The stealth bomber is a mature system, prepared for deep, precision strike missions worldwide.
Ready

By John A. Tirpak, Senior Editor
During the past year, as Congress argued about whether to buy more B-2 aircraft and the media debated such fanciful issues as whether the bomber dissolves in the rain, those who actually fly and maintain the aircraft have matured it into a combat-ready system able to make good on the promise of stealth, long range, and heavy payload.

The B-2 in the past 16 months has shown its capability to deliver precision guided bombs under real-world conditions; been certified for nuclear operations; racked up experience with long-range missions and exercises; and acquired a skilled cadre of pilots and maintainers well qualified to fully exploit the B-2’s unprecedented capabilities.

USAF has also labored to debunk wild accusations of gross deficiencies in the airplane even as it has tried to explain its reluctance to buy more of the expensive bombers.

Today, all B-2s operating with the 509th Bomb Wing at Whiteman AFB, Mo., are Block 20 or “final configuration” Block 30 versions, meaning each is capable of delivering large numbers of heavy bombs with very high precision. That capability was dramatically demonstrated over a year ago when three B-2 bombers destroyed 16 targets in one pass on a desert bombing range in Nevada. All of the targets were either destroyed or severely damaged, and all of the bombs used were of operational standard, not “test” rounds that had been tweaked to guarantee success.

The demonstration was made using the GBU-36, also called the GATS/GAM, or Global Positioning System–Aided Targeting System/GPS–Aided Munition. It is a standard 2,000-pound bomb with a tail kit that can cue off the B-2’s synthetic aperture radar and GPS satellite. The GBU-36 is a special munition that was designed to give the Block 20 B-2 an “interim” precision bombing capability until the full-up Block 30 version of the airplane was delivered.

Block 30 bombers can use the new Joint Direct Attack Munition, which offers similar capabilities but which will be mass-produced. Now that Whiteman has only Block 20s and Block 30s, its range of conventional targets is “unrestricted,” according to 509th commander Brig. Gen. Thomas B. Goslin Jr. The base has about 100 GBU-36s on hand as well as a growing supply of JDAMs.

Ready Now

“The B-2 is combat-ready today,” Goslin said. “We are meeting our training requirements and ... maturing the system.”

Within a few months of the demo, the 509th was certified as having achieved Initial Operational Capability, having shown its ability to deliver conventional bombs with precision and having passed a Nuclear Surety Inspection which vetted its handling, storage, and deployment with nuclear weapons. Since then, the wing has been trading its Block 10 airplanes back to the factory in exchange for more-advanced configurations such as the Block 20 and Block 30. The Block 10s and 20s are undergoing refit to the Block 30 standard; by the turn of the century, all 21 B-2s will be of the final configuration.

“Everyone’s seen the B-2 GATS/GAM tape,” said the head of Air Combat Command, Gen. Richard E. Hawley. “I’ve shown that to almost the whole world. That’s a very impressive capability, that JDAM-equivalent capability, the ability to drop near-precision weapons from ... 45,000 feet, ... eight miles from the target, and achieve near-precision results. [It’s] an incredible addition to the warfighting capability [of regional commanders in chief].”

At any given time, about nine B-2s can be found at Whiteman. The rest either are in refit to higher block configurations at Northrop Grumman’s Palmdale, Calif., facility or in flight test at Edwards AFB, Calif.

Every month, about 40 pilots spend their time alternating between mission planning, three to four long-duration simulator rides, about five proficiency flights in a T-38 Talon, and two missions in an actual B-2. More pilots are in the pipeline, and unlike many other segments of the Air Force, pilot retention is not a problem. Goslin reports that he’s only had three pilots leave the service since he assumed command last year, and one of them is still involved with the program as a reservist.

“You have to remember that these pilots compete very hard for this assignment,” he noted. “They are highly motivated.”

