GULFSTREAM'S proposed 1,200-mile-per-hour wonder

MINE'S FASTER THAN YOURS

Planemakers are trying to hatch an aircraft that no mogul could do without. Get ready for the supersonic business jet.

BY STUART F. BROWN

MANSIONS, SUPERCARS, AND BESPOKE SUITS may be just fine, but in the world of "positional goods" it's hard to beat that most alluring of accessories, the business jet. Except with a faster business jet. Could we perhaps interest you in a *much* faster jet? Like twice as fast as today's poky Gulfstreams and Citations?

Lured by what could be a multibillion-dollar market and goosed by money from the Pentagon and NASA, planemakers like Lockheed Martin, Boeing, and France's Dassault are starting to get excited about designing a new generation of hot little jets that would warp the very fabric of space-time while meeting noise and environmental regulations. On a flight from London to Los Angeles—stopping in Teterboro, N.J., for fuel—a Mach 1.8 supersonic jet would save almost eight hours of travel time.

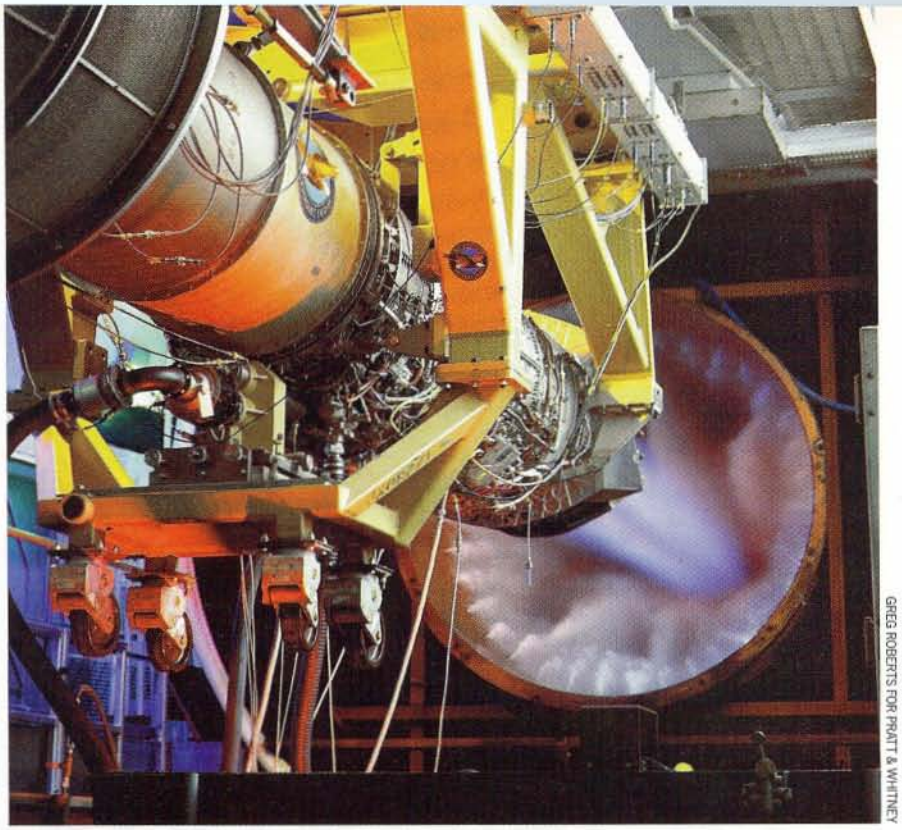
Breaking the sound barrier is relatively easy—military jets have been doing it for 50 years. But flying business planes at such speeds is another story; to do that, manufacturers must overcome a set of le-

ILLUSTRATION BY JOHN PIRMAN

gal hurdles that might be called the sonic-boom barrier. The Federal Aviation Administration forbids overland supersonic flight, and so do aviation authorities that control overland routes in other parts of the world.

Add to that challenge the vast expense of developing a new plane, and supersonic jets may end up costing twice as much as today's top-of-the-line business jets, which sport pricetags of $45 million. Even so, there will be plenty of eager buyers, predicts aerospace analyst Richard Aboulafia at the consulting firm Teal Group Corp. in Fairfax, Va. He notes that the market for today's $45 million jets has ended up being far larger than anyone imagined. "The supersonic business jet is the last untapped aerospace market that's waiting for the technology to catch up," he says. "People will pay anything at the top end."

Planemakers have other reasons to relish the idea of supersonic business jets. "A business jet could be a stepping stone to building larger supersonic airliners that would be available to the general public," says Sam Bruner, director of advanced design at Raytheon Aircraft. What's more, the R&D could help them build stealthier warplanes and drones for the Pentagon.



GREG ROBERTS FOR PRATT & WHITNEY

"SUPERCRUISING" military engines can go supersonic without fuel-gobbling afterburners.

Promising new research into suppressing sonic booms is what makes supersonic business travel more than a post-Concorde pipe dream. "We don't think there will be a sonic boom anymore. We think it will just be a sonic whoosh," exults Ronald Swanda, senior vice president at the General Aviation Manufacturers Association, the trade group representing business jet makers.

The optimism about taming the sonic boom stems from a program called the Quiet Supersonic Platform, sponsored by the Defense Advanced Research Projects Agency. In 2001, DARPA put up $7 million for Northrop Grumman and NASA to explore boom reduction. In a series of supersonic test flights conducted last August at the NASA Dryden Flight Research Center in California's Mojave desert, a Northrop F-5 fighter with a specially modified nose showed a reduction of about a third in sonic-boom intensity compared with a standard F-5. The test plane's thickened nose looked like a pelican's beak (see photograph on last page of article). It was ugly, but it proved that changes to an aircraft's contours can reduce the impact of its supersonic shock waves on the human ear. Now aeronautical designers are pondering what an airplane would look like that was optimized for low boom from nose to tail. The eventual outcome will determine whether new supersonic planes for civilians ever get built; only a big noise reduction could induce regulators to amend their rules.

Sonic boom was a big reason the Mach 2 (about 1,350 miles per hour at cruising altitude) Concorde failed as a business proposition. Here's a sad example: Last year a Concorde en route from New York City's JFK airport to a retirement berth at the Museum of Flight in Seattle wasn't allowed to fly over the U.S. It had to follow a specially arranged northerly flight path across thinly populated Canada. The beautiful bird had been unable to fly overland routes during its service career because of the calm-shattering booms it would have inflicted on the people below.

If the necessary engineering breakthroughs happen, there are apt to be buyers waiting to snap up the small supersonic jets, which could go into production in a decade or so. Working for a group of three aircraft makers and three jet engine builders, analyst Aboulafia conducted a study that projected a market for about 400 supersonic business jets—wearing pricetags of $70 million to $80 million—over a 20-year period. Those numbers are big enough to make aerospace executives think there's opportunity here. John Rosanvallon, CEO of the French maker Dassault Falcon Jet Corp., says his company thinks 200 aircraft is the minimum needed to justify the cost of developing such a radical new product. Falcon Jet, whose parent company builds the renowned Mirage series of supersonic fighters, has proposed a three-engine supersonic business jet (see picture, last page of article). The firm would like to partner with a U.S. aerospace company to share the financial and technical risks.

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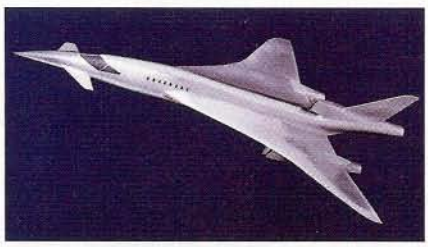
Dassault is far from alone in its aspirations. Boeing, Raytheon Aircraft, and Sukhoi of Russia, builder of some of the world's most evil-looking fighters, are also eyeing the potential market. Gulfstream Aerospace is proposing a swing-wing design called the Quiet Supersonic Jet. Lockheed Martin's fabled Skunk Works, which is known for its stealth and spy planes, has also been busy. Intriguingly, the Skunk Works research is backed by a "high-net-worth individual" whose identity remains a secret. Who could it be? Warren Buffett, who bought the fractional-ownership

company Netjets in 1998, assures FORTUNE that it's not he.

Conventional jet planes, both business craft and airliners, cruise at about four-fifths the speed of sound, or 530 mph at cruising altitude. At that speed the air slips smoothly around an airplane's shape. But when a supersonic airplane powered by high-performance military engines approaches the speed of sound, the air can't get out of the way fast enough. It starts to pile up into pressure waves that stream outward like the wake from a ship at sea. When those pressure waves reach the ground, they produce a ka-boom! that can startle people and rattle windows. Aeronautical engineers know that the intensity of a sonic boom is proportional to the size of the aircraft producing it—hence the interest in making the first new supersonic passenger plane a small one. Engineers cannot entirely eliminate sonic boom. But they are hoping that by tweaking an airplane's shape, they will be able to transform its sonic footprint into a soft-shoe shuffle. That may involve trading off some fuel efficiency for quietness. "A low-boom plane will be somewhat draggier than a plane optimized for speed, but I don't think it will be a huge difference," says Ed Haering, NASA's principal investigator for the F-5 test flights.



A DREAM AND A TEST Dassault's three-engine biz-jet concept (top); the F-5 test plane's pelican nose softens its sonic boom.

The other big item on the wish list of would-be supersonic business jet builders is a suitable engine. The planes will have to be acceptably quiet while taking off, landing, and taxiing. And they will need to be able to cruise supersonically without using fuel-gobbling afterburners like the Concorde's. Military technology may already have the answer. Engineers at Pratt & Whitney have been in talks with airframers, as airplane builders are known, about applying to a business jet what they've learned building engines like the one in the red-hot Lockheed F-22 fighter. It can "supercruise" without afterburners.

Pratt & Whitney says it also knows how to design exhaust nozzles that would muffle jet noise during taxi and takeoff. And the company has advanced combustion chambers that should be able to meet air-pollution regulations, it says. "Most of the supersonic business jet ideas that are being looked at now would cruise in the Mach 1.6 (1,050 mph) to Mach 1.8 (1,190 mph) range," says Simeon Austin, director of advanced engine programs. "A business jet at Mach 1.6 wouldn't see engine temperatures or pressures any higher than what thousands of airliners see every day at takeoff."

If the airframers develop a supersonic business jet, who in particular is going to plunk down the big wad of cash to buy it? Richard Smith, executive vice president at Netjets, would like to. "Time is money, and speed sells. Going Mach 1.8 is going to sell," he says. Smith believes that industry needs to come up with a plane that can carry about eight passengers the 4,750 nautical miles needed for flights from San Francisco to Tokyo. And he wants its engines to be able to operate supersonically for at least 2,000 hours between visits to the maintenance shop. (Military planes actually spend very little time in supersonic flight and require more frequent maintenance than airliners do.) What's needed first, Smith believes, is for the FAA and the EPA to come up with numeric goals for the noise and pollution limits the jet would have to meet. Last November and again in May, airframe and engine makers, potential customers, and federal officials met to work on a roadmap airframers could follow. "NASA got the insight it needed from the business world to define the development targets," says Smith.

Once firm goals are in place, the next logical step would be to build an X-plane, a one-off experimental craft that would prove once and for all whether a shape can be devised that will fly well at supersonic speeds while producing a sufficiently gentle boom. Some engineers think that a boom "overpressure" of three-tenths of a pound per square foot (psf) at ground level would be acceptable to the public; the big booms unleashed by Concordes sometimes topped 2.0 psf—louder than a thunderclap.

Estimates of the cost of building a low-boom X-plane vary from $750 million to $1.5 billion. NASA has built a long series of X-planes over the years, but with its planning now geared to President Bush's goal of sending astronauts to the moon and Mars, the agency is unlikely to devote that kind of money to developing what could be seen as a hot rod for fat cats. Bruner at Raytheon Aircraft predicts that some sort of joint industry-government funding may be worked out. Raytheon is eager to put to work on new supersonic planes its expertise in automated manufacturing of lightweight composite structures.

Boeing has been studying notional business jets that would carry eight to ten passengers at speeds ranging from Mach 1.2 to Mach 1.8, and in the past has discussed a joint venture with Sukhoi. "We learned in the [canceled] Sonic Cruiser program that an incremental increase in speed wasn't worth as much as we thought it would be to the airlines," says Lee Monson, president of Boeing Business Jets, which sells a poshed-up version of the 737 jetliner. "But there is an underlying demand for a much faster airplane in the business market." In addition to the corporate-aviation market, Monson sees smaller markets for government VIP planes and express-freight haulers with time-sensitive cargos.

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One thing everybody studying the potential supersonic business jet market agrees on is that it will only be big enough for one airplane: Rival planemakers or consortia competing with one another would bleed to death. Smith at Netjets says he expects supersonic jets may end up with a pricetag as high as $100 million apiece, which will nonetheless be acceptable to purchasers of fractional shares in the world's fastest passenger plane. If this aeronautical fairy tale comes true, the really big spenders will get to brag about how little time they waste getting places. Talk about positional goods. F

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