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Family rocket

Aerostar puts speed and comfort in one package

BY RICK DURDEN

"Looking good, now stop with the nosewheel on the runway centerline and hold the brakes," says Stan Musick, owner of this Aerostar 601P. It's his family airplane and just happens to be one of the fastest civilian piston twins in the world. He's in the right seat and talking me through my first launch.

"OK, bring the power smoothly up to 25 inches and let the twin turbos on each engine take hold and stabilize, and then ease the power up to redline," he instructs.

The props' roar becomes a howl and the nose comes down like a bull about to charge.

I take a last breath to center my thinking and get my brain well ahead of this airplane, as Musick has made it clear that it won't tolerate inattention. I release the brakes and feel the acceleration in my soul as a power loading of 10.3 pounds per horsepower makes itself felt and the airplane leaps its way down the runway. The airspeed starts its rapid upward scroll on the Garmin G600 primary flight display in this Normal category aircraft.

Going through 90 knots I raise the nosewheel about six inches off the pavement, hold the pitch attitude, and wait a moment. Takeoff in an Aerostar is more like a jet than a piston-powered airplane. With a wing loading of 33.6 pounds per square foot—twice that of what I've been flying—and a NACA 64-series airfoil it shares with the Learjet, it doesn't just float off the ground. It rolls on the mains for a few seconds, still accelerating hard, and then flies cleanly off.

PHOTOGRAPHY BY MIKE FIZER

There is little "feel" at first, just as in a jet. My sense is that right now the airplane is a ballistic collection of aerodynamic forms that will point and go as I command, provided I know the right commands.

Speed is increasing quickly in the rather shallow initial climb. Gear and flaps up, I let the speed build above V_Y, 117 knots, as I blast into the low overcast and watch the rate of climb build to nearly 2,000 fpm.

With speed comes sensation and feedback in the controls; the Aerostar changes personality from a point-and-shoot machine to a living, delightfully responsive being. Yet, trimmed for cruise climb at 140 knots, it is so nicely stable that it stays where I put it when I must divert my attention to other demands as Departure clears me higher and hands me off to Center, which turns me on course and sends me on up to FL230.

Under Musick's tuition I will later discover that hand-flying an Aerostar is one of the true joys of aviation. Steep turns are surprisingly easy, made even better by the extra windows in the headliner that allow me to see where I am going when tossing the airplane about; slow flight is utterly predictable, although the high wing loading means that it can develop a stunning sink rate; and stalls are straightforward, as long as I keep the ball centered. Nevertheless, I want to see how well the recently installed Garmin G600 and old Bendix FCS-810 autopilot work together, and let them do the flying for a bit.

The Garmin G600 retrofit takes a very good airplane and makes it better. Simply put, it is an intuitive system that simplifies the pilot's workload, providing him or her with far more information regarding the behavior and health of the airplane and the airspace around it than was ever available in even the most lavishly equipped, analogue Aerostar.

Approaching top of climb the pressurization system has continued to work smoothly. Now at its maximum 4.25-PSI differential, the cabin altitude will be about 9,000 feet once I level at FL230, which is coming up on the PFD right now. I punch the ALT button on the autopilot and pull out the cruise checklist as the nose gently comes down a few degrees and the speed again builds.

Musick sets power at 24 inches and 2,400 rpm. Speed stabilizes at 227 KTAS, burning 18 gph a side. Moving to lean-of-peak operation, I see a true airspeed of 205 knots and the fuel flow drops to 12.5 gph per side.

Out of curiosity, Musick pushes the power up to 27 inches while holding 2,400 rpm, rich of peak. Fuel flow goes up to 22 gph per side but the speed slides all the way up to 242 KTAS—faster than some twin turboprops, on less fuel.

With some time on my hands, I look around the circular-cross-section cabin. It is more spacious than it appears from outside, with more than adequate head and leg room. For Musick, this is the perfect family airplane; with full fuel (165.5 gallons usable) he can carry 719 pounds in the cabin. He has removed a middle-

Aerostars originally had but one hydraulic pump, on the right engine. The danger of being unable to retract gear and flaps in the event of a right-engine failure on takeoff, thus compounding an already serious emergency, causes one to wonder just what Smith was thinking that day.

Dramatically clean lines of the Aerostar are apparent even on the ground (left).

The pilot's seat slides forward and the clamshell door (above) provides easy entry to the deceptively wide, passenger-pleasing cabin (right).

row seat, making it a very comfortable five-place machine. Because of the high wing loading, the ride is smooth; turbulence is handled amazingly well, without tail wagging.

While preparing to fly the 601P I did some homework and learned that the Aerostar line was the brainchild of the eccentric genius, Ted R. Smith. After successfully midwifing the Douglas A–26 Invader attack bomber (with Ed Heinemann and Robert Donovan), and the Aero Commander series of twins and jets, he conceived a new line of mid-wing airplanes based on a common airframe of great strength so that it might eventually accommodate a pair of jet engines. The first Aerostar, the 600, was delivered in 1968. Shortly afterward the company changed hands with dismaying regularity—first to, of all entities, a cement company (the image is distressing); then an FBO chain; back to Ted Smith; and, finally, after Smith's death, to Piper Aircraft. Through that time the line expanded to turbocharging, pressurization, and larger engines. Production ended in 1984. Type certificates for the entire Aerostar line are now held by Aerostar Aircraft Corp., which also owns the tooling and spares, according to Ken Bacon, executive director of the Aerostar Owners Association. Bacon, a maintenance technician who often works on Aerostars, says owners report no difficulty in obtaining parts.

Musick's 601P is a 1977 model and bears the distinctive imprint of Ted Smith's designing hand. As with virtually all Aerostars, it has been oft modified and the subject of numerous ADs. Aerostar owners are fierce in their devotion to the marque; however, they are not always enthusiastic about the characteristics of certain systems.

Nosewheel steering is an electro-hydraulic arrangement controlled via a rocker switch; first taxi attempts by those new to the Aerostar are best compared to a drunk's excursions on a sidewalk. Should some component of the system fail, taxiing is a painfully difficult affair using differential power and brakes.

Aerostars originally had but one hydraulic pump, on the right engine. The danger of being unable to retract gear and flaps in the event of a right-engine failure on takeoff, thus compounding an already serious emergency, causes one to wonder just what Smith was thinking that day. This shortcoming has been remedied in virtually all Aerostars by an STC for an auxiliary hydraulic pump.

Fuel is stored in three tanks and provided to the engines in a novel fashion: the wing tanks gravity feed to a single tank in the rear fuselage; from there it goes to the engines. Should the ball be out of center for any length of time, one wing tank will drain faster than other, potentially creating a significant lateral imbalance. A solution is to retrim the airplane with the ball out of center by the same value in the opposite direction. Crossfeeding can be a remedy; however, a pilot who has heard the shuttling of the

