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The Top-Secret Warplanes of Area 51

Bill Sweetman

For a closer look at the exotic aircraft the Air Force might be cooking up at Area 51, launch the photo gallery.

On a trip to las vegas in 2004, observing from my east-facing hotel room in the pyramidal Luxor Hotel at daybreak, I watched a fleet of six unmarked 737s make commuter flights to nowhere. These aircraft depart every weekday morning from a tidy, anonymous terminal on the western side of McCarran International Airport. A long line of cars pours into a 1,600-spot parking lot as the jets pull away from the terminal, taxi to the runways, and head out into the desert sky. At the end of the day, the shuttle flights return and the lot empties. The passengers go home and tell their families nothing about what happened at work that day.

Cut to April 4 this year. San Diego is hit by a rumbling shock that isn't an earthquake. It is ruled out by the media as a sonic boom after military operators claim it is not one of their aircraft. San Diego Union-Tribune reporter Alex Roth does some digging and comes up with six puzzlingly similar incidents around the country since 2003.

Fast-forward to July, at the Farnborough International Airshow in southeastern England. Frank Cappuccio, the avuncular vice president of Lockheed Martin's secretive Skunk Works division, opens a press conference by introducing what he calls a promotional video, "something to show the kids and families about what we do." Two minutes into the show, a gray, cockpit-less airplane that nobody has seen before—it looks like a B-2 bomber's chick—soars over a backdrop of stony, barren hills and mountains.

All these events are linked. They are the visible signs of an invisible, parallel world within the universe of aerospace and defense: the classified, or "black," world of secret military programs. Those unmarked 737s were ferrying employees to the flight-test center near Groom Lake, Nevada, known to the public as Area 51. The gray airplane is Polecat, a next-generation stealth unmanned aerial vehicle (UAV)—Cappuccio's video was his sly way of unveiling the program. Those earthquakes? Quite possibly sonic booms from a long-suspected hypersonic attack vehicle, a sleek aircraft that has consumed the imaginations of black-project enthusiasts and military analysts, including me, for two decades. Though seemingly dormant in recent years, the program appears to be on the move again, and with a renewed vigor that has me feeling, somewhat unsettlingly, a bit like the aerospace industry's own Ahab.

Is speculating on top-secret military technology a national security risk? Tell us what you think on the *PopSci* Blog. The black airplane world has, without question, produced the most significant advances in aviation technology. In the 1950s, it spawned the U-2 spyplane, which flew higher and farther than anyone had thought possible. It gave birth a decade later to the SR-71 Blackbird, the exotic, revered speed king. It also produced the slow but stealthy, origami-like F-117 fighter.

But for aerospace sleuths, there's been little activity recently in the form of declassified vehicles that might hint at current efforts. (Classified programs can be unveiled to aid in broad combat deployment or when the technology appears in other programs.) The F-117 came out of the black world during the first Iraq war 15 years ago, and only three aircraft have been introduced since. One was Polecat. Another was Northrop Grumman's ungainly reconnaissance aircraft Tacit Blue, nicknamed "the Whale." The third was Boeing's Bird of Prey, which tested visual stealth strategies, including shaping that minimizes shadows and contrast and, rumor has it, body illumination that allows it to blend into its background.

This dearth of unveiled prototypes does not mean, however, that the black-aircraft community is dormant. In fact, all signs point to steadily increasing activity. Google Earth reveals a newly constructed additional runway and multiple new hangars and buildings at the base. The usual vague, untraceable allocations in congressional budgets that often signal classified programs are on the rise, and modern technological innovations are now enabling aircraft designs that might have floundered in the black world for years. Further, there are significant gaps in the military's known aviation arsenal—gaps that the Pentagon can reasonably be assumed to be actively, if quietly, trying to fill.

The need for such secrecy is simple: It is essential to preserving technological surprise. The Pentagon wishes to prevent enemies from developing strategies to counter the technology. The challenge is to figure out what precisely is happening—without betraying national security—because the bigger the black world gets, the better it conceals its activities. What follows is inescapably an educated guess, arrived at by analysis of the available evidence, at the tantalizing designs being cooked up on the sly at Area 51, including a radical special-forces transport, a stealthy UAV, an agile new bomber, and my own white whale—the mythical, hypersonic dragster and presumed source of those faux earthquakes: Aurora.

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One of the best pointers to a secret program is an obvious gap in the "white world" force, and one of these gaps is a stealthy, short-runway transport airplane. The U.S. Air Force's special operations community has talked for many years about stealthy transports that could take off and land vertically or on a few hundred feet of level ground (a soccer field is the classic example).

The new V-22 Osprey tilt-rotor transport is a partial answer to that problem, but the military would really like something faster, so it can fly farther into and out of enemy territory, and the Osprey's big rotors quickly betray it to radar. So far, there is no sign of unclassified, white-world money developing such a vehicle. In 1992, however, Skunk Works engineers filed a patent application for such an aircraft. (New aircraft can take years to develop. A 14-year-old patent filing could easily represent a current program.)

