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# B-2 STEALTH BOMBER AT WAR

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*“Air strategy begins with airplane ranges.”*

– General Carl Spaatz, US Air Force

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*Waiting. Ready.* Between the Atlantic and the Pacific, in green farmland, there is Whiteman Air Force Base, home of the B-2 stealth bomber.

The highest calling of America’s air power is to reach any place on the globe. Against any defenses, to attack with precision. This is the core of diplomacy and of deterrence. This is mission of the B-2.

B-2s are at the center of war plans, for every theater of operations around the globe. The B-2 stealth bomber, built for nuclear deterrence, has also taken the lead in America’s toughest combat operations over the last twenty years.

That’s because there are missions that only the B-2 – with its stealth, range and payload – can pull off.

Since the first flight of the B-2 in July 1989, the B-2 has become a guardian of deterrence, an instrument of policy and a first-night precision strike weapon.

Five times the B-2 has gone to war: over Kosovo and Serbia in 1999, Afghanistan in 2001, Iraq in 2003 and Libya in 2011 and 2017. Campaigns ranged from 78 days to just 48 hours. Each held unique lessons that point to the ongoing demand for the B-2 in multi-domain operations in a world with aggressive, great power militaries.

The B-2 is world-famous now, but this bomber began as a fiercely guarded secret.

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## FROM FIRST FLIGHT TO WHITEMAN AFB



*Think about a stealth bomber.* In the spring of 1979, that was Air Force Lieutenant General Tom Stafford’s challenge to Northrop.

Despite détente, the Soviet Union was rapidly building up in all areas, land, sea and air. The Pentagon was secretly funding stealth technology like Lockheed’s F-117 stealth fighter. Secretary of Defense Harold Brown and his deputy William J. Perry saw great potential in precision and stealth.

“Perry and the government wanted a stealth bomber,” said Irv Waaland, B-2 designer. “They saw it as the only way to counter the Soviet Union.”

Northrop’s engineers picked a high altitude, subsonic concept. “You gain a lot more range, there are less things coming at you, and if you are stealthy, they aren’t going to see you,” said Jim Kinnu, the first Northrop program manager for the B-2.

“We took one look at the flying wing and said that’s the shape that gives you more efficient structures and more efficient aerodynamics – lift-to-drag ratio,” recalled T. V. Jones, who headed Northrop.

The smooth curves of the flying wing controlled and reduced the B-2’s “signature” – the energy return to enemy radar systems. “You can’t get rid of

radar cross section,” explained John Cashen, a B-2 patent-holder. “All you can do is push and pull it around, like a balloon.”

Northrop defeated Lockheed to win the stealth bomber contract. The B-2 was built in secret with the formal development program beginning in 1981.

“There was the window of vulnerability, which the Administration at that time felt very strongly about being able to close,” said retired Air Force Lt. Gen. Richard M. Scofield, who led the B-2 program.

In 1987, Congress gave the Air Force approval to start procurement of 132 operational B-2 aircraft, principally for strategic bombing missions.

Word of the bomber trickled out. But the principles of stealth remained a mystery to most observers. “This much we acknowledge: the B-2 will not be invisible to radar. All we’re saying is that the B-2 will be so hard to detect from a distance that the Soviets will not have much warning before it arrives,” an official said.<sup>1</sup>

The first B-2 bomber rolled out of the hangar at Air Force Plant 42 in Palmdale, California on November 22, 1988.

## FROM FIRST FLIGHT TO WHITEMAN AFB

On Monday, July 17, 1989, the B-2 took off from Palmdale, California, on its first flight. At the controls were Bruce Hinds, Northrop's Chief Test Pilot, and Colonel Richard Crouch, Commander, B-2 Combined Test Force, Edwards AFB.

"The B-2 is revolutionary. It represents a crucial leap in our strategic modernization program. "Its stealth will permit us to penetrate the most sophisticated air defense and survive well into the 21<sup>st</sup> Century," said Secretary of the Air Force Pete Aldridge.

"We're talking about an airplane now that basically negates the air defenses that had been built up over many years around the world," said Air Force General Bernard Randolph.

Major Tony Imondi was the first Strategic Air Command pilot to fly the B-2. "It handled like an F-111 with four fuel tanks," he said.

Months later, the Berlin Wall fell in November 1989. The Cold War was over and the Soviet Union broke apart. Stealth technology proved out with the success of the F-117 in the 1991 Gulf war driving Iraq's forces out of Kuwait. But by 1992, Washington wanted a peace dividend. The B-2 fleet size was cut to a final buy of just 20 aircraft. Criticism of the unit cost of the truncated stealth bomber program persisted. So did doubts about its stealth capability.

The first B-2 delivered to the Air Force was the sixth stealth bomber off the line, known as AV-6. It touched down at Whiteman AFB, Missouri on Decem-

ber 17, 1993 – ninety years to the day after Orville and Wilbur Wright's first flights at Kitty Hawk.

Preparing for combat would take time. "The plane didn't even have a GPS on it yet," recalled one pilot who would later fly the B-2 in combat. The 509<sup>th</sup> went to work on operations, crew training, maintenance, deployments and weapons tests.

Many derided the bat-wing bomber, criticizing its cost, its stealth, and its place in the combat Air Force. "Everybody thought the Cold War's over, we don't need to invest in the B-2. The mission's gone away," B-2 pilot and commander Brigadier General Jonathan George recalled of this time period.

With little publicity, the B-2 force was quietly developing a completely unique capability for penetrating, precision conventional attack. The B-2 achieved initial operational capability in 1997. That same year, the B-2 was also certified to drop the new Joint Direct Attack Munition (JDAM) guided by satellites of the Global Positioning System constellation. Together the stealth of the B-2 and the precision of its weapons were becoming an irresistible capability.

On March 24, 1999, over the former Yugoslavia, the B-2 went to war.





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## THE B-2 BOMBER IN NATO'S FIRST AIR WAR

The B-2 made its combat debut with the credibility of NATO on the line.

In the spring of 1999, Serbian leader Slobodan Milosevic, in control of the former Yugoslavia, walked away from peace talks. His forces were driving ethnic Albanian Kosovars from their homes. To stop the ethnic cleansing, NATO authorized an air campaign. Three days of pre-planned strikes turned into an all-out air war when Milosevic sent military forces into Kosovo. NATO determined to pay back his brutality with an air campaign to punish leadership, degrade military forces and force the Serbs out of Kosovo.

Serbia's tight air defenses posed significant risks. "There's no assurance we won't lose aircraft trying to take on those air defenses," warned Air Force Chief of Staff General Mike Ryan on March 18, 1999. Stealth did not make the B-2 invisible. Stealth made the B-2 harder to detect and track. That gave the B-2 a tremendous advantage over other NATO aircraft.

The B-2 flew in combat for the first time on night one of the campaign. Eric Single and Steve Basham, and Steve Sicking and Darrell Davis flew the first night's missions.

Davis recounted the mission in detail:

*We took off in the dead of night. Night turned to day. Day turned to night. Some 15 hours prior, we had left our family and friends, the first employment of a combat sortie from the central part of the United States. Left the teams that got us airborne and the friendly voices of aircraft controllers. We met tankers, got our gas, and left them behind as well. And then it was just the two aircraft.*

*As it got dark and the last speck of light was in the air we drifted apart and went on our separate ways...*

*We checked in with airborne command and control. They said the picture's clear, green light. From that point on we knew it was real.*

*We turn inbound. The right-seater's managing the mission. The left seater's looking inside and outside for threats. You have that job between you.*

*It was pitch black in the cockpit. We're both packed in our seats. Dim glow of the displays out in front of us. It was a beautiful night, you could see every star in the sky. Gorgeous. They didn't know we were coming. Every light was on. You could see every urban center, every highway. Very surprising. That said, it was very quiet and it was just the way we wanted it.*

The quiet did not last. A flight of Tomahawk Land Attack Cruise Missiles launched from Navy ships was inbound.

*Eventually, blistering, boiling balls of orange light began emanating from the ground. The TLAM strike was on....Now we were hyper-vigilant. Here we are flying 300,000 lbs. of steel and composite and they'd be looking for us.*

*Then came another flash. Down below I see the corkscrew trajectory of a missile firing.*

Below their B-2, a Dutch F-16 had shot down a Serbian MiG-29.

Coming up soon was the most important part of the mission and the point of maximum risk. In minutes, the B-2 would open its bomb bay doors for weapons release. As Davis explained: *You open the weapons bay doors and present angles to radars. When radars have angles they get hits. When they have enough hits they can build tracks and pass them on to target tracking radars and cue other radars. If they get a good track they can launch against you.*

The most important part of the mission was dropping the bombs. To release weapons, the B-2 must enter the launch acceptability region, or LAR. Davis continued: *The LAR. An invisible cone in the sky that goes down toward the target itself. You have to fly into that cone. The systems give you some confidence but you never really know until you get inside that basket. Would we be detected? Would our weapons delivery be successful?*

Tension grew. *We got into the LAR, our systems came alive and said we had a good weapons delivery solution. Just a few seconds before release, the weapons bay doors open.*

It's the most dangerous part of the mission. Davis continued:

*You hear the rush, the noise changes in the cockpit and then 3-2-1 the weapons begin kicking out.*

*Doors shut. Okay, now it's on... We've given them every reason to know we are here now. You're checking inside, checking outside. Things remain quiet. Your confidence begins building that this could go well.*

In the past, it had taken multiple bombers to destroy a single target with unguided bombs. But with their large payload of precision-guided JDAMs, the B-2s were able to destroy multiple separate targets on a single sortie. Davis describes what this entailed:

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*We had several more sets of targets we went through. We essentially S-turned our way through the country, got all our weapons out, then departed. As soon as we were clear of Serbian airspace, we both confirmed that, then we dropped our masks and turned to each other and high-fived.*

Over the Mediterranean the B-2s sought tankers flying out of Spain for their dark, post-strike refueling and return to Missouri.

