

# U.S. Army Observes 75<sup>th</sup> Anniversary of Armored Force

## Part 2 of 2

Growing Soviet might and creation of the Warsaw Pact posed new challenges to the Army in Europe post-World War II. American military planners envisioned a possible World War III opening with a rapid Soviet/Warsaw Pact invasion of West Germany on a massive scale. Stopping this mechanized avalanche quickly became the U.S. Army's dominant concern. American armored forces were expected to play the principal ground role in what was likely to be a fast-paced war of maneuver.

Yet American armored formations continued to field the same platforms used in World War II, while Soviet tanks steadily improved in number and capability. Similarly, the rapid demobilization that followed World War II left the Army with only 10 divisions on active service by 1948. Only one was an armored division. Readiness also eroded, leaving the Army with limited means with which to confront Soviet aggression.

In the background of U.S. lack of readiness was a significant breakthrough in Soviet tank design in 1964. The T-64 was produced, which for the first time used an automatic loader, reducing the crew of the tank to three crewmen. Subsequently this model, and the later T-72 and T-80 tanks introduced further innovations that influenced armored warfare by introducing guided missiles into the tank-ammunition mix, allowing anti-tank guided weapon fire from standard tank guns. The most advanced Soviet tank up until the end of the Cold War was the T-80U, which shared similar characteristics with the M1A1 (turbine engine, advanced fire-control systems, strong armor and firepower).

Also, infantry fighting vehicles were developed in the 1960s with the Soviet Union's BMP-1, for the first time allowing supporting infantry to accompany tanks on a battlefield when nuclear-weapon use was expected.

During the Cold War, as the North Atlantic Treaty Organization (NATO) assumed armored warfare to be a dominant aspect of conventional ground warfare in Europe, the light tank was largely discontinued and heavy tanks were also mostly abandoned. The medium-tank design, however, evolved into heavier models due to an increase in armor. The larger-sized main weapon resulting in the main battle tank (MBT) came into existence, combining most of the different types of tanks during World War II. The MBT continued to evolve; by the 21<sup>st</sup> Century, most advanced Western MBTs were built around powerful engines, large 120mm guns and composite armor.

For the most part, NATO armored doctrine remained defensive and dominated by use of nuclear weapons as deterrence. Although most NATO nations began the Cold War period with a large number of U.S.-designed tanks in their fleets, there was a considerable degree of disagreement on the design of future MBTs among NATO's major nations. Both the United States and Germany experimented with but abandoned the missile-armed MBT-70. The M26 Pershing basic design of the United States evolved until the M60 Patton MBT was replaced with the gas-turbine-powered M1 Abrams in the 1980s.

## Korean War

With the U.S. Army focused on Europe, North Korea invaded South Korea in 1950, just days after the establishment of the Armor Branch. North Korean columns of tanks and infantry quickly overran the small U.S. contingents in their path and routed South Korean forces. Within weeks, the remnants of the American military presence had been driven into the southeast corner of the Korean peninsula, where they formed a final defensive position with surviving South Korean soldiers (the Pusan Perimeter).

There American and United Nations reinforcements began to arrive, including several U.S. Marine Corps and Army tank battalions. These mounted units initially performed defensive actions, counterattacking North Korean breakthroughs and strengthening key positions. They then spearheaded a counteroffensive synchronized with large-scale landings at Inchon. The ensuing drive to the 38<sup>th</sup> Parallel witnessed several tank-vs.-tank actions that generally favored American tank crews and resulted in the destruction of much of the North Korean mounted force.

Reconnaissance elements gathered information regarding enemy dispositions and intent, surveyed terrain, acted

as a reserve and provided general security. Their ability to engage enemy armor in the early stages of the conflict remained sharply limited by their reliance on M24 light tanks, which proved no match for North Korean T34/85s.

The war also marked the first operational employment of the new combined-arms reconnaissance platoons adopted as a result of analysis of the World War II experience. These platoons possessed great versatility, but their mix of jeeps, light tanks and armored personnel carriers made command in rugged terrain difficult due to the differences in mobility among these platforms. At times, the tanks of different platoons were combined to form a more powerful armored strike force. Similar actions with the mortar and infantry elements could provide a concentration of fire support or an enhanced ability to operate in complex or urban terrain.

Combat operations in Korea and lingering fears of an outbreak of war in Europe triggered efforts to field new materiel to Armor and Cavalry organizations. Initially, mounted units dispatched to Korea entered combat with the same M4 and M26 tanks that had fought in World War II. Indeed, the need for tanks in Summer 1950 became so intense that vehicles only recently placed on display at Fort Knox as monument vehicles were pressed back into service.