Tailless, with a blended wing and body, the aircraft is powered by six jet engines driving rotor-like lifting fans ensconced in wide, round bays in the wings. For takeoff and landing, doors and Venetian-blind vanes cascade open, and the fans lift the airplane vertically. While cruising, the engines drive smaller, forward-thrusting fans. Why six engines? The engines and fans are interconnected by an elaborate system of cross-shafts so that any engine can deliver power to either side of the airplane. With six engines, the airplane can complete a mission if one fails.

Is something like that out there today? The job of a vertical-takeoff-and-landing aircraft still needs doing, perhaps now more than ever before, and, barring antigravity solutions from the friendly aliens at Area 51, an aircraft like this is one of the few ways to get it done. Technologically, it is probably benefiting from the innovations behind the Osprey's power-sharing engines—in that aircraft, if one engine fails, the second still drives both propellers—and the development of the shaft-driven vertical-lift fan in the new F-35 Joint Strike Fighter, or JSF.

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Although manned fighter jets and bombers have long dominated classified programs, unmanned vehicles are rising as quickly in the black as in the white world, particularly because the Air Force lacks any kind of stealth-reconnaissance aircraft. It plans to replace the U-2 spyplane with the Global Hawk UAV, but even though the Global Hawk has the advantage of being robotic—that is, capable of longer flights and expendable, since there's no human on board—it doesn't fly as high and can't carry the same hefty high-performance cameras as the U-2. Nor does it carry a jammer to spoof enemy missiles.

Polecat, just outed from the black world, is part of the answer. Lockheed Martin representatives talk about an operational version with U-2-like altitude and payload, along with technology to avoid visual detection (including features seen on the Bird of Prey) and, perhaps, an automated system that detects a contrail behind the airplane and tells the flight-control system to change altitude.

Other stealthy UAVs have probably been tested—among them, possibly, armed UAVs. It is known, for example, that engine maker Williams International delivered the first dozen or so of its new FJ33 small jet engines to the U.S. government four or five years ago, but no known project uses that engine. A recent report in Jane's International Defence Review described another, larger vehicle that uses different engines from Polecat, apparently recycled from a 1960s UAV program. The article speculated that the engines are probably General Electric J97s, built for a UAV called Compass Arrow.

Why reuse old jet engines? There is only one good reason. The J97 was unusual in that it was designed to operate at up to 80,000 feet, an altitude at which most jet engines cough, stall, and quit. The Air Force does not send the stealthy B-2 and F-117 over hostile territory in daylight, because those planes could be easily spotted. But at 80,000 feet, six miles above a fighter's cruising altitude, the sky is almost as black as night, and a UAV could survive at high noon. I suspect that both Polecat and the second, larger stealth UAV are currently undergoing high-altitude flight-testing at Area 51.

Some UAV projects may be much slower than even the stealth birds. A Boeing patent filed in 2004 describes a vehicle that is a cross between an airship and an airplane—employing both buoyant lift from helium gas and wing lift generated by forward speed, and capitalizing on recent developments in on-board solar power generation and autonomous flight control.

What would be the advantage of such a vehicle? For one thing, it would have long flight endurance, measured in days or weeks rather than hours. For another, airships can easily be made to accommodate very large and sensitive antennas. If you want to locate weak or sporadic radio transmissions—such as cellphones or scattered satellite phones used by insurgent groups—the airship is an ideal platform.

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Another surprising gap in U.S. capabilities is the lack of an all-weather, stealthy ground-attack aircraft. The Joint Strike Fighter is supposed to do that, but not until 2014. The new F-22 Raptor, mostly an air-to-air fighter, will be able to do some of it eventually, but that jet carries a relatively modest 2,000-pound bomb load. The F-117 Stealth fighter can be flown only in clear nighttime weather—it has no radar to bomb accurately through clouds, and its black coating easily betrays it to ground spotters.

Fellow black-project sleuth Jeffrey Richelson, author of the 2001 book The Wizards of Langley and one of the leading historians of U.S. intelligence efforts, guessed in a recent conversation that a behind-the-scenes tour of Groom Lake might reveal a revived program to plug that gap sooner than 2014, when the JSF flies.

A hint about possible all-weather attack vehicles now in testing—ones available sooner than 2014 and capable of carrying significant bomb loads—could reside, aerospace historian Peter Merlin pointed out, in a test pilot's unclassified biography. Daniel Vanderhorst, who flew Northrop's Whale and six other secret aircraft in a 20-year career, evidently "tested modified landing gear and conducted initial tests of internal weapons bays and weapon separation tests." What's unusual about this is that most prototypes are simple aircraft without weapon bays, which suggests that this airplane was closer to an operational type. Specifically, I'm guessing, it could be an extension of the heavy-payload, all-weather attack jet A-12 Avenger II, which then–Secretary of Defense Dick Cheney canceled in 1991 because it was overbudget and not meeting its technological goals.

