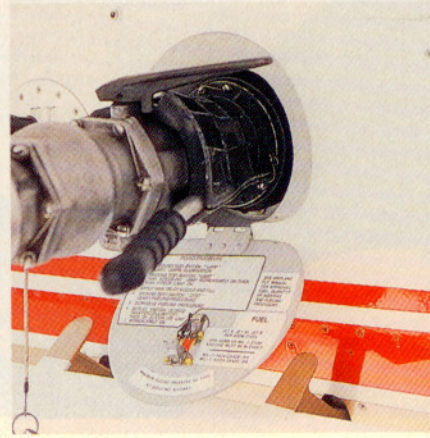
off mode as you take the runway, then turn the system off altogether once you've reached 60 kt (when aerodynamic steering kicks in) during the takeoff run. You do this by hitting a push button—one that does double duty as an autopilot-disconnect switch—on the left side of the control yoke. For those transitioning to the Avanti, groping for that switch with your thumb while simultaneously roaring down the runway with exquisitely sensitive steering is bound to be disconcerting. When landing, you have to remember to hit the switch again as speed slows below 60 kt during the rollout.

There are flaps on the forward and main wings, and these extend simultaneously. The main-wing flaps are the split-Fowler type, and extend both aft and down to increase lift. The airplane has no spoilers or other lift-dumping devices.

Another Avanti oddity is the lack of antiskid braking. This no doubt explains why balanced-field takeoff lengths run somewhat high for an airplane of this caliber. Under sea level, standard conditions, a max-takeoff-weight P180 will take 2,850 feet to clear a 50-foot obstacle. But accelerate-stop distances can be much longer. Piaggio is thinking about adding antiskid to future P180s.

Cabin

The cabin is definitely the Avanti's strong suit. It's more reminiscent of a mid-size jet's cabin—like a Hawker's—than an 11,550-pound turboprop's. It's quiet, too. The following may



sound like advertising malarkey, but here's the truth: A person seated in the aft cabin *can* hold a conversation with a person seated up front, by the refreshment center, in normal tones. Many times, the pilot can effortlessly hear what's being said in the back.

The pressurization system is exemplary, too, with a nine-psi cabin pressurization differential. This means that a sea-level cabin can be maintained all the way to 24,000 feet; at the maximum operating altitude of 41,000 feet, cabin altitude is listed as 6,400 feet.

To demonstrate the tightness of the pressure vessel and the huge volume of bleed-air coming from the airplane's 850-shp (derated from its 1,490-shp thermodynamic potential) Pratt & Whitney PT-6A-66 engines, McKamey turned off one engine's bleed air switch while cruising at 30,000 feet. There were no pressure bumps, and cabin altitude remained the same.

The typical cabin arrangement is double-club seating with a bench seat and jump seat up front, an aft lavatory, and forward refreshment center. Seating for six is the most commonly ordered interior, but the cabin can accommodate up to nine passenger seats. Avantis are flown green across the Atlantic, then paint and interior completions are done at Stephens Aviation in Greenville, or at AvCraft in Tyler, Texas.

Dual wheels distinguish the nosewheel setup and slippery, futuristic looks distinguish the entire airplane. Single-point refueling is standard.

Fam flight

The P180's cockpit is almost 10 years old, and it looks it. Compared to today's monster liquid-crystal displays the

Avanti's standard three-tube Collins EFIS-85 system looks a bit dated. Once again, Piaggio is exploring more modern displays for future Avantis.

Starting is fairly conventional for a PT-6 (crank the engine, move the combination propeller/condition lever forward at 13 percent gas-generator speed), and taxiing is a challenge at first. Except for the bit about the nosewheel steering, takeoffs shouldn't surprise anyone who's got some turbine time.

Once airborne, the Avanti feels more like a jet than a turboprop. First of all, it's quick to build speed and slow to dissipate it. And then there's that almost jet-like quiet. "It's quieter than a Challenger," McMillan says.

Passing through 23,000 feet on our way to 31,000 feet, the Avanti was still climbing at 2,000 fpm—and doing 290 knots' worth of true airspeed. McKamey says that cruise climbs typically run from 300 to 305 KTAS—"way faster than any King Air, and remember, that's in the climb."

Level at 31,000 feet, props dialed back to 1,850 rpm, burning 333 pounds per hour (about 50 gph) of fuel per side, and at 7 degrees above standard temperature, we saw 380-kt true