SPECSHEET

Aerostar 601P
Price: $245,000

Specifications

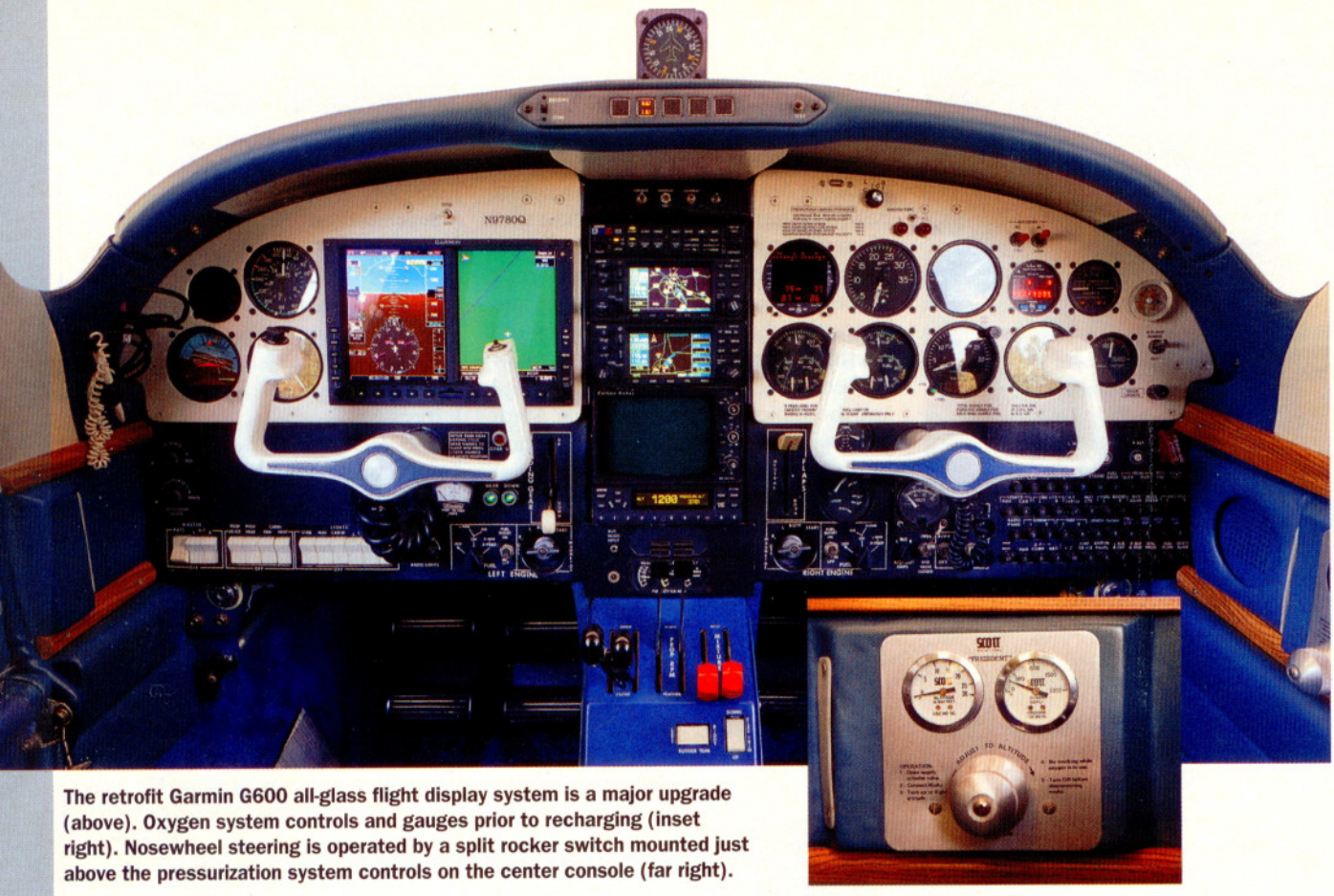
Powerplants	Two, 290-hp Lycoming IO-540-S1A5
Recommended TBO	1,800 hours
Propellers	Hartzell 3-blade, full feathering
Length	34.8 feet
Height	12.1 feet
Wingspan	36.7 feet
Wing loading	33.6 pounds/square foot
Power loading	10.3 pounds/horsepower
Cabin length	12.5 feet
Cabin width	3.8 feet
Cabin height	4 feet
Empty weight as tested	4,313 pounds
Max ramp weight	6,025 pounds
Zero fuel weight	5,900 pounds
Useful load	1,712 pounds
Payload with full fuel as tested	719 pounds
Max takeoff weight	6,000 pounds
Max landing weight	6,000 pounds
Fuel capacity	173.5 gal/165.5 gal useable
Baggage capacity	240 pounds/30 cubic feet

Performance

Takeoff distance, ground roll	1,900 feet
Takeoff distance over 50-foot obstacle	2,400 feet
Accelerate-stop distance	3,500 feet
Max demonstrated crosswind component	17 knots
Rate of climb, sea level	1,970 fpm
Single-engine ROC, sea level	240 fpm
Cruise speed, 74% power	233 knots
Fuel consumption 74% power	36 gph
Max operating altitude	25,000 feet
Single-engine service ceiling	8,500 feet
Landing distance over 50-foot obstacle	2,000 feet
Ground roll	1,200 feet

Limiting and Recommended Airspeeds

V_{MC} (min control w/critical engine inoperative)	84 KIAS
V_X (best angle of climb)	100 KIAS
V_Y (best rate of climb)	117 KIAS
V_{YSE} (best single-engine rate of climb)	109 KIAS
V_A (design maneuvering)	166 KIAS
V_{FE} (max flap extended)	148 KIAS
V_{NO} (max structural cruising)	215 KIAS
V_{NE} (never exceed)	241 KIAS
V_{S1} (stall, clean)	86 KIAS
V_{SO} (stall, in landing configuration)	77 KIAS



The retrofit Garmin G600 all-glass flight display system is a major upgrade (above). Oxygen system controls and gauges prior to recharging (inset right). Nosewheel steering is operated by a split rocker switch mounted just above the pressurization system controls on the center console (far right).

Speedstar

BY DAVE HIRSCHMAN

Oscar Taylor bought a new Aerostar 600 in 1978 and flew it for more than three decades because, in his mind, no other piston twin looked as good or flew as well—or as fast.

"I'm an old hot-rodder," said Taylor, 73, a general aviation pilot since the early 1970s (multiengine/instrument/seaplane/rotorcraft) and a serial entrepreneur who has started a dozen manufacturing businesses. "Performance, speed, and looks were always in my blood. And by those measures, nothing could beat an Aerostar."

The advent of single-engine turboprops more than a decade ago such as the TBM 700, Piper Meridian, and Pilatus PC-12 got Taylor's attention. But rather than buy a new turbine airplane, he began a five-year quest to convert an Aerostar into a single-engine turboprop that he believed would offer superior speed, range, and payload.