At Whiteman AFB, the command post read the message: *Clean and green*. The first B-2s were on the homeward leg of their 30-hour mission. “The real hero of that night was the platform itself. That is one awesome jet,” summed up Eric Single.

The B-2s struck regularly over the next eight weeks. Just six B-2s generated a mix of two-ship and single-ship sorties. Fifty different pilots flew combat missions. The B-2 flew 37 of the 53 air tasking orders generated for Operation Allied Force.

Commanders could count on each JDAM to hit its precise target, called the Designated Mean Point of Impact. “Sixteen quality DMPIs no matter how bad the weather was,” recalled Lt. Gen. Mike Short, Combined Forces Air Component Commander.

“We went from World War II–style bombing... to a single bomber striking multiple target areas, individually hitting points in those target areas and moving to the next one,” said Sicking.

It was never easy. Many pilots saw anti-aircraft fire. “You could see tracers in the distance coming up,” said pilot Andy Sanchez, after releasing weapons on a later combat mission. Serbian surface-to-air missiles often hid and “kept that element of doubt out there,”

said Gen. John Jumper, Commander, U.S. Air Forces Europe. Surface-to-air missile launches actually increased during the first few weeks of the war and an F-117 stealth fighter was shot down. Maintainers launched every B-2 in pristine condition: with all low observability features meeting high combat standards.

All told the 509<sup>th</sup> dropped 650 JDAMs on targets ranging from strategic sites in downtown Belgrade to a mobile SA-3 picked up by off-board sensors and the B-2’s own synthetic aperture radar. A B-2 also dropped the massive span of the Zezelj railway bridge over the Danube at Novi Sad, Serbia, on April 23, 1999. Analysis after the war found the B-2 strikes scored a stunning 84% success rate.

By early June, the pressure worked, and peace talks began. British military historian John Keegan wrote with some awe, “Now, there is a new date to fix on the calendar: June 3, 1999, when the capitulation of President Milosevic proved that a war can be won by airpower alone.”<sup>ii</sup> The B-2 helped NATO give the people of Kosovo a better chance for peace.

All this had been done without using bases in theater. “We have validated that we can reach out from the continental US,” said Brig. Gen. Leroy Barnidge, in command of the 509<sup>th</sup> Bomb Wing. “That’s a pretty big deal.”<sup>iii</sup>

And of course, stealth worked. “The B-2 can’t be whipped,” added Lt. Gen. Short. “It is an incredible capability for the nation that we verified in this conflict.”

“The point of every combat mission is to kill and survive,” concluded Davis. “We were successful in proving this aircraft could do both.”<sup>iv</sup>

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## AFGHANISTAN: 44-HOUR MISSION



Two years later came Afghanistan. A potential response to terrorism somewhere on the globe had been on the minds of many B-2 pilots at Whiteman. In May 2000, Jonathan George was the Operations Group Commander or “war chief” of the 509<sup>th</sup>. “Capt. Chad Stevenson walked in to the office and said we’re tracking this individual called Osama bin Laden. We don’t know what he’s doing, but he’s up to something suspicious,” George later recalled.<sup>v</sup>

Pilots at the 509<sup>th</sup> anticipated that anti-terrorist targets could take them anywhere on the globe. To prepare, they flew the B-2 on long sorties, landed, and sent the bomber aloft again without shutting down engines. B-2s practiced continuous run time. “We’d leave the jet running for up to 100 hours to find the limitations,” said George. On their own, pilots “started flying sorties in the simulator that were 50 hours, up to 72 hours non-stop.”

Tanker planning was vital. “We came up with routes that went west, went east, we went over the pole north and south. They all had their different pluses and minuses. What it really came down to was where could we get the tankers into in a short amount of time,” said B-2 pilot Col. Brian Neal, who as a younger officer had flown missions over Kosovo in 1999.

Then came the attacks of 9/11. Whiteman went into overdrive as planning focused on Afghanistan, where the Taliban government harbored terrorists from the Al Qaeda network headed by Osama bin Laden.

“We did a tremendous amount of simulations. In the three weeks before the mission, there was some intense study downstairs in the vault. Across the base the team united to work overtime to prepare for the unexpected,” said Neal.<sup>vi</sup>

Operation Enduring Freedom began on October 7, 2001. “About 15 land-based bombers, some 25 strike aircraft from carriers, and US and British ships and submarines launching approximately 50 Tomahawk missiles have struck terrorist targets in Afghanistan,” said Air Force Gen. Richard B. Myers, Chairman of the Joint Chiefs of Staff.

The first order of business was to “remove the threat from air defenses and from Taliban aircraft,” Secretary of Defense Donald Rumsfeld said on Oct. 7. That assignment fell to the B-2. “The primary mission of the first three nights was to gain and maintain air superiority,” said Major General Jim Dawkins, who in 2001 was one of the pilots fly combat missions.<sup>vii</sup> “Even though Afghanistan didn’t have a first-rate air defense system, they did have an air defense system,” said Air Force Lt. Gen. David Deptula, who was briefly assigned to Central Command’s air operations center in the fall of 2001. “The B-2 was used in locations where there was significant radar coverage.”

Strikes hit military aircraft, airports, runways, and air defense sites, military command and control centers, and other fixed targets near major cities and installations. Terrorist training camps were also tar-

## AFGHANISTAN: 44-HOUR MISSION



geted. Caves used by the terrorists were hit by 5,000-lb. “bunker busters” dropped from the B-2s.<sup>viii</sup>

“We took down all their surface-to-air missiles. We destroyed all their MiGs. We damaged their ability to launch in a way that then allowed us to come in and use those airfields,” recalled Col. Tony Cihak, who flew an Afghanistan mission.

B-2s launched from Whiteman then stopped at Diego Garcia to change crews. On the small atoll in the Indian Ocean the 509<sup>th</sup> had prepositioned fresh crews, maintainers – and food.

For the Afghanistan missions, planners at the air operations center communicated directly with B-2s in flight, changing targets when required.

That’s how the longest mission unfolded. It was night two of Operation Enduring Freedom. Major Melvin Deaille and Captain Brian Neal were in the cockpit of *Spirit of America*, the last B-2 delivered. They flew west meeting tankers over California, Hawaii and Guam. The Pacific crossing alone took 24 hours. “The idea was we service four targets, then come out of country,” recalled Deaille. Their B-2 spent two hours in country creating synthetic aperture radar maps to fine-tune strikes for 12 of its 16 JDAMs. “We exited, we still had JDAMs retained. We were tasked to go find a tanker, go back in and service another

target, which is again, the flexibility,” said Deaille. All told, “70% of targets changed from the moment we took off. 5 target areas in one mission.”

When the *Spirit of America* landed at Diego Garcia, the crew logged in their mission at 44.3 hours – the longest in history. As for the B-2 itself, a mere 45 minutes for fuel and oil and it was back in the air with a fresh crew. The B-2 ran its engines for 70 hours before returning home to Whiteman.

“The stealth aspect – this is an aircraft that has a penetration capability like no other. We can exit, get gas and go back in without worrying about escort. But it also requires some human ingenuity and tactics to get a stealth aircraft to the target. Those are the things that make a B-2 and that mission unique from the standpoint of what we did that night,” summed up Deaille.

After the first three days, the B-2s were not used again in Operation Enduring Freedom, since the air defenses in Afghanistan no longer posed a threat to conventional bombers if they stayed above the altitudes for man-portable SAMs and anti-aircraft fire. B-52s and B-1s took over and flew missions from Diego Garcia and other bases.



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## OPERATION IRAQI FREEDOM



*Over a million and a half pounds of ordnance.* That's what the B-2s would drop during ten intense days of taking apart the air defenses, command and control and airfields of Iraq.

On March 19, 2003, Coalition air forces led a joint campaign that culminated in the fall of Baghdad on April 9, 2003. This was Operation Iraqi Freedom, designed to end Saddam Hussein's rule and eliminate Iraq's ability to harbor terrorists or weapons of mass destruction. "This will be a campaign unlike any in history," declared Army Gen. Tommy R. Franks, Commander, United States Central Command, who was in charge of the war.

Lieutenant General T. Michael Moseley set Air Force planners to work on an Iraq campaign in mid-2002. "We had an impending sense something was going to happen," said one B-2 pilot, callsign Pita.<sup>ix</sup>

Iraq still had an air force and heavy air defenses concentrated around Baghdad. To gain air superiority fast, Moseley's planners put together the biggest single night of B-2 strikes ever. "With the B-2, I could hit eight airfields right up front," Moseley explained.<sup>x</sup> To increase B-2 sortie rates, Moseley brought a detachment of B-2s forward to Diego Garcia.

Moseley tasked the stealth and enormous precision payload of the B-2 to hit air defenses and

airfields simultaneously. "Our job is to lead the fight, force open the defenses and make a path to allow all the rest of the forces that are going to be taking part to exploit their capabilities," said one B-2 mission commander, callsign GQ.<sup>xi</sup>

Six B-2s attacked on night one of Operation Iraqi Freedom. Three flew from Missouri and three from Diego Garcia.

Basham, now a lieutenant colonel and Director of Operations for the 325<sup>th</sup> Bomb Squadron, watched the three-ship formation take off from Diego Garcia. The winds were intense on that day. "You see the palm trees starting to move," he recalled. "The third aircraft rolling down, the palm trees were laying flat. It was the worst tail wind I've ever seen. But all three aircraft got off," he recalled.

Three more B-2s were en route from Whiteman AFB. Lt. Col. Scott Vander Hamm was mission commander for one of them. "We were carrying 2,000-lb. precision-guided weapons and the 5,000-lb. bombs known as "bunker busters," and our targets were the regime's command and control centers, airfields and palaces," said Vander Hamm, who was serving as commander of the 325<sup>th</sup> Bomb Squadron.

Facing them was Iraq's "Super MEZ" or missile engagement zone. The MEZ was "an integrated

## OPERATION IRAQI FREEDOM



system of air defense artillery, radars, command and control, communications and surface-to-air missiles,” explained Maj. Gen. Stanley McChrystal, who was on the Joint Staff at the Pentagon. “If you can take down parts of that and degrade it, then it gets more feasible to operate effectively in day or night,” McChrystal said.<sup>xii</sup>

B-2s followed the “blue line,” a special-ly-planned route for each B-2 to weave through air defenses using tactics to maximize its stealth.

Vander Hamm described his mission from Whiteman in detail:

*Our mission was to go after Saddam’s critical infrastructure, to degrade his ability to respond. It was a 38-hour-long flight from Missouri and back again, with five mid-air refuels. As we were flying over Iraq towards Baghdad, we could see the precision strikes by the Navy’s Tomahawk missiles, but otherwise the night sky was very quiet and I could see the outlines of the Tigris and the Euphrates rivers where they converged.*

*As we closed in on Baghdad, the anti-aircraft fire opened up. It was snaking up, like a Slinky, in the tracer fire. Then, after we released our first bombs, the Iraqi surface-to-air missiles opened up.*

*Their missiles weren’t targeted and they weren’t tracking us, but our biggest fear was still that they would get off a lucky shot. We felt pretty comfortable, however, and there were no near misses.*

B-2s continued to strike at air defense and other targets. “We are the only assets right now over Baghdad. Our job is to do what Gen. Franks wants us to do, decapitate the regime and put pressure on the

regime and their command and control capabilities,” said Col. Doug Raaberg, who was commander of the 509<sup>th</sup> Bomb Wing.<sup>xiii</sup>

Retargeting was again part of the missions. “We showed the flexibility of the B-2 and how we can fly half way across the world and still be able to accept changes at the last minute and have a good effect on the war effort,” one B-2 pilot at Whiteman said in late March 2003.

Capt. Jennifer Avery became the first woman to fly the B-2 in combat during Operation Iraqi Freedom. “For a combat mission, you definitely have the adrenaline,” she recalled. “Where you find yourself getting tired is after you’re out of the country, and you’re headed back and it’s a long flight. All that adrenaline starts to ebb, and that’s when you find yourself exhausted. We had a lot of coffee, though.”<sup>xiv</sup>

The B-2s flew 22 sorties from Diego Garcia and 27 from Whiteman AFB during the first 10 days of Operation Iraqi Freedom.<sup>xv</sup> B-2s struck 600 targets.

The 2003 combat operations deployment also proved the B-2 could fight forward and sustain a high tempo of operations. Loading bombs, refueling, maintenance, mission planning: all elements came together, presenting the B-2 as a force proven for high-intensity operations. They posted an 85% mission-capable rate during Operation Iraqi Freedom, besting the B-1 at 79.4% and the B-52 at 76.7%.<sup>xvi</sup>

“Undetected inbound, unscathed outbound,” one pilot said of the B-2’s missions over Iraq.<sup>xvii</sup>



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## OPERATION ODYSSEY DAWN



The mission was classic B-2: decimate Libya's air force, inside its ground shelters. All in one night. "We did quite well," said Vander Hamm, now a brigadier general and commander of the 509<sup>th</sup> Bomb Wing at Whiteman AFB.

On February 26, 2011, the United Nations voted for a no-fly zone resolution to contain the forces of Muammar Gaddafi during Libya's civil war. "We're on the leading edge of coalition military operations designed to enforce United Nations Security Council Resolution 1970 in Libya," briefed Vice Admiral William Gortney at the Pentagon.

At U.S. Africa Command (AFRICOM), Air Force Major General Margaret Woodward scrambled to plan an air campaign. "Almost no one in Washington publicly seemed to believe we would actually execute this operation," she later said. Washington pondered several options then decided on an initial strike to impose air superiority before setting up the no-fly zone.<sup>xviii</sup>

The first task was taking out air defenses. Libya had a small air force, and older but still lethal SA-2, SA-3 and SA-5 surface-to-air missile sites.

The B-2's ability to strike from long range and target with precision drove it to the front of planning. The formal request came from Africa Command to U.S. Strategic Command (STRATCOM) and then to Air Force Global Strike Command, owner of the B-2s and B-52s. For nearly one year, B-2s had been flying trans-Atlantic exercises and partnering with Africa Command. "The communications piece was well-established," recalled Maj. Gen. Floyd Carpenter, Commander, Eighth Air Force.<sup>xix</sup>

Odyssey Dawn began on March 19 with strikes from Navy-launched Tomahawk Land Attack Missiles and NATO airpower. Along with B-1 strikes, three

B-2s departed Whiteman for the trans-Atlantic flight. Over the target area, one experienced problems with the rotary launcher. The other two bombed successfully. Their targets? Forty-five hardened aircraft shelters along a dual civil-military airfield in Sirte, Libya. "Gaddafi's hometown," noted Vander Hamm.<sup>xx</sup> Post-strike imagery went immediately to the air operations centers and confirmed mission success.

The B-2s touched down at Whiteman after 25 hours.

Gortney, at the Pentagon, presented a post-strike photo showing the B-2's impact. "You can see the scar damage from the hardened aircraft shelters, one of which we've blown up here that is actually flattened," he said.<sup>xxi</sup>

"We succeeded," said Vander Hamm. "The battle damage was good. And it will further limit his ability to fly, and then allow other forces to follow on and enforce that U.N. mandated no-fly zone."

The B-2s had another advantage. They flew all the way from Whiteman AFB via an overwater route toward the coastal area targets. The route eliminated any delay for advance consultation and diplomatic overflight clearances. With just two refuelings outbound and two on the return, the B-2 sorties fit efficiently into the tanker plan. Electronic warfare assets from an undisclosed location in-theater were coordinated with the B-2 strikes.

The United States led the fight until March 31, and in April, NATO took over under the name Operation Unified Protector. Several nations would go on to conduct strikes, carry out surveillance and fly combat air patrols. Tripoli fell to Libyan rebels in August.

Gaddafi died in the fighting in late October 2011. Six years later, the B-2s would be back.



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## DYNAMIC TARGETING: ISIS IN LIBYA



*“We can’t tell you specifics, but we are all going to need you to be flexible over the next 24 hours,”* a lead technical sergeant at Whiteman AFB told a team of airmen in January 2017.<sup>xxii</sup>

Up ahead was Operation Odyssey Lightning, a mission that would involve a dynamic, direct attack by two B-2s, delivering over 100 weapons on a terrorist training camp near Sirte, Libya.

The war against the so-called Islamic State of Iraq and Syria (ISIS) had started in the late summer of 2014. Libya was still contending with a civil war, and in the chaos, ISIS saw an opportunity. In late 2016, US reconnaissance watched a group of ISIS fighters setting up training camps near Sirte. “This was a group that had plans,” said Pentagon spokesman Peter Cook. They were stockpiling ammunition and rocket-propelled grenades. “The fighters in those training camps posed a security risk to Libya, to its neighbors, and to our allies in Africa and Europe, and to the United States and its interests,” Cook explained. It was a risk the United States chose not to accept.

The B-2 was chosen for its ability to conduct dynamic targeting. In the air war against ISIS, many airstrikes had targets finalized with fresh intelligence just before weapons release. The practice acquired the name “dynamic targeting” in contrast to deliberate targeting, with aimpoints assigned in advance. Now, commanders needed the heavy payload of the B-2 for dynamic targeting.

Commanders requested the B-2 by name. They wanted its precision, payload – and ability to loiter and follow-up with a rapid second strike. Here was the unique element of Operation Odyssey Lightning. “This mission is the first time the B-2 executed a sortie that was nearly, entirely dynamic in nature,” said B-2 pilot Maj. Christopher Conant. “What I mean by that is, we had an idea roughly where targets were, but we had no fidelity what the final answer was going to be, and we took off knowing that.”<sup>xxiii</sup> The B-2s would get precise weapons coordinates in flight, hit their assigned aimpoints, and then await bomb damage assessment. If necessary, they would reattack.



## DYNAMIC TARGETING: ISIS IN LIBYA



“This is what the commanders chose,” Secretary of Defense Ashton Carter said of the B-2. The B-2s carried out direct attack – important against mobile targets that could scoot away. Cruise missiles launched from ships could take too long in their flight to the targets. Delivered by the B-2, a guided munition has only a few minutes of flight time. In contrast, cruise missiles launched from ships may take almost an hour to arrive. By then, some targets might have moved.

The 509<sup>th</sup> readied five B-2s for the mission and loaded them with a total of 400 weapons. Some of the bombers were spares. Three would ultimately depart from Whiteman AFB, with two continuing on to Libya to attack the ISIS training camp.

“It was a very humbling experience when my squadron commander told me that I would be flight lead,” Capt. Nathan Mueller—call sign Shatter—said in a Whiteman press release.

As they approached the target area, up-to-date latitude and longitude coordinates were relayed to the B-2s over the radio. Crews then typed each long sequence of numbers into a data entry panel the size of a graphing calculator.

Over the target, B-2s dropped 108 of their 160 500-pound precision-guided Joint Direct Attack Muni-

tion bombs. These strikes were followed by an MQ-9 Reaper unmanned aerial vehicle firing Hellfire missiles.

Then the B-2 crews waited, high above the Mediterranean. Command posts processed bomb damage reports from the Reapers and other platforms. If needed, the B-2s would go back in. “There were a lot of eyes watching for activity,” said Vander Hamm. “But one pass was enough. And so they were sent home.”<sup>xxiv</sup>

Keeping the B-2s in the air for 34 hours took aerial refuelings from both KC-135s and KC-10s from five different bases. Fifteen tankers supported the 30-hour round trip mission. “Our goal was to find the aircraft to do the mission,” said Lt. Col. James Hadley, 18<sup>th</sup> Air Force operations planner. “The mobility enterprise flexed to put tankers from the U.S., U.S. European and U.S. Central Commands toward this effort.”<sup>xxv</sup>

“These were critically important strikes for our campaign and a clear example of our enduring commitment” to destroy ISIS “not only in Iraq and Syria but everywhere it emerges,” concluded Gen. Carter Ham, Commander, U.S. Africa Command.<sup>xxvi</sup>

“That was the best weapon system we had for that mission,” said Air Force Chief of Staff General David Goldfein.

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## BOMBER TASK FORCE



*August 18, 2018: Three B-2s land at Joint Base Pearl Harbor-Hickam. Their mission: six weeks of forward operations, ranging the Pacific.*

The stealth bombers also brought special impact to a growing mission best described as “bomber diplomacy.” This type of diplomacy emerged with the rise of China’s military power, missile and nuclear threats from North Korea, and the ongoing business of training with allies. As a conventional deterrence mission, its dual role was to stand up to adversaries, and to reconfirm military ties to allies.

Since 2004, US bombers have rotated through Guam and other locations to show presence, reassure allies and deter rivals.

“Think of Guam as the bull’s-eye and we go 360 degrees,” General Gary North, Commander, U.S. Air Forces Pacific, said of the bomber missions in 2011. “Both our friends and adversaries are very aware.”<sup>xxvii</sup>

The B-2 missions from Guam came at a cost. On February 23, 2008, the B-2 “*Spirit of Kansas*” crashed just after take-off. Water in the sensors gave bad input to flight controls and the B-2 struck its left wingtip on the ground, then exploded.

Both pilots ejected and survived. It was the right move. “My dad said, ‘You didn’t almost die. You did exactly what you were supposed to do,’” one of the pilots commented later.<sup>xxviii</sup>

Another B-2 was damaged on February 26, 2010, when an engine caught fire as pilots prepared for a mission. Extensive damage kept the charred B-2 on Guam until 2011, when it was finally able to fly to Palmdale to complete repairs. The “*Spirit of Washington*” returned to service in 2013.

None of this stopped the B-2 fleet. The stealth bomber with its formidable reputation could ratchet up

the intensity in regional deterrence just by showing up.

In March 2013, President Barack Obama approved a step up in bomber diplomacy. Two B-2s joined annual exercise Foal Eagle across military ranges in South Korea. The message was clear: put North Korean dictator Kim Jong Un on notice, and assure Seoul and Tokyo of firm American commitments.

This “Blue Lightning” exercise was a choreographed show of force. In February 2013, North Korea had conducted its third illicit, underground nuclear test. The regime was also increasing missile tests amid hot rhetoric with South Korea. “The North Koreans have to understand what they’re doing is very dangerous,” said Secretary of Defense Chuck Hagel.

The B-2s conducted practice bombing runs on a South Korean training range. Flying the B-2 across South Korea sent the firm message: these B-2s could fly anywhere on the peninsula, targeting weapons of mass destruction under international auspices, as needed. The point of the B-2 flight was “to assure our allies that they can count on us to be prepared and to help them deter conflict,” said Chairman of the Joint Chiefs of Staff General Martin Dempsey.<sup>xxix</sup>

B-2s formally rejoined the bomber presence rotations to Guam in 2016. But they also demonstrated reach from the heartland.

In October 2017, a B-2 from Whiteman conducted a long-range mission over the Pacific for U.S. Strategic Command. The task was to “familiarize aircrew with air bases and operations in different geographic combatant commands, enabling them to maintain a high state of readiness and proficiency.” This B-2 mission was another “visible demonstration of commitment to our allies” after a major nuclear test by North Korea.

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## NUCLEAR DETERRENCE



All along the B-2 team maintained its original mission: strategic nuclear deterrence. The B-2 was developed to carry sixteen B83 nuclear weapons and other payloads. Full nuclear certification of the B-2 was completed in the 1990s. After that, B-2s of the 509<sup>th</sup> Bomb Wing stood ready to execute nuclear missions for US Strategic Command at any time.

In 2013, the 131<sup>st</sup> Bomb Wing became the first Air National Guard Bomb Wing certified to deliver nuclear weapons. “The 131<sup>st</sup> Citizen Airmen have proven they can exceed every stringent challenge posed in the nuclear realm,” said Col. Michael J. Francis, the 131<sup>st</sup> Bomb Wing commander.<sup>xxx</sup>

Upgrades kept the B-2 prepared to deter great powers. Both Russia and China have modernized their nuclear weapons arsenals over the past decade. The current US deterrence posture also calls for low-yield weapons to add a variety of targeting options against rogue states who might attempt to develop weapons of mass destruction to coerce others.