The flying-wing, carrier-based stealth-strike airplane was being developed under a tightly classified but not-quite-black program. The jet was only 11 months from first flight, and nobody has ever disclosed what happened to the partly built prototypes. If one of them had been completed and tested in a revived black program, most likely in the early 1990s, it could have pointed the way toward the F-117 replacement that Richelson suspects is flying now. Unlike the other stealth aircraft, an operational A-12 descendant would combine stealth ground-attack capability with the ability to shoot back at enemy fighters, packing a pair of anti-radar missiles and two AIM-120 air-to-air missiles.

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Lastly, there's Aurora. The name itself is mysterious, evoking something you may or may not have seen. This code name leaked out of an unclassified budget document back in 1985. Such a vehicle—a ramjet-powered reconaissance and strike aircraft capable of flying at least five times the speed of sound and deploying anywhere in the world in a matter of hours—has been high on the government's wish list. Aurora is certainly possible. The basic propulsion unit, the ramjet, is no more than a tapered tube with a fuel injector and burner in the middle and a thrust nozzle at the end. Basic ramjet-powered missiles have topped Mach 6. A wealth of aerodynamic data and test flights suggest that a wedge-shaped aircraft would work at these speeds.

I first heard about this kind of program in the mid-1980s, and the first public hint of the project popped up in 1988, when the New York Times reported that the Air Force was developing a spyplane capable of better than Mach 5—nearly twice as fast as the SR-71, then the world's fastest airplane.

Two years later, the Blackbird was retired. In June 1991, the first in a series of unexplained shock waves rolled across the Los Angeles basin, rattling doors and windows and making people think of earthquakes. But they were not earthquakes, and the military adamantly denied that any of its vehicles caused the booms. In May of this year, I consulted with Dom Maglieri, an ex-NASA sonic-boom expert who has played a key role in the development of low-sonic-boom aircraft. We studied 15-year-old seismograph data from the California Institute of Technology, whose uniquely sensitive sensors could actually track the booms. "The data showed something at 90,000 feet, Mach 4 to Mach 5," Maglieri says now. The booms did not look like refracted, "over the top" booms, as other reports had indicated—booms from aircraft miles away that had traveled up through the atmosphere and bent down toward Los Angeles. The booms looked like direct overflights by a supersonic airplane that no one admitted to owning. "The signatures are awfully different," Maglieri says.

Shortly after the first set of waves appeared, Chris Gibson, an oil engineer and well-known aircraft-recognition expert, contacted me. In August 1989, Gibson said, he had been working on a North Sea rig when a colleague called him outside to see a formation of airplanes overhead. Clearly silhouetted against the sky were two F-111 bombers, a KC-135 tanker and—in refueling position behind the tanker—an unidentifiable delta-shaped airplane, about 90 feet long, a near-perfect match for unclassified studies of high-supersonic cruise airplanes.

Is speculating on top-secret military technology a national security risk? Tell us what you think on the *PopSci* Blog. This evidence helps establish the program's initial existence. My investigations continue to turn up evidence that suggests current activity. For example, having spent years sifting through military budgets, tracking untraceable dollars and code names, I learned how to sort out where money was going. This year, when I looked at the Air Force operations budget in detail, I found a $9-billion black hole that seems a perfect fit for a project like Aurora.

Over the years, I've learned that few people investigate budget holes seriously. Analysts such as Steven Kosiak of the Center for Strategic and Budgetary Assessments, a Washington, D.C.–based think tank that pushes innovation in defense, doubt that Congress even knows what's going on. "A fair amount of classified spending goes through in supplemental requests," he told me. "It's seen as must-pass legislation, and people don't look at it closely." This $9-billion gap and the most recent booms felt in San Diego and elsewhere are the most compelling evidence for the program's resurgence. (We can't analyze the new booms because seismic sensors of the same type were not present.)

But if Aurora has been active for years, why would it be surging forward now? The main hold-up has probably been fuel. The way to make a hypersonic cruiser work is to use circulating fuel to soak up the engine's heat, but conventional jet fuel can't absorb enough heat to do the job. In the 1980s, Aurora would have been designed to use fuels such as hydrogen or methane, which are gaseous at normal temperatures and had to be supercooled and densified to fuel the aircraft. Although that strategy is possible, it's not operationally easy, and complicated refueling would be counterproductive for a jet intended to provide prompt overflight when the military needed it. Better fuels and engine technologies exist now.

The question, finally, is does Aurora exist? Years of pursuit have led me to believe that, yes, Aurora is most likely in active development, spurred on by recent advances that have allowed technology to catch up with the ambition that launched the program a generation ago.

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