Piaggio P180 Avanti

Base price: \$4,695,000

Specifications

| | |
|------------------------|---|
| Powerplants | Pratt & Whitney PT-6A-66, 850 shp |
| Recommended TBO | 3,000 hr |
| Propellers | Hartzell, 85-in dia, 5-blade, constant-speed, full-feathering, reversible pitch |
| Length | 47 ft 3 in |
| Height | 13.06 ft |
| Wingspan | 46.03 ft |
| Wing area | 172.22 sq ft |
| Wing loading | 67.07 lb/sq ft |
| Power loading | 6.8 lb/hp |
| Seats | 6-9 + 2 |
| Cabin length | 14 ft 7 in |
| Cabin width | 6 ft |
| Cabin height | 5 ft 9 in |
| Standard empty weight | 7,500 lb |
| Maximum ramp weight | 11,600 lb |
| Maximum takeoff weight | 11,550 lb |
| Useful load | 4,100 lb |
| Payload w/ full fuel | 1,298 lb |
| Maximum landing weight | 10,945 lb |

| | |
|--------------------------|---------------------|
| Maximum zero fuel weight | 9,500 lb |
| Fuel capacity | 415 gal/2,802 lb |
| Baggage capacity | 400 lb, 44.15 cu ft |

Performance

| | |
|--|-------------------|
| Takeoff distance over 50-ft obstacle | 2,850 ft |
| Rate of climb, sea level | 2,950 fpm |
| Single-engine ROC, sea level | 756 fpm |
| Cruise speed/range | |
| @ Maximum cruise power/5 passengers plus 2 pilots/NBAA fuel reserves/ 28,000 ft, | 391 KTAS/950 nm |
| @ Maximum range power/5 passengers plus 1 pilot/ VFR fuel reserves/ 39,000 ft | 310 KTAS/1,750 nm |
| Maximum operating altitude | 41,000 ft |
| Landing distance over 50-ft obstacle | 2,860 ft |

Limiting and Recommended Airspeeds

| | |
|--|----------|
| V _{MC} (min control w/one engine inoperative), autofeather operative | 100 KIAS |
| V _X (best angle of climb) | 133 KIAS |
| V _Y (best rate of climb) | 160 KIAS |
| V _{XSE} (best single-engine angle of climb) | 132 KIAS |
| V _{YSE} (best single-engine rate of climb) | 160 KIAS |

| | |
|---|--------------|
| V _A (design maneuvering) | 199 KIAS |
| V _{FE} (max flap extended) | |
| 20 degrees/first notch | 180 KIAS |
| 43 degrees/full down | 175 KIAS |
| V _{LE} (max gear extended) | 185 KIAS |
| V _{LO} (max gear operating) | 180 KIAS |
| V _{MO} (maximum operating) | 260 KIAS |
| M _{MO} (maximum Mach number) | Mach 0.67 |
| V _R (rotation) | 101-106 KIAS |
| V ₁ (takeoff decision speed) | 103 KIAS |
| V _{REF} (final approach reference) | 117-121 KIAS |
| V _{S1} (stall, clean) | 103 KIAS |
| V _{SO} (stall, in landing configuration) | 93 KIAS |

For more information, contact Piaggio America Inc., 23 Exchange Street, Greenville, South Carolina 29605; telephone 864/277-3979; fax 864/277-4378; or visit the Web site (www.piaggioamerica.com).

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.

The Avanti's large, comfortable cabin is a big draw, making the airplane competitive with jets that may be long on speed but short on fuel economy.

airspeeds. This represents a max-cruise power setting; maximum-range power would call for about a 200-pph/30 gph-per-engine power setting and yield a true airspeed of about 330 kt.

Of a typical 1,000-nm trip, McMillan, who sees the Cessna Citations CJ1 and CJ2 as two of the principal competitors, says, "Sure, the CJ2 gets there about 15 minutes faster, but the Avanti's fuel cost will be somewhere around \$570. The CJ2's will be about \$300 more. And our cabin's bigger."

Descents and speed reductions have to be anticipated and managed carefully, especially since there are no spoilers or speed brakes—and at 20 seconds or so the flap extension speed is fairly sluggish. Once established on final at an approach airspeed of between 117 (light weights) and 121 kt (heavy), it's a matter of slowly pulling off the power and holding what may look like a rather lower-than-usual pitch attitude—a function, no doubt, of looking down that rakish nose—as you prepare for touchdown.

Bottom line

At a base price of \$4,695,000 the Avanti is comparable in price to many of the turboprop twins manufactured today and, like the light jets, it can be flown single pilot. But its large cabin, impressive speed, and fuel efficiency give it an edge over much of the turboprop competition, and the Avanti offers an acceptable alternative to economically pressed jet owners. Although its futuristic, unconventional looks may drive some customers away, Piaggio is most worried about



service support. Fortunately, Piaggio America Inc. has set about improving the P180's support network. Spare parts inventories are climbing rapidly, and field service representatives are assigned to each owner. So far, four facilities have been named as authorized service centers: Jetworks, at the Fort Worth Meacham Airport in Texas; Stephens Aviation, at the Denver-Broomfield and Greenville, South Carolina, airports; and AeroMech, at Lakeland, Florida's Linder Regional Airport. More are on the way, Piaggio says. They'll be needed if the company reaches its 30-airplanes-per-year sales targets. It will be interesting to see if a worthy but long-dormant airplane can resurrect itself in the U.S. market.

ACRA

E-mail the author at tom.horne@aopa.org