Because the B-2 is expected to be such a high-demand system in the event of war—and because there’s no certainty it will be cleared to operate from forward bases—the pilot-to-airplane ratio on the system will be higher than for most other systems. The greater number of pilots would be needed if the B-2 were called on to fly back-to-back missions of more than 35 hours for more than a few days. Both actual missions lasting in excess of 35 hours, as well as simulated missions of over 40 hours, have been run routinely to show that the 509th can maintain a credible sortie rate with the B-2 even from its home base.
Behind six B-2s on the ramp at Whiteman AFB, Mo., are special hangars—with maintenance ports and hookups positioned to mate with the bomber. USAF is also acquiring some portable shelters in which personnel can carry out touch-ups to maintain the B-2's stealthy coating at a forward base.

Dynamic Duo

These "global power" missions are part of the B-2 training repertoire which last year included sorties to participate in Red Flag exercises, some of which were run in concert with the B-2's stealthy stablemate, the F-117 Nighthawk fighter. The two stealth airplanes practiced simulated strikes on enemy air defenses, command-and-control nodes, and "high-value" targets that would be attacked early in a war.

The exercises also help educate other forces and CINC staffs about the capabilities of the airplanes and how to work with and around them.

"The bomber force is acquiring the same kind of precision capabilities that we've had in the fighter force the last several years," Hawley said, "and so we're beginning to make that known, to make sure that the CINCs are planning for the employment of bombers."

Hawley noted that B-1Bs have made several such deployments—to Korea and to the Middle East—and the B-2 is now on call to follow suit.

Already under the B-2's belt are long-duration missions to Guam and Chile and to France for the Paris Air Show. The lengthy simulator missions of over 40 hours—monitored by USAF medical researchers—have been useful in finding out how each pilot best handles the problem of fatigue.

"We found that some of them do better with short catnaps," Goslin said, while others are refreshed by a single nap of several hours. Sometimes, "just a change of clothes can really wake them up" or a wet-toweling. Each pilot learns his optimum techniques to stay alert "during those portions of the mission where they really have to concentrate" and to rest during the "automated" portions of the flight. Diet and premission sleep pattern also play a role. Mission plans and crew rosters are designed with individual alertness patterns in mind.

A B-2 mission would typically involve three bombers in an orchestrated attack, two in the lead and one trailing behind. One of the lead airplanes would use its synthetic aperture radar to acquire an image of the target area; the image then is correlated with reconnaissance imagery prepared beforehand. Aim points are selected and matched with previously determined GPS coordinates. With this "three-dimensional" and non-optical targeting information, the B-2 can score hits comparable to those achieved with laser-guided weapons, and it is not hampered by bad weather over the target, as would be the case if they were using laser-guided weapons.

Cleaning Up

The two lead ships in an attack would strike most of the targets in one pass, while the "mission commander"—in the third and trailing ship—would do what amounts to an immediate bomb damage assessment with the synthetic aperture radar. Any targets not sufficiently damaged would be attacked by the third ship, greatly reducing the need to "restrike" a complex with an entirely new flight. The tactic also allows for more flexibility to attack secondary targets.

The number of sites hit with just three aircraft is truly startling. "Typically, they will go after 32 targets," Goslin said.
Sophisticated training equipment, such as the weapons load trainer (top) and the full motion cockpit flight simulator (above), has helped ensure that Air Force personnel are ready to maintain the bomber and to fly it into combat.

The past year has seen a sharp decline in the 509th’s dependence on contractor help for maintaining B-2 low-observable surfaces and materials, and so there has been a great reduction in the number of contractor personnel who actually work at Whiteman. The experience and knowledge of the maintenance crews have increased substantially—so much so that Goslin doubts it would be necessary to take many—or any—contractor technical representatives along on a deployment. Virtually all of the B-2’s daily maintenance needs are met by blue-suiters, with contractors called in only for special problems or to help train new maintainers.

Software support requirements for the B-2 are growing, however. At Tinker AFB, Okla., USAF has erected a special support facility to handle the millions of lines of computer code that make the B-2 run. As new tactics are developed, experience gained, and new weapons added, the software must be continually updated, and this job will fall to about 200 programmers located permanently at Tinker.

Portions of the airplane not directly associated with its stealthiness—hydraulics, engines, and the like—are proving no harder to maintain and repair than those on other airplanes. If anything, airplane crews find the B-2 easier to work on because the B-2 “bays”—the hangars at Whiteman built to house the B-2 specifically—are designed with maintainers in mind, with fuel ports, drain holes, electrical hookups, and other umbilicals in the hangar positioned to mate to the airplane without fuss or difficulty.

The B-2 figures to play a key role in the new national military strategy, which assigns high value to swiftly halting an aggressor’s initial thrust at the outset of a Major Theater War. DoD’s latest force and strategy assessment, the Quadrennial Defense Review, put great emphasis on using bombers as the first means of counterattack against a no-warning invasion of an American ally. Unlike aircraft carriers, they do not need to get into position before they can begin their missions.

All in a Day’s Work

Goslin said that the QDR’s emphasis on the halt phase of theater war did not prompt any significant changes in the B-2 training syllabus, as the long-duration missions were already a large part of it.

“We’ve always ... been prepared for that kind of mission,” since the B-2’s initial duty was as an intercontinental nuclear bomber. “The same kinds of training you do for the [nuclear] mission ... translate to the conventional mission we see becoming a larger part of our operations,” he said.

Though the stealthy B-2 will be a key player in dismantling an enemy air defense system, it will be available throughout the conflict to attack high-value targets or even simply to carry large payloads of dumb bombs, Goslin said. The B-2, for instance, can carry 80 Mk. 82 500-pound bombs, almost as many as the B-1B’s capacity of 84. The B-2 will also be able to carry a monster 4,700-pound “deep penetrator” to destroy deeply buried command-and-control bunkers and next year will be certified with the Joint Stand Off Weapon. The JSOW is a stealthy glide bomb. Goslin, when asked why the B-2 would need it, explained that it “in-
creases our footprint” and makes it possible for the B-2 to attack at even longer ranges without exposing itself to the most lethal or unpredictable air defense threats.

Overall, Goslin asserted, the B-2 is “a major contributor ... to the halt phase,” though he added, “Not everything depends on the B-2.”

The General Accounting Office, one of Congress’ watchdog agencies, late last summer lobbed a series of criticisms at the B-2 program. Many of them were picked up by press critics. The GAO concluded from the B-2’s initial operational experience that its stealthy skin required too much maintenance; that it could operate from few forward bases because there are no shelters available under which to service its stealth surfaces between missions; that rain and bad weather degraded its stealth capabilities; that deployments were not possible because of a lack of spares; and that it wasn’t coming even close to its intended mission readiness rates.

These conclusions—based on preliminary data long since overtaken by events—quickly and widely were repeated in the media, which interpreted them as indicating the B-2 could not fly through bad weather, that it wasn’t stealthy, that it was simply too finicky for combat conditions, and that it was a costly technological failure.

“I’m the guy that’s got to take it into combat, ... and I’m telling you this airplane has no [low-observability] degradation in rain or weather,” Goslin said. “There’s no other airplane I’d rather go to combat with.”

“This is a new system,” he explained. “We’re still learning how you make this work.”

Substitutes

Some of the early approaches taken to sealing seams on the B-2’s skin—necessary to maintain its low radar cross section—did indeed fail to live up to expectations, he said. However, new substitute techniques have proved up to the task. Tape that tended to peel back in the rain and airflow was replaced by tape with stronger adhesive, for example. And, “new materials are becoming available all the time,” Goslin said.

The B-2’s stealth does not degrade in bad weather to an appreciable extent, and to underline the point, Goslin noted that “we would like to go into combat at night and in really bad weather” to further hamper air defense efforts.

In an unsubtle effort to make the point, the Air Force welcomed dozens of journalists to Whiteman in September to look over the B-2, talk to pilots and crews ... and see it scrubbed down in a thorough washing.

Goslin admits that the B-2’s surface needs some spot touch-up after a mission to make it fully stealthy for the next one. But this is the nature of stealth technology today, and it can be done quickly, Goslin said. Shelters make the process easier.

“You wouldn’t paint your car in the rain,” he pointed out.

While some overseas bases—such as Guam—have shelters the B-2 can use, more are being built, and the 509th will acquire some transportable shelters to take along on deployments.

Finally, spares kits were only funded for the final configuration model, the Block 30. For the Block 20 to go on deployment, spares kits will have to be created by cannibalizing some airplanes and tapping into the regular operating stores for others. It’s a problem that will disappear once all the airplanes reach Block 30 configuration and the war readiness spares kits match the bulk of the fleet.

“We feel we will make the mission capable rate of 77 percent ... with the Block 30 airplane,” Goslin asserted, “It will happen ... when the airplane is mature.”

He also noted that neither the B-52 nor the B-1B had achieved anything like the progress being shown by the B-2 at comparable points in their development and deployment.

Why doesn’t the Air Force want to buy more B-2s, given its promising performance so far and its crucial role in the halt phase in a future no-notice war?

“I would love to have ... all B-2s” in the bomber force, Hawley said. “In an unconstrained budget environment, they would be.” However, he pointed out, “We don’t live in an unconstrained budget environment. In fact, we live in a very severely constrained budget environment. Therefore, everything involves trade-offs.”

In the Deep Attack Weapons Mix Study that came to an end earlier this year, analysts “concluded that the bombers made great contributions in the halt phase,” Hawley explained. “They also looked for the trade-offs you’d need in order to buy more B-2s. And in every case, those trade-offs would have involved giving up some important near-term capability in order to get a B-2 capability 10 or 12 years down the road.”

Given the current high operating tempo of the military as a whole, “giving up significant forces in the near term, in order to acquire that enhancement in the long term, we believe not to be a good trade,” Hawley said.

Neither the B-52 nor B-1B bombers had achieved the progress of the B-2 at comparable stages of development and deployment, say USAF officials. They express confidence that the B-2 fleet will achieve a high mission capable rate.
Brig. Gen. Bruce A. Carlson, the Air Force's mission area director of global power, put it in more concrete terms.

End of the Line

"The bottom line is, from our point of view, it would be impossible to build more B-2s as we know them," he said. While B-2s will go through modifications at the plant for another three years, in terms of production, "the line is closed."

Of the more than 4,800 suppliers that contributed to the B-2 effort, "Ninety percent are out of that business or have shifted their product lines or laid off their people" Carlson noted. To restart and recertify the production line and all those suppliers—"if you could get the people, if you could get the parts, [it] would probably cost a billion and a half bucks," he said. "That's a significant chunk of change."

Coupled with a possible flyaway cost of more than $750 million per airplane, an addition of only nine B-2s would cost about $9 billion, Carlson said, and wouldn't include the cost of standardizing the fleet to a single configuration. He noted, for example, that the B-2 design was largely frozen in the early 1980s and that to take advantage of the computer, sensor, and materials advances since then would constitute virtually a new design effort—a B-3, so to speak.

Moreover, the B-2 program has been funded for operations, spares kits, and other considerations based on a 21-airplane fleet. Raising that number to 30 would require far more substantial increases in all those accounts and greatly increase the system's life-cycle cost.

For all these reasons, Carlson asserted, "It is, in our judgment ... prohibitive."

The $331 million Congress appropriated to fund additional B-2s would be only enough to start the job and would force USAF to slash other programs to make good on the balance, something the service is not prepared to do, he added. By his reckoning, the appropriation provides "only 10 percent of the cost to reach the B-2 assembly line.

The service is asking Congress for permission to use the additional B-2 funds to enhance some of the battlefield communications capabilities of the airplane, upgrade some of the cockpit displays, and enhance the low-observables technologies. While the upgrades would not constitute a "Block 40," they do represent the next highest priorities in hardware upgrade for the B-2.

Asked if the rising cost of modern warplanes has made the B-2 the de facto "last" bomber for the Air Force, Carlson said that time will tell.

"It's not time yet to start thinking about a B-2 follow on," he said, given USAF's time-phased approach to modernization. Bomb-