**Figure 1. A U.S. Marine Corps Pershing tank scrambles around the edge of a burning Korean village lately occupied by Communists to get at an enemy tank delaying the U.S. advance Sept. 4, 1950. (Photo by SGT Frank C. Kerr, <http://www.dodmedia.osd.mil>)**

An upgraded version of the M26 also made its debut in Korea: the M46. The Army, however, also undertook the rapid design and production of a new tank, the M48. Development began in 1950, and by 1953 the new platform was in full-rate production. The rapid pace of development resulted in many teething troubles, but the Army considered it more important to quickly field a satisfactory tank rather than await perfection of the design. The M48 featured a dome-shaped turret that improved ballistic protection, a 90mm gun and an improved fire-control system. Continuous improvements based on engineering reviews and soldier feedback resolved early problems, resulting in a tank both reliable and popular.

After the Korean War, American armored development focused on building tanks superior to Soviet designs. Throughout the 1950s and 1960s, Soviet tanks became more effective and continued to outnumber their American and NATO counterparts. Hence, the continuous evolution of Soviet tank designs spurred the United States to experiment with advanced technologies and accelerate the pace of tank development. American armored units anticipated being outnumbered in any conflict in Central Europe. Therefore tank systems that improved the ability to hit and kill a vehicle at long range received priority development. This emphasis resulted in a fire-control system that included a rangefinder, ballistic computer, ballistic drive and gunner's periscope. Such fire-control systems marked a major improvement over the optical sights used in World War II, where the gunner's ability to gauge distance and mentally calculate the impact of wind, cant and movement largely determined accuracy. Fire-control systems underwent continuous improvement throughout the Cold War, thereby establishing the technological

basis for the fire control and stabilization of the later Abrams tank. Related developments focused on improving guns and ammunition. American tanks also tended to be more spacious and comfortable than Soviet ones. Crew stations were designed to minimize fatigue and prevent the rapid erosion of combat ability through discomfort.

By the late 1950s, the Army had begun design work upon a successor to the M48, using proven components and technologies. The resultant M60 matched a 105mm gun and diesel engine with the M48's turret and chassis. Combat units first received the M60 in December 1960. Subsequent modifications gave the M60 a distinctive look and resulted in the M60A1. The M60A1 proved popular and largely free of the major teething troubles encountered with the early M48s. The M60-series reflected a steady qualitative increase in component development and armor protection that could be traced to World War II. The M60A3 became the final version of this series and constituted a major systems upgrade that incorporated technologies also used on the M1 Abrams tank.

The evolutionary nature of American tank designs resulted in increasingly reliable tanks generally popular with their crews. However, several efforts were made to build revolutionary designs incorporating leap-ahead technology. In the 1950s, for example, the Army developed the T95 as a potential replacement for the M48. It featured a variety of new concepts, including the Optical Tracking, Acquisition and Ranging System. This device measured the time taken for a pulse of light to travel to and from the target to provide an accurate range. It was the precursor to the laser rangefinder but suffered from being too fragile and prone to generating multiple returns. The MBT-70 design of the 1960s featured an autoloader, a dual gun/missile main armament, a three-man crew located in the turret and hydro-pneumatic suspension. Both the T95 and the MBT-70, however, proved too expensive and complex. Although they never advanced beyond a developmental stage, they did pioneer new technologies later brought to maturity in the Abrams tank.

Cavalry and reconnaissance organizations benefited first from the fielding of the M41 light tank, which carried a 76mm gun and improved armor compared to the M24. Efforts to field a satisfactory armored car, however, failed. Achieving the right combination of desired qualities proved elusive, as did parallel actions intended to generate a more survivable jeep that did not sacrifice the vehicle's low silhouette and quietness. The M114 Armored Command and Reconnaissance Vehicle offered armored protection and tracked mobility, but it proved mechanically unreliable and never met expectations.

Organizationally, armored cavalry assigned to divisions and armored-cavalry regiments retained their combined-arms nature, adding air-cavalry components equipped with helicopters. Maneuver battalions continued to include a scout platoon, but the configuration of this unit underwent continuous change in the years following World War II, fluctuating between combined-arms organizations and pure scouts intended for information collection over a broad frontage.

## **Vietnam War**

Despite its focus on countering the Soviet threat to Central Europe, in the 1960s the Army found itself embroiled in a war in Southeast Asia. In 1965, the United States committed to a major deployment of ground troops to South Vietnam to ensure that nation's continued independence from North Vietnam. Initial terrain assessments suggested little role for armored units. Jungles, swamps, paddy fields and other topographical features seemed to reduce vehicular operations to a marginal role. The Army also considered difficult terrain and counterinsurgency (COIN) the domain of the rifleman, not the tanker.

Hence the first mounted units to arrive in South Vietnam initially found themselves greatly restricted in their operations, often performing base security. Over time, these restraints disappeared, and armored vehicles became commonly used in many roles, fully exploiting their combination of firepower, protection and mobility.

Since doctrinal guidance remained oriented on a European battlefield, basic principles of combined-arms operations had to be applied to the fundamentally different operational environment of Southeast Asia. Armor and Cavalry organizations therefore developed through trial and error their own tactics, techniques and procedures suited to South Vietnam and COIN. In doing so, they stressed the use of firepower and mobility to counter Viet Cong guerrilla tactics. Tanks often accompanied infantry units, frequently leading their advance. They provided fire support, created jungle paths, cleared areas for helicopter landings, performed bunker-busting and carried supplies to forward units.