He bought an Aerostar 602P fuselage from an intact airframe that was being parted out. The wings came from a damaged Aerostar 600 and the rudder from an Aerostar 700. Taylor rebuilt the wings with thicker skins; added structure under the holes where the piston engines used to be, covering them with sheet metal; and made sure the entire surface was as smooth as possible with flush rivets for minimum aerodynamic drag.

Taylor, a skilled designer and fabricator who had taught himself to weld as a child, has a hangar filled with precision tooling equipment. When he wants to replace an aircraft part, or believes he can improve upon its design or construction, he frequently does the jobs himself. He used a CNC mill to build a larger and stronger nosewheel fork and made his own molds to create a thicker, more streamlined windshield (one-half-inch thickness instead of one-quarter inch), as well as thicker oval windows (three-eighths of an inch instead of one-quarter).

Aerostar designer Ted R. Smith had planned someday to build a twin-jet version of the sleek airplane, but no suitable fanjet engines existed at that time. Still, the knowledge that the Aerostar was designed for even greater speed than the twin piston engines could deliver gave Taylor confidence that, with his own modifications, it would stand up to the rigors of higher altitudes and greater forces that come from turbine power.

Taylor chose a Garrett TPE331-6 engine (840 shaft horsepower) because it was smaller, lighter, and less expensive than the alternatives. A 5.5-psi cabin pressurization system came from a Piper Meridian and keeps the cabin altitude at about 8,000 feet or below when flying at flight levels in the low to mid 20s. He modified the flight control system, increased the size of the horizontal stabilizer and elevator, replaced the original electrical system, and totally remade the interior.

"There are hundreds of modifications that you can't see in this airplane," he said of the Speedstar, which is registered in the Experimental category.

Adding a 500-plus-pound engine and four-blade McCauley prop at the front of the airframe required shifting weight aft to maintain the proper center of gravity. Taylor moved both 85-pound batteries to the rear of the airplane and placed 30 pounds of lead in the tail.

Taylor also pulled out the original instrument panel and replaced it with a new one stocked with Garmin avionics. A

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several electrically driven fuel valves while going through the fuel selector position test prior to engine start usually makes the prudent decision to avoid moving a selector in flight because an electrical hiccup can stop the delivery of fuel to that engine.

The 601P is not for the dilettante or someone unwilling to learn it thoroughly. The price of its capability is the willingness of its pilot to keep skill levels high and take serious recurrent training, as well as joining the Aerostar Owners Association (www.aerostar-owners.com) for updates on the airplane and systems. While it is pure enjoyment when everything is working, it is not particularly forgiving when something goes wrong. As an example, single-engine rate of climb is only about 240 fpm—if the pilot does everything right.

But now, Center has cleared me to begin my descent and I program the autopilot to progress downward at the desired rate. Later, hand-flying for the sheer joy of it, I approach the nontowered airport that is my destination, enter the pattern with power at about 17 inches, slowing to gear and flap speed comfortably on downwind. Turning final I hold 100 knots, finding that the airplane easily trims for the desired speed. Coming into the flare I close the throttles, pitch up a few more degrees, and roll on the mains, holding the nosewheel off as long as I can.

Slowing to taxi speed I reflect on the flight, and how the ability to retrofit the powerful technology of the G600 should help keep such a high-speed, capable work of art flying in good form for many years.

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two-screen G600 places an MFD and PFD on the left side, and it's driven by a pair of GNS 430W receivers. A Garmin G3X with its own AHRS provides the backup display.

Dave Morss, a highly accomplished test pilot, performed the initial Speedstar flights in 2009, and the airplane has now logged more than 120 flight hours. Taylor said the airplane typically cruises at 260 KTAS at 20,000 feet and consumes 38 gallons of fuel an hour at altitude. With full tanks (235 gallons) it can carry four adults (Taylor removed two of the original airplane's six seats) and 200 pounds of cargo more than 1,200 nm with reserves.

The Speedstar's flying characteristics are significantly different than those of the original Aerostar, however, because of the higher speeds, removal of the piston engines (1,400 pounds) from the wings, addition of a turboprop up front, larger control surfaces, and other factors, Taylor said.

"It's a very solid, stable aircraft that's light on the controls—but not at all twitchy," he said. "Its control balance is perfect and the trim is neutral in cruise. It's just a phenomenal airplane."

Taylor said he built the Speedstar to satisfy his own curiosity and doesn't plan to produce any more. He didn't keep track of how much he spent on the project but estimates it's "well south of $1 million."

He is so pleased with the Speedstar that last year he did something that previously would have been unimaginable. He sold his original piston Aerostar 600. "It was my ideal airplane for 32 years," Taylor said, "but I like the Speedstar even better."

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