In June 2018, the B-2 successfully completed a weapons integration test by dropping an inert, bomb-body test article for the newest nuclear weapon. The B-61-12 was developed as a medium-to-low yield weapon to supplant other variants of the B-61 design. Fielding the B-61-12 added precision targeting for the B-2 to hold many different types of targets at risk using one bomb type. Different fuze settings and attack profiles enable the B-61-12 to vary the yield of the nuclear blast and select options for deeply buried targets or surface detonation.

In the 2018 Nuclear Posture Review, Secretary of Defense James Mattis wrote of “a bedrock truth: nuclear weapons have and will continue to play a critical role in deterring nuclear attack and in preventing large-scale conventional warfare between nuclear-armed states for the foreseeable future.” B-2s will remain essential to the nuclear deterrence triad at least until the B-21 Raider fleet reaches maturity after 2030.



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## COMBAT LESSONS



Singling out one asset in air campaigns contains analytical risks. Also, the B-2 crews would be the first to say their work over the last 30 years was always part of wider Air Force and Coalition efforts.

Yet beyond question, the B-2 had unique qualities as a stealth, heavy bomber. “It provides the President options across the spectrum of conflict to execute our nation’s business. Whether its low intensity conflict with bombers supporting troops on the ground, to the thigh end of the scale, using a nuclear deterrent if need be,” summed up Major General Jim Dawkins, who as a young B-2 pilot flew Afghanistan missions.

Every American military campaign from 1999 to 2019 began with strikes by the B-2. While the campaigns varied in scale and duration, each contained several elements relevant to future operations.

First, the stand-out primary B-2 tasking from these campaigns was striking targets essential to gaining air superiority up front. Airfields, hardened aircraft shelters, command and control targets, surface-to-air missiles: all these categories appeared on target lists for the B-2. As General Moseley described it, the ability to mass B-2s up front allowed near-simultaneous attack on the key offensive counter air target set.

Second, the B-2 also showed its tactical flexibility. Because of their payload and stealth, B-2s were often tasked to hit geographically-separated target areas on the same mission. Only a stealth bomber could roam enemy territory it had just bombed and focus on fresh targets. Of course, the B-2s flew carefully-planned routes, alert for enemy tracking. Their ability to strike,

then move on to another target was exceptionally valuable to air commanders focused on time-critical targets.

The B-2 conducted inflight re-targeting beginning in Operation Allied Force. This capability grew as more of the overall air campaign technique shifted from deliberate to dynamic targeting.

It wasn’t just mission targeting. The 509<sup>th</sup> proved to be excellent planners. They stayed attuned to global conflict trends and how new conflicts might shape B-2 missions. Just as important, B-2 crews constantly asked themselves “what if” and trained to upcoming scenarios. As a result, the B-2 was ready even on short notice.

If the five campaigns reflect a single message, it may be this: the B-2 force is always a step ahead. They’ve thought through the routes, tanker plans, tactics, and weapons load-outs for many, many war plans in every theater. Crews have practiced long sorties and maximum flexibility. Maintainers can generate aircraft with all stealth features in pristine condition and ready for combat. Ongoing upgrades provide fresh cockpit capability in areas from communications to defensive systems management.

The twenty bombers in the B-2 fleet are still the nation’s only bombers with range, payload and stealth for heavily-defended airspace. The pursuit of changing, strategic targets will demand persistent missions and dynamic retargeting from the B-2. Where the B-2 will next go to war is unknown. But this is certain.

For conventional missions or nuclear deterrence, the B-2 is ready. *Anytime, anywhere.*



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## END NOTES



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<sup>iii</sup> John Tirpak, “With Stealth in the Balkans,” *Air Force Magazine*, October 1999.

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<sup>vi</sup> Transcript, Mitchell Institute, October 15, 2016.

<sup>vii</sup> Dawkins, Transcript, Mitchell Institute, October 15, 2016.

<sup>viii</sup> Rumsfeld remarks on caves quoted in *St. Louis Post-Dispatch*, October 20, 2001.

<sup>ix</sup> James R. Chiles, “The Stealth Bomber Elite,” *Air and Space Magazine*, September 2013.

<sup>x</sup> Author Interview, April 2019.

<sup>xi</sup> Foxnews.com, “B-2 Bombers Lead Shock and Awe,” reprint Jan 13, 2015.

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<sup>xx</sup> “B-2 Bombers from Missouri Hit Libyan Targets,” NPR, March 21, 2011.

<sup>xxi</sup> Pentagon briefing, VADM William Gortney, March 24, 2011.

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<sup>xxiii</sup> Cerri, op. cit.

<sup>xxiv</sup> Joe Pappalardo, “To Libya and Back,” *Popular Mechanics*, February 8, 2017.

<sup>xxv</sup> Master Sgt. Thomas J. Doscher, “Air Force Refuelers enable B-2 strike against Daesh in Libya,” *Air Force News*, January 20, 2017.

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## THE B-2 STEALTH BOMBER

B-2s are at the center of war plans, for every theater of operations around the globe. The B-2 stealth bomber, built for nuclear deterrence, has also taken the lead in America's toughest combat operations over the last twenty years.

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