**Figure 2. Men of Troop B, 1<sup>st</sup> Battalion, 10<sup>th</sup> Cavalry Regiment, 4<sup>th</sup> Infantry Division, and their M-48 Patton tank in a position in the jungles in the Central Highlands of Vietnam, June 1969. (Photo from U.S. Army Military History Institute, Vietnam Photos Miscellaneous Collection)**

To disrupt ambush and sabotage of principal roads, Armor units conducted “thunder runs.” In these operations, armored columns intentionally entered areas known for ambush activity. They deliberately sought contact with enemy forces. Upon contact, the column dashed through the ambush area, regrouped and assaulted the hostile force. Throughout the operation, Armor relied on its firepower, armor and speed to obtain a rapid, decisive result.

More mundane but vitally important missions included convoy escort and route security to sustain the flow of supplies throughout South Vietnam.

Mounted units sought to force battle upon elusive enemy forces. Armor and Cavalry units used a search pattern in which platoons moved in a clover-leaf formation. Once hostile forces were discovered, “pile-on” became the principal tactic. All friendly units in the vicinity of the target raced toward the contact area, assaulting from multiple directions and employing maximum firepower. To provide security during roadmarches, armored units adopted the herringbone formation when halted. This formation provided all-round security and minimized the chances of being surprised.

For tank and cavalry units, the M48A3 tank and the M113 armored personnel carrier represented the principal armored fighting vehicles. The M48A3 benefited from several improvements over the original M48, including the incorporation of features developed for the M60 series. Crews especially appreciated the M48A3’s survivability. Mines tended to throw tracks without destroying the vehicle, while rocket-propelled grenades (RPGs) needed to hit a vital area to destroy the tank. Crews regularly continued to fight their vehicle long after being immobilized or otherwise damaged.

The M113 did not possess the same level of protection, but its superior mobility permitted it to operate throughout South Vietnam. It was often used in a tank-like role, with its crew fighting from the vehicle rather than dismounting to attack on foot. After initial engagements in which M113s suffered heavy crew losses while operating the exposed .50-caliber machinegun, the vehicle underwent modification in the field. Two more machineguns were mounted, and gunshields were added to all positions. Thus reconfigured, the vehicle proved a more effective combat platform and became known as the Armored Cavalry Assault Vehicle (ACAV). Against enemy infantry, it relied upon its armor and mobility to attack at close range, where its machineguns proved deadly. However, it remained vulnerable to mines and RPGs, resulting in a variety of improvised measures

intended to boost survivability. More heavily armed infantry fighting vehicles such as the M2/M3 Bradley Fighting Vehicle (BFV) would be based on experience with the M113.

The M551 (Sheridan) also made its combat debut in Vietnam as U.S. armored-cavalry units began exchanging their M48A3 Patton tanks for M551 Sheridan Armored Airborne Reconnaissance Assault Vehicles in January 1969. By 1970, more than 200 Sheridan tanks were operating in Vietnam. The Sheridan evolved from efforts to build a light tank for air-assault operations that could also engage armor. To achieve this goal, the vehicle carried the Shillelagh gun/missile launcher. The missile promised the ability to destroy any known tank, while the 152mm gun provided a powerful weapon against soft targets. The gun, however, used caseless ammunition that often left smoldering debris in the gun tube, resulting in the premature detonation of subsequent rounds. It took several years to eliminate this problem. The gun's recoil also lifted the front roadwheels off the ground and damaged the delicate missile fire-control system.

Nevertheless, the M551 deployed to Vietnam in the expectation that it would provide a powerful weapon system to troops entering combat, even though it required further development and testing. It proved a partial success. Its 152mm gun proved devastating to enemy personnel, but the vehicle's light aluminum chassis provided only limited protection. Mine explosions tended to rip open the chassis, detonating the ammunition and destroying the tank.

Armor played an important role throughout the Vietnam War. From an initial minimal presence, mounted combat elements increased until they represented a significant percentage of the Army's ground-combat forces. Armor capitalized on its own mobility and firepower and the reconnaissance capabilities of the newly developed air cavalry to find and engage an elusive opponent. The combined-arms nature of division cavalry squadrons and 11<sup>th</sup> Armored Cavalry Regiment (ACR) proved highly effective in a COIN environment, validating the organizational and doctrinal principles embedded in their design.

## Cold War to Gulf War

After the Vietnam War, the Army's focus returned to countering the Soviet threat in Central Europe. Lessons learned in Vietnam tended to be lost or neglected as "special cases." The continued evolution of Soviet capability encouraged this abandonment of the Vietnam experience. In 1973, the outbreak of war between Israel and its Arab neighbors provided the U.S. Army an opportunity to study the capabilities of new Soviet weapons the Arab armies used. