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Fourth Time's A Charm

In its fourth iteration, Diamond's DA42-VI is a far better twin

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SAVE ARTICLE



Most people who buy twin-engine airplanes do so for one of three reasons. Either they: a) operate over rough terrain, large bodies of water or at night on a regular basis; b.) fly with their families and want the ultimate in redundant reliability; or c. plan to use the airplane for multi-engine training.

Not every twin can fulfill all three missions, but the Austrian Diamond DA42-VI is one airplane that just might. These days, there are only five twins on the market: Piper's Seneca V and Seminole, Beechcraft's 58 Baron, Tecnam's P2006T, Vulcanair's P68 and the DA42-VI. These range from \$450,000 for the entry-level Tecnam to \$1.367 million for the top-of-the-class Baron.

Pricewise, the Diamond entry falls in the middle of the field, at \$758,000. If you're thinking, "Ah yes, my old friend, the Twin Star," think again. These days, the DA42-VI may very well still be your friend, but it's no longer the Twin Star. It seems Eurocopter, one of the world's largest producers of corporate helicopters, had been building a rotary wing called the Twin Star for the last 30 years, and felt they had a prior claim to the name. As a result, Diamond's twin has been forced to fall back onto its model designation, at least temporarily.

By whatever name, the latest DA42-VI version is a very different machine from the original. It looks cosmetically similar to the first of its type, but the series VI incorporates a variety of improvements that collectively transform the airplane.

It has become something of a cliché to label aircraft that look similar to previous models as "new" and "innovative" when they really aren't, but the DA42-VI introduces enough improvements to deserve the superlatives. In total, Diamond counts 21 improvements to the breed, most aimed at increasing performance and cabin comfort.



Right up front, Diamond was determined to avoid any improvements that would require recertification, the financial bane of all aircraft manufacturers. If you've heard some of the horror stories about the inconsistencies of FAA certification in different regions of the United States, imagine how tough it is earning certification in Europe, where EASA must satisfy the demands of a dozen or more countries. For that reason, most manufacturers are reluctant to make changes that would require costly recertification.

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Diamond's first task was perhaps the most formidable—reduce empty weight. Once an aircraft is designed and constructed, weight reduction is a magic trick even David Copperfield couldn't match on his best day. It seems every new aircraft battles weight problems, and the conundrum of adding features and controlling empty weight only becomes worse as the aircraft ages.

Diamond went through the carbon-fiber airplane piece by piece with an eye toward trimming weight without compromising strength or flexibility. When they were done, they had realized an airframe savings of 88 pounds, a phenomenal improvement.



Performance enhancements were next. Here again, the primary task was to increase performance without recertifying any portion of the aircraft. The Diamond twin was originally conceived with a pair of German Thielert 1.7 Centurion turbo-diesels on the wings, each rated for 135 hp. These were later upgraded to 2.0 liters displacement, but still rated for the same 135 hp.

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Following the bankruptcy of Thielert in 2008, Diamond CEO Christian Dries decided the company would begin building its own engines. Diamond constructed a new facility on Austria's Wiener-Neustadt Airport, and the much improved 168 hp Austro 2.0 engines premiered in 2009 on the DA42NG (for Next Gen).

Diamond is betting its future on what some have incorrectly defined as an antediluvian technology. It's true the Austro engine is a piston mill that burns jet fuel, a diesel, complete with 17:1 compression ratio, no spark plugs and a heavy, cast iron block. Ironically, it's a diesel that's not even approved to burn diesel fuel (assuming you could find any).

That's fine with Diamond, as they'd just as soon distance themselves from the whole stigma of diesel, a primitive propulsion system that's well over a century old and long outdated as an aircraft propulsion system.



Dave and Susan Passmore purchased the first of the new series IV aircraft.

Or is it? Today's diesels have about as much resemblance to the originals as does a Falconer V12 to a LeRhône rotary. Twenty-first century diesels are as modern as tomorrow, many based on Mercedes Benz turbo-diesel R&D. Most fly clean and efficiently with the help of FADEC (Full Authority Digital Engine Control), so much so that a diesel-powered DA42 was the first of its type ever to cross the North Atlantic nonstop without ferry tanks.

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Diesels burn jet fuel, so they cleverly side-step considerations of fuel availability, since jet fuel is becoming readily available worldwide. Conversely, the 100LL avgas supply is slowly diminishing around the globe, either by political mandate over environmental concerns or the simple law of supply and demand.

Major oil companies that refine avgas are in business to make money, and that means volume. The volume of avgas worldwide is shrinking. Mobil is already out of the avgas business, and other companies are considering production cuts so they can allocate their resources to more profitable products. Viable alternative fuels are under development for present and future avgas aircraft, but if they ever do come to market, they'll almost undoubtedly be more expensive than today's 100LL. In Europe today, jet fuel generally sells for at least \$1.00/gallon less than avgas, another significant benefit of a jet A-powered aircraft.



On the latest version of the DA42, Diamond progressively improved Austro thrust and power by extending the composite MT props' diameter and recontouring the blades to more of a semi-scimitar configuration, adding three knots to cruise in the process. The company also redesigned the nacelles and air intakes to improve cooling and thrust, realizing another eight knots.

Out on the wings, the curved TKS anti-ice panels that cover the leading edges were reworked to bond flush with the wings, a major concern since drag is most critical in that area. Diamond claims another 2.5 knots from the flush TKS panels.

At the wing-trailing edge, Diamond added flushed and faired aileron and flap hinge fairings. The DA42-VI also received roughly 240 replacement flush-mounted screws on the wingtips and tail to replace the raised head hardware on the previous NG version. During flight testing of the improvements, Diamond discovered that the boarding assist steps presented slightly less drag if they were reversed, so Diamond simply turned them 180 degrees.

“Diesels burn jet fuel, so they cleverly side-step considerations of fuel availability, since jet fuel is becoming readily available worldwide.”

The rudder was redesigned to enhance directional stability, and the T-tailed stabilator improved to provide a five-knot reduction in minimum, single-engine control speed, better known as V_{mc} . That, in turn, allowed a shorter takeoff run.



The overall speed improvement over the previous NG was about 15 knots, but another significant result of all the aerodynamic cleanup was a single-engine service ceiling equal to the airplane's max operating altitude. In other words, for pilots willing to strap on a mask and ascend to 18,000 feet, you could lose an engine at FL180 and continue to cruise on the remaining mill without losing altitude.

Inside the cabin, Diamond made a number of improvements designed to increase comfort for pilots and passengers. To help counter high temperatures, Diamond upholstered the seats with a new type of leather that includes a radiant barrier designed to repel heat. The

seats offer recline and lumbar support, as well, and they're enclosed within a cabin that's 50 inches wide. Backseat passengers also enjoy a foot enclosure on the floor that extends slightly forward, below the front seats.

There's a new rooftop-mounted air distribution system that can channel air-conditioning or standard outside cooling air into the cockpit. The baggage compartment benefitted from new hinges and a better door seal that allows the door to close tighter for less drag. Sun visors are an option.



Dominion Aircraft

East Coast Diamond dealer John Armstrong of Dominion Aircraft arranged for my evaluation flight in conjunction with the 2013 Oshkosh AirVenture. Dominion has responsibility for most Eastern states, and Armstrong is one of those positive salesmen who takes his job very seriously.

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Armstrong labels his sales efforts the “Diamond Experience,” and in this case, he put me together with Dave and Susan Passmore of Leesburg, Va. The Passmores purchased the first of the new series VI twins, and Armstrong arranged for them to accompany him to Austria where the new owners trained in their airplane, toured the Alps and flew their new twin home via the UK, Iceland, Greenland and Canada with a Diamond ferry pilot in the right seat.

Passmore is a semi-retired MIT graduate, so he's well-grounded in high-tech machinery. That puts him right at home in the DA42-VI. The Passmores' previous airplane was a DA-40XLS Star, so Diamond Aircraft were nothing new to him. Both he and his wife are pilots, and both will operate the DA42-VI.

Dave Passmore ordered practically every option on the list, including TKS, Synthetic Vision and air-conditioning.

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On top of that, the airplane comes standard with the Garmin G1000/G700 PFD/MFD/autopilot, so the level of automation can be pretty much as you like it.

That's not to suggest the DA42-VI requires a doctorate in aeronautical engineering to fly. In fact, if anything, the airplane is almost silly simple to operate. Flying the new DA42-VI is more reminiscent of driving a pair of turbines than twin pistons. You set power by percentage rather than manifold pressure, using single-lever power controls, thanks to FADEC. Like turboprops and jets, the Austros are relatively impervious to shock heating or cooling, in this case a function of water-cooled engines, a semi-retro feature that works better than air cooling when there's no one trying to shoot holes in your radiator.

Conversely, the Diamond twin's sticks for roll and pitch control may seem a little unconventional. Personally, I love center-mounted sticks. The controls spring from the center of the pilot's and copilot's seat cushions, and despite what you might think, that's not uncomfortable at all.

As mentioned above, the engines are fitted with FADEC, so hot and cold starts are no longer even a consideration. Combine that with an ECU (Electronic Control Unit), and the most complex part of starting the Austros is waiting for the glow-plug to extinguish.

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With all the automation under the cowlings, there's also little to be done prior to takeoff. Assure that both engines are running and the cabin doors are closed, and you're pretty much ready to fly.

Let's Go Flying

We had three people and half fuel on board for my check flight, so the airplane was close to gross weight. Passmore ordered his DA42 with the long-range fuel tanks, 76 gallons worth, but standard fuel is 50 gallons. Buyers who purchase the airplane for multi-engine instruction probably won't have much need for the big tanks, but ironically, they won't need the extra 174 pounds of payload, either.

Paying pounds with the big tanks topped is about 570, so the airplane isn't that shy of four folks' worth, anyway. It's important to remember that fuel burn at 60% power is just over 10 gph total, so you could conceivably fill the seats and still have enough payload for 60 gallons, about four hours plus IFR reserve at better than 170 knots.

Inflight handling is about what you'd expect of a two-ton twin. Stick forces aren't exactly light, but the airplane maneuvers with comfortable pressure. It's stable around all three axes, perhaps partially a function of the tall winglets mounted on the tips.



Contrary to popular opinion, winglets don't work on all airplanes, but they definitely have a stabilizing effect on the DA42. They also probably contribute several knots to cruise speed. Winglets work best on high-aspect-ratio airfoils with comparatively long span and short average chord. They're most often advantageous on airplanes with high-wing loading. All these conditions fit Diamond designs perfectly, and it's no big surprise that the company's success building high-performance sailplanes has carried over into the DA40 and DA42.

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Climb is brisk, and while we didn't try any single-engine work, multi-engine ascent was impressive, 1,300 fpm or better. Without a full service of O₂ aboard, we couldn't try out the airplane's speed at near-flight-level altitudes, but it did very well at breathable heights, typically over 180 knots.

That's one of the joys of the DA42-VI. You have the choice of hustling right along at up to

190 knots on a reasonably efficient fuel flow or pulling back to loiter power and logging 150 to 155 knots on a frugal six gph.

Similarly, you can elect to descend in any manner you or ATC decide you should. You can scream downhill as fast as your ears can take it, or you can elect for a penetration descent, starting 75 miles out and bleeding off altitude in increments of 400 to 600 fpm.

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Another new feature on the VI is the hush kit that suppresses noise. The airplane generates an overflight noise level of only 56 EPNL at 300 feet. That's sure to make the DA42 a good neighbor at airports under siege by not-so-friendly neighbors who moved in last week.

The DA42's trailing beam gear is perhaps the greatest face-saver in the industry, not that there's anything especially challenging about returning to Earth in Diamond's twin. If there's a need to plant the airplane and stop it short, you can paint it on and stop in less than 1,200 feet; then, sneak back out in only slightly more runway.

Price is always a subjective judgment, but if quality construction and high-tech materials mean anything (they do), the DA42-VI deserves to dominate the twin-engine market. (Diamond had cornered 80% of twin sales before Thielert's bankruptcy.)

The fixed-wing Twin Star (sorry, Eurocopter) manifests quality control far beyond its price. The carbon-fiber construction is impeccable with all surfaces polished to a smooth, low drag finish. The DA42-VI's switches and controls operate with the glycerin smoothness of a well-oiled Glock, no less than you'd expect from an Austrian product. The airplane fits together with a precision that's almost uncanny, and workmanship is excellent.

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Putting aside for the moment the debate as to whether twins are any safer than singles (statistics don't suggest they are), at least, a twin with one engine caged offers a proficient pilot the possibility of flying to a landing site more distant than whatever happens to be directly beneath him. One advantage of redundant power is undeniable. If one engine fails, you can always start the other one.

At the end of any flight evaluation, those of us lucky enough to write pilot reports on new aircraft have to ask if we'd buy the airplane in question and add it to the two dozen or so others we keep in our huge, blimp-sized dream hangar. I would.

Diamond's Eastern Dominion

John Armstrong is the president and flying experience counselor of Dominion Aircraft, the Diamond regional distributor center for the mid-Atlantic region. Armstrong is one of those folks who helps dispel the sometimes myth of the disinterested aircraft salesman.

Granted movie star looks, a dynamic personality and a knowledge of his products that far transcends brochures, Armstrong has a strong commitment to customer service. He understands his market and his customers intensely, and he's usually one step ahead of them on any question of factory support.

America's first DA42-VI owner, Dave Passmore, says, "John is one of the good guys."

For more information on the Diamond Experience, contact John Armstrong at (406)-FLY1NOW or visit www.flydominion.com.

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