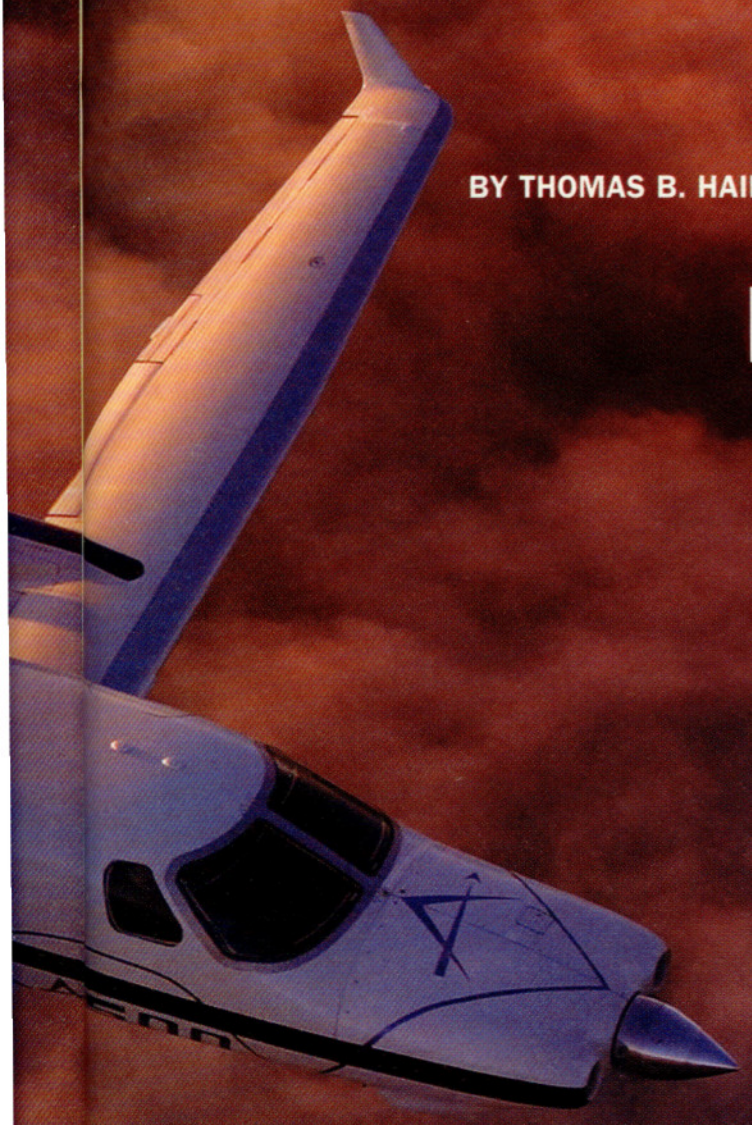
Adam A500

Get in line

A new centerline thrust twin puts all 700 horses in a row

BY THOMAS B. HAINES



Every guide to starting a successful small business will advise you to find your niche. Differentiate yourself. Create a unique product no matter how crowded the marketplace. Manufacturers in large markets might think of general aviation, which delivered all of 2,500 aircraft last year, as a niche itself. But even in this tiny marketplace, a manufacturer can't just build another Spam can and expect pilots to come knocking, checkbooks in hand. Even here in GA-land, where sometimes we feel like we all know one another, a manufacturer must seek out niches in order to survive.

Cirrus Design found a niche in the four-place piston market by offering the SR20, a simple fixed-gear airplane with a large, comfortable cabin, good performance, and the latest safety features. Other airplanes are faster. Others are bigger. Others are simpler. But none combines all the features in a brand-new package.

New entrant Adam Aircraft seems to have found its niche as well. Its A500 twin is a new twist on an old idea—centerline thrust. Capitalizing on the safety and performance benefits of centerline thrust, Adam adds in new manufacturing materials and methods, modern systems, and a large cabin…and out of the autoclave comes the first comparable piston twin since the Piper Seneca 30 years ago and the first completely new certified pressurized piston airplane since the Piper Malibu 20 years ago.

PHOTOGRAPHY BY MIKE FIZER

With his background in the dynamic computer business, Adam Aircraft founder George F. "Rick" Adam Jr. knew from the start that the only way to make his new design price competitive was to control costs from the start. Given his background, it's not surprising that he turned to computer automation to help manage the complex process of designing, certifying, and manufacturing a new aircraft. The all-carbon-fiber A500 emerges from an eerily quiet new factory on Centennial Airport just outside Denver. Rather than drop hammers and rivet guns, you hear the whir of a computer-controlled milling machine cutting a new mold out of dense foam—and that's about it. In a positive-pressure clean room, a computer-controlled machine figures out the most efficient way to cut layers of composite material and then does so on its own. Workers building a wing set use bar-code scanners on their wireless work stations to record which part is going into which airplane—a permanent paperless paper trail for every part.

The Adam A500 mock-up features a panel and two-lever FADEC setup similar to what will be delivered to customers.

Necessity, invention, and motherhood

Adam used to own a Cessna Skymaster. He liked the safety concept of its centerline thrust, but not much else. When he decided to get into the aircraft business, he wanted to build an airplane that he and other relatively low-time pilots would appreciate. He wanted the safety of a twin without the dangers brought about when one engine of a conventional twin fails. For the initial design, he turned to famed designer Burt Rutan. Rutan turned out the proof-of-concept airplane, which debuted in March 2000. Adam Aircraft refined the design significantly with its first production prototype, which flew last summer. That airplane was retired from flying earlier this year to endure structural testing. Meanwhile, the second production prototype flew early this year. The third, a fully conforming aircraft, was scheduled to take flight in late June.

The company hopes to complete certification this fall and to make first

deliveries by the end of the year, perhaps turning out 10 airplanes before December 31. It plans to deliver 40 to 50 airplanes next year, working off some of its 100-order backlog.

I had a chance to sample what those customers will get when the number-two airplane was in Florida in April. Glenn Maben, chief test pilot, showed me around N501AX before our flight.

Tall, contoured seats in a club configuration, video screens, power outlets, and other amenities grace the A500 mock-up.

As I had noted in earlier encounters with the model, the A500 is larger than you think it is. With its airstair door, big cabin, and those sweeping booms, you feel as if you're standing next to something the size of a Beechcraft 90-series King Air.

The composite wing spans 44 feet and contains only about 250 parts—about one-tenth as many as a traditional metal wing. Carbon fiber, like other composite materials, is relatively easy to repair in the field. Adam makes it even easier with the A500 by making the wing leading edges removable. That feature also makes it easy to add a TKS anti-ice system later if a customer doesn't order it from the factory. TKS won't be available for the very first deliveries, but can be retrofitted. Wiring and plumbing for the system will be installed on all airplanes.

The 230 gallons of fuel is carried in wet wing tanks. The left tank feeds the front engine; the right nourishes the aft one. A fuel transfer pump can balance the tanks if necessary. In the case of an engine failure, the pilot can pull a knob in the cockpit to interconnect the tanks so they burn down together. During our flight, the twin turbocharged, dual intercooled 350-hp Continental TSIO-550E engines burned about 19 gph each at a low-speed cruise of about 195 kt, giving the A500 an endurance of about five hours with reserves. The endurance is attractive to companies interested in special missions. One company that does such missions for the government has already ordered 30 A500s.

At a more typical cruise setting of 45 gph combined, endurance with reserves still tops four hours while true airspeed at about 10,000 feet rose to about 201 knots during our test flight.

Maben was disappointed in the number, noting that the previous day,

The impressive single-engine climb performance provides a great deal

when temps were lower, the speed was closer to 210 knots on the prototype. The prototype was carrying a long test pitot tube, had no gear doors, and had a poor-fitting plug door for flight test rather than the airstair, pressurized door. Because the pressurization system was not yet installed, we did not fly above 10,500 feet. Adam claims the production units will fly at a maximum cruise speed of 230 knots at 22,000 feet. With an airframe cleanup and the increase in altitude, true airspeeds of around 230 knots are not unrealistic.

Since my flight, Adam has added "ventlets" to the wing tips—short winglets that carry a fuel tank vent at the top. According to Maben, certification standards require an airplane to be able to sit at a 1-percent downslope without losing any fuel when topped off. Putting the vents on top of the tips keeps fuel from draining out when parked at such an angle.

Maben pointed out that Adam has switched from composite flight control surfaces to metal. As other manufacturers have discovered, it's easier and lighter to build such small parts out of aluminum. The electric flaps come in four segments—a section inboard of the booms on each side and a section outboard of each boom. The pilot can select 15 degrees for takeoff and as much as 40 degrees for landing.

Pilots will appreciate the A500's beefy trailing-link landing gear, which softens all but the worst landings. Dual hydraulic pumps suck the gear up in less than seven seconds, a requirement to meet single-engine climb rates. But if one pump fails, either alone can put the gear up or down, albeit at a slower rate. When all else fails, a nitrogen blowdown system *will* get the gear down.

The prototype used only differential braking and a free castoring nosewheel for steering. It worked fine, but Adam is considering adding a more sophisticated nosewheel steering system.

At each end, the Continentals drive three-blade Hartzell scimitar-tipped aluminum propellers. Adam had hoped to certify the A500 with Continental's full-authority digital engine control (FADEC) system, providing the pilot with single-lever control over each engine. But the Continental FADEC system for the turbocharged engines has languished, forcing Adam to move forward without it. Adam may succeed in certifying the first airplane with FADEC, but regardless, each airplane will be equipped to receive the system later if the customer desires.

Each engine drives a 100-amp alternator and charges its own battery. If you lose an alternator, the other one can charge either battery. In addition—one of those modern features that make life easy for the pilot—the A500 includes an emergency load-shedding system. In the unlikely event that both alternators fail, hit a well-marked switch and you're left only with the things you need to keep the airplane flying. There's no need to bury your head in the cockpit at such a critical time trying to figure out which circuit breakers to pull. Vacuum system? There is none. Like Cirrus and Lancair, Adam favors an all-electric airplane.

Inside, there's a big cabin with club seats. Your passengers will like it. Tell

them not to make too much noise while you're enjoying the flying part.

The only baggage space is behind the aft seats. In anticipation that it won't be enough for charter operators and special missions, Adam is already planning to offer a belly pod for additional storage. The booms will contain small storage areas for chocks, inlet plugs, and a couple of quarts of oil.

Up front, the most obvious difference from your average twin is the lack of control yoke. Again, like other newly certified airplanes, the A500 uses sidestick control. Never flown with a stick or a side stick? It feels perfectly natural. By the time you've made the first takeoff, you will feel completely comfortable.

Adam originally intended to certify the A500 with a full-glass cockpit, but the company's aggressive certification schedule kept it ahead of the development of most electronic flight instrumentation systems (EFIS) for light airplanes. Rather than risk delays and fearing that too many novel concepts would cause the FAA to stall in the approval process, Adam charged ahead with conventional instruments—a decision that has paid off. You can bet that later models of the airplane will feature both FADEC and EFIS.

The A500's all-carbon-fiber construction allows for a variety of shapes and curves throughout the airframe, providing exceptional aerodynamic efficiencies.

For engine monitoring, the A500 uses a pair of Vision MicroSystems LCDs. Each panel combines displays for manifold pressure, rpm, oil temperature and pressure, cylinder head and exhaust gas temperatures, and a variety of other sensors. The system also records operating parameters for maintenance purposes. The standard $895,000 airplane comes with a Sandel SN3308 electronic HSI, copilot instruments, a Meggitt S-Tec Fifty-Five X autopilot, and a complete stack of Garmin avionics, including dual GNS 530s.

The 'A' is for *aviating*

For the takeoff, Maben instructed me to rotate at 80 knots and then head for the 105-knot blue line. What's most remarkable about a takeoff in a centerline thrust twin is that it isn't remarkable. The engines, facing opposite directions, cancel the p-factor. There is no need for rudder input of any kind.

The same holds true during engine-out work. At 6,000 feet, we simulated a failure of the front engine. We were about 250 pounds below the maximum takeoff weight of 6,300 lb. The airplane climbed at 200 fpm as I sat with feet on the floor. In a conventional twin, of course, the pilot would need to use rudder to counteract the p-factor of the operating engine.

As an additional exercise, we shut down the front engine and feathered the prop. It's one thing to look out on the wing and see a stopped prop on a conventional twin—a fairly common sight in multiengine training. It's quite another to look forward—as you do in a single—and see a stopped prop. It gets your attention. In this case, though, the airplane simply surged ahead and kept on climbing—at about 600 fpm—as the prop stopped. Most conventional light twins can barely get out of their own way with an engine out, but the A500 turned in a climb rate on par with what a light single might do with its one engine running. The impressive single-engine climb performance provides a great deal of comfort when flying over hostile terrain.

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In slow flight with both engines running and the wings right at the stall, it was easy to roll into and out of 20-degree turns. At the stall, the nose just dropped over and the airplane started flying again. At cruise speeds, I rolled into a 20-degree turn and trimmed a little nose up to hold altitude. When I let go of the stick, the airplane just flew in circles by itself. Mooneys, known for their stability in flight, will do the same trick. Don't try it in a Beechcraft Bonanza or Baron.

From a handling perspective, the A500 behaves much like a Mooney throughout the flight envelope. It is stable with a good solid feel—very desirable traits for a traveling aircraft, especially one designed for duty in the flight levels. The flight controls feel noticeably stiffer at higher indicated airspeeds than they do at slower speeds—again, much like a Mooney.

We entered the pattern at about 120 knots, slowed to 100 knots on final, and touched down just above the 70-KIAS stall speed. The trailing-link main gear cushioned the landing nicely.

Joining the jet set

New funding jumpstarts the A700 project

While clearly focused on completing certification of the A500 push-pull piston twin, Adam Aircraft is looking to expand its product line by jumping into the light-jet fray. Last fall, the new company introduced the A700, a light jet powered by a pair of Williams International FJ33 engines generating 1,200 pounds of thrust each. The A700 features the same planform as the A500, but with about a 29-inch fuselage stretch. Most of the stretch will be dedicated to an aft lavatory that CEO Rick Adam describes as "the best bathroom in its class."

According to Adam, the A700 cabin will be almost as large as a Cessna CitationJet, bigger than an Eclipse 500, 20 percent larger than a Cessna Mustang, and about the size of a Beechcraft King Air C90B.

The A700 is projected to cruise at 340 knots with a maximum altitude of 41,000 feet and comes with a price tag of $1.995 million.

The company has built the A700's fuselage tooling and has an engine at its Denver plant. First flight is scheduled to occur before the end of the year. Certification will follow 12 to 18 months later. "It is quite likely that we'll be the first of the light jets in customer hands," Adam said recently.

The founder funded much of the A500 project with his own money. But, with the announcement of the A700 project, he went searching for additional resources. He found them in the form of a private equity investment fund managed by Goldman Sachs. Adam is a former general partner at Goldman Sachs. The financial infusion this spring has kept the A500 program moving forward while the A700 project gets off the ground. ***—TBH***

Got a niche?

Back to that niche thing. The A500 actually carves a space out of several niches. Anyone flying a high-performance single or light twin will relish the greater performance, pressurization, and safety brought by the all-new airplane. At just under $900,000, the A500 smokes the $1 million Baron from a performance, comfort, and safety standpoint. Only the Malibu comes close from a performance standpoint, but it sports only one engine and a much bigger price tag.

Flying a light turboprop? The A500 offers competitive performance at a fraction of the acquisition cost.

Adam Aircraft appears to have found its niche.

It will now be interesting to watch the young company hit its stride. AOPA

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i Links to additional information about Adam Aircraft may be found on AOPA Online (www.aopa.org/pilot/links.shtml). Keyword search: Adam.

SPECSHEET

Adam A500

Base price: $895,000

Specifications

Powerplants	Two Continental TSIO-550-E, 350-hp ea
Propellers	Hartzell, aluminum 3-blade, 78-in dia
Length	36 ft 8 in
Height	9 ft 6 in
Wingspan	44 ft
Wing area	169.8 sq ft
Wing loading	37.1 lb/sq ft
Power loading	9 lb/hp
Seats	6
Cabin length	13 ft 7 in
Cabin width	4 ft 6 in
Cabin height	4 ft 4 in
Empty weight	4,200 lb
Max gross takeoff weight	6,300 lb
Useful load	2,100 lb
Payload w/full fuel	720 lb
Fuel capacity, std	230 gal 1,380 lb
Oil capacity, ea engine	12 qt

Performance

Takeoff distance, ground roll	1,700 ft
Takeoff distance over 50-ft obstacle	2,150 ft
Max demonstrated crosswind component	20 kt
Rate of climb, sea level	1,800 fpm
Single-engine ROC, sea level	400 fpm
Cruise speed/endurance w/45-min rsv, std fuel (fuel consumption, ea engine)	
@ 75% power, max cruise, 22,000 ft	230 kt/5.0 hr (120 pph/20 gph)
@ 60% power, best economy, 22,000 ft	210 kt/6.4 hr (96 pph/16 gph)
Max operating altitude	25,000 ft
Single-engine service ceiling	15,000 ft

Limiting and Recommended Airspeeds

V_R (rotation)	84 KIAS
V_X (best angle of climb)	90 KIAS
V_Y (best rate of climb)	110 KIAS
V_{XSE} (best single-engine angle of climb)	90 KIAS
V_{YSE} (best single-engine rate of climb)	105 KIAS
V_A (design maneuvering)	160 KIAS
V_{FE} (max flap extended)	150 KIAS
V_{LE} (max gear extended)	150 KIAS
V_{LO} (max gear operating)	
Extend	150 KIAS
Retract	150 KIAS
V_{NO} (max structural cruising)	200 KIAS
V_{NE} (never exceed)	230 KIAS
V_{S1} (stall, clean)	82 KIAS
V_{SO} (stall, in landing configuration)	70 KIAS

For more information, contact Adam Aircraft, 12876 East Jamison Circle, Englewood, Colorado 80112; 866/232-6247; www.adamaircraft.com

All specifications are based on manufacturer's calculations and preliminary flight test and are subject to change during certification process. All performance figures are based on standard day, standard atmosphere, sea level, gross weight conditions unless otherwise noted.