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Jim Taylor Boosts Single Engine Business Jets Overcome Concerns of Safety and Image with the Facts


## CityLine cuts costs with RJs

Managing Director Dr. Karl-Friedrich Rausch (left) and Chief Pilot Horst Udo Ulbig at Cologne (CGN) with a Canadair Regional Jet used on hub-overfly routes.

Case for Single-Engine Business Jets

# Flight of fancy or sleeping giant?


**The goal of VisionAire, following certification of the BJ-1 Vantage, is to sell 500 copies of the single-engine, all-composite corporate jet in 10 years at an initial purchase price of about $1.5 million. It will cruise in excess of 400 mph with a range of over 1200 sm.**

## A case for the single-engine business jet.

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MORE than 17,500 aircraft make up the world's turbine business fleet, all of them powered by two or more engines. They range from the small, four-place Morane Saulnier MS-760 Paris to a number of converted transports, such as Boeing's 700 series and the Douglas DC-8. But there's not one single-engine jet in the whole lot. And here we are—well over a half-century into the Jet Age.

Why do airframe manufacturers continue to ignore what appears to be a potentially lucrative, untapped market? Partly because of marketing myopia, but mostly because of psychological hang-ups.

Flying abounds with myths. One of the most unfounded is the misguided notion that two engines are safer than one. Many company pilots still resist the idea of operating a single-engine jet. It recalls the days when the first corporate jets came on the scene. Pilots accustomed to DC-3s, Convairs and Lodestars were inwardly apprehensive about their ability to make the transition.

Once pilots became jet-rated, however, they took great pride in their newfangled flying machines. But to suggest now that they fly something with only one jet engine may require some education, for two reasons: (1) their safety concerns, and (2) their image. Commanding a single-engine plane of any kind doesn't carry the prestige of the much more expensive twinjets.

The same negatives might also apply to status-conscious flight department managers should their bosses ever consider adding smaller aircraft to the company fleet—even though bigger, thirstier twins can't fly certain travel patterns as economically or conveniently.

Single jet syndrome is an aberration, but it's curable. If pilots afflicted with it took time to analyze the modern

reaction motor's function and its operational history, they would find that it is far more dependable than its reciprocating cousin.

Studies conducted by Robert E. Breiling Associates, the respected safety consultants, concluded that a single jet engine is even more reliable and therefore safer than a pair of pistons or turboprops.

That says a lot because mechanical failures in piston engines that have been properly maintained are extremely rare. Hundreds of single-engine piston aircraft have flown over the oceans since the second world war. (Another perspective: How many automobiles do you see with two engines, or how often does the family car quit running?)

The turbojet principle dates back to the 1920s, but progress in metallurgy was slow, retarding jet development. By the end of World War II, however, the Germans, Italians, British and Americans had successfully flown jet fighters. In the U.S., the Bell XF-59 was the first to fly (1942). Two years later Lockheed's USAAF P-80 Shooting Star, powered by a single General Electric J-33 turbojet, became the first U.S. jet to enter operational service.

One big advantage of a jet over the piston is its simplicity. The jet is less complex, has fewer moving parts (and no propeller), yet delivers more power in relation to its weight.

Until the advent of the turbofan, the jet's disadvantages were noise and a high fuel burn rate. Turbofans, on the other hand, are much quieter, provide greater thrust and have a substantially lower fuel consumption—everything else being equal. And because of their operating principles, both types function best in the rarefied atmosphere, well above the piston engine's altitude capability.

A pioneer in small aircraft turbines, France's novel Fouga CM-18-R Cyclone, a jet-powered glider, attracted a lot of attention at the 1950 Miami All American Air Maneuvers. The aircraft mounted a single Turbomeca TR-O11 jet weighing around 100 pounds. The little engine produced 225 pounds of static thrust, not very impressive by modern standards, but it did portend of things to come.

Today hundreds of single-engine military jets fly thousands of trouble-free hours every day, many of them over open water. Their powerplants are marvels of propulsion system engineering.

Still, the efficiency, reliability and safety of the turbofans that power the worldwide business turbine fleet are equally remarkable, if not more so. For most turbofans, the time-between-overhaul is much longer than that of their reciprocating counterparts. And periodic overhaul frequency is one of the aviation industry's best measures of aircraft engine dependability.

As we all know, airframes are configured for one, two, three or four jet or piston engines to accommodate the power required for a given airplane weight which is dictated by payload capacity and the mission.

A few years ago one business jet manufacturer introduced a new "trijet" derivative of its basic twin. The new model offered higher performance and a longer range. Unfortunately, its promoters tried to inflame public fears by proclaiming that "three jet engines are safer than two"—merely to achieve a marketing objective.

As might be expected, the "twin" builders cried foul. They promptly countered, thoughtlessly, that anyone who multiplies machinery multiplies the prospects for a problem. Finally, wiser heads prevailed and business aviation returned to a more prosaic theme in public pronouncements about competitive aircraft.

Failures in contemporary turbofans are incredibly remote. In fact, any loss of power in a modern turbofan-equipped commercial or business aircraft usually results from common causes—such as flight through hail or volcanic ash, or failure to install engine oil seals, or simply running out of fuel.

Moreover, recent advances in turbine technology have enabled the major airframes to increase load-carrying capabilities with two instead of three or four jet engines, the Boeing 777 being one of the more notable examples. Its two 84,000-pound-thrust engines can fly 375 passengers more than 8,400 miles non-stop. (Pratt & Whitney and General Electric build the engines in America, Rolls-Royce Ltd. makes another one in England.)

Less than 10 years ago, only Boeing four-engine jets and the McDonnell Douglas DC-10 were allowed far out over the oceans. Now the use of two-engine planes for trans-Atlantic operations represent more than 80 percent of all airline traffic, dominated by the 270-passenger Boeing 767.

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That "more is better" is reminiscent of the oceangoing steamer's heyday when most ships sported multiple funnels, mainly for promotional purposes. Sea voyagers thought vessels with four stacks were not only faster but safer, even though most ships need only one for engine exhaust. (Remember the unsinkable Titanic—it had four funnels.)

Long before scheduled carriers began traversing international airways with two-engine airliners, corporations were already using private twinjets for routine overseas business trips. As the world economies grow stronger, more and more companies will be traveling in personal jets to handle expanding global operations.

Domestically, much of American industry is relocating for social and economic reasons. Many corporations have already moved their headquarters from city centers to the suburbs. Now they are looking at cost-compatible country towns. Other environmentally sensitive corporations are also migrating toward semirural areas where they enjoy more space, affordable housing, less congestion, less pollution, less crime and better schools.

All of which means that the demand for fast transportation in specific regional sections of the U.S. will rise proportionately. Many of these sections have little or no airline service. And no matter how sophisticated, telecommunications will never completely replace the business benefits of face-to-face contact (and a warm handshake) in a world of steadily increasing competition.

Can general aviation airframe and engine manufacturers meet this challenge? Not by resurrecting obsolete technologies. Not by restarting old single piston-engine production lines, except that this anticipated move will mean more jobs, which is good.

Whether the General Aviation Revitalization Act of 1994 can stimulate an industry with a recession-oriented mindset remains to be seen. General aviation is ailing not because it lacked product liability legislation, but because it lacked vision. Now that we have tort reform, at least to a certain extent, will the principal players in business avi-

ation step up to the plate and invest in new technologies and new concepts?

General aviation was founded on ingenuity and innovation. And ingenuity and innovation are the keys to its future. It might be well for business jet makers to take a cue from EAA. Every year at Oshkosh new and more advanced kitplanes appear, underscoring a pent-up demand for new general aviation aircraft. This has little to do with business flying per se, but it does show that in one segment of the industry, aeronautical creativity is alive and well.

In business aviation, most new-generation corporate jets are flying higher, faster and farther. But the market that's begging can't be filled by existing models or even by new preliminary designs still in computers, especially the supersonic business jet.

To compete in the 21st century, companies whose annual sales may range from $25 million to $500 million will be forced to get around with the same flexibility and speed as big corporations grossing several billion dollars or more. They won't need to fly as far, perhaps, but just as fast. And as a rule, most of these small and midsize companies would take fewer people on a typical business trip.

The only commonsense answer is the single-engine jet, a plane offering flight performance and a level of comfort comparable to its bigger brothers, but available at a much lower cost.

**Author Jim Taylor (left) with VisionAire President Tom Stark (standing) and Aircraft Designer Burt Rutan.**

Just as the new Boeing 777 will change flying on international routes, a revolutionary new single-engine business jet would change flying on shorter stage lengths. While it won't carry as many or fly the distances of Learjets, Citations, Falcons, Challengers and Gulfstreams, it will be much cheaper to acquire and operate. And it could threaten the turboprops—and some twinjets as well.

So far, the most promising candidate for this heady assignment is the aptly named VisionAire BJ-1 Vantage, St. Louis entrepreneur Jim Rice's creation which he hopes to deliver before the end of the decade.

Rice heads VisionAire, a young company funded by a number of private investors, though more venture capital is always welcome. Following FAA certification, his goal is to sell 500 BJ-1s in 10 years at an initial purchase price of about $1.5 million. If all goes according to plan, he could corner the market.

The new Vantage is a pressurized, six-place, all-composite jet with a gross takeoff weight of 6,500 pounds. Its single Canadian Pratt & Whitney JT15D-5 turbofan produces 2,900 pounds of thrust. It has a cruising speed of more than 400 miles per hour, a cruising altitude of 35,000 feet (with an 8,000-foot cabin) and a non-stop range of over 1,200 statute miles with 45-minute IFR reserves.

Rice intends to make the Vantage a model of standardization, which will help lower costs and increase safety. Its standard state-of-the-art panel and avionics package, including GPS, and its standard interior (only the material is optional) should give the BJ-1 a distinct advantage in the business aircraft marketplace.

Standardization (instrumentation and components) sharply cuts manufacturing and maintenance costs and facilitates accessory (black boxes) and parts interchangeability in the field—all over the world. Anything that can be done will be done to enhance reliability, says Jim Rice, including "power-by-the-hour." He's also very much aware of the positive impact such a philosophy would have on the plane's resale value.

Also included in the purchase price is customer pilot and mechanic training. While some airframe manufacturers are buying simulators and bringing flight and maintenance training back to the factory, VisionAire plans to utilize the services of a professional learning center, such as FlightSafety International. Rice has made it known that he will never compromise safety.

When Bill Lear first introduced his "businessman's fighter," he promptly spread the word that anyone who could fly a Cessna 310 could fly a Learjet. Not so. A rash of fatal accidents early in the program gave the Learjet a bum rap. Bill quickly changed his tune and began stressing pilot training.

Much of VisionAire's initial market for the Vantage will be comprised of entrepreneurs and others who may or may not own their own piston aircraft and who do not fly for a living. It is this group that must be thoroughly trained in the new jet, particularly with respect to its flight characteristics at high altitudes.

Which brings to mind the importance of recurrent jet training, where much of the emphasis is placed on emergency procedures (they are modified or improved occasionally). FAA should make periodic refresher courses mandatory for every pilot, private or commercial. It should also require all pilots seeking jet ratings to demonstrate their competency in the high-altitude operating environment.

As for pilot mental block against single-engine jet operation, the JT15D's proven in-flight shutdown rate of 0.008 (one shutdown for every 125,000 flight hours) should instill confidence in even the harshest safety skeptic. There isn't a piston engine or even a turboprop that can match such a high level of reliability. Also, the JT15D probably has more service experience than any other jet engine in its weight and power category.

Burt Rutan's Scaled Composites is slated to build a proof-of-concept prototype. Burt also built a scale model of the Beechcraft Starship, designed to deliver jet performance at a propeller-plane price ($3 million). But don't hold that against him; the Starship program failed and everyone involved learned a lot. Few engineers have as much technical knowledge of composites as Burt Rutan.

VisionAire also plans to petition for a change in Federal Air Regulations to permit single-engine jets to carry passengers for hire. This would open up a whole new market for the airplane. The company is already projecting an ultimate production run of 100 units or more a year.

The latent market for a single-engine business jet is not a flight of fancy, it's a sleeping giant. All it needs is a wake-up call with some persuasive, effective marketing and promotion—and, of course, the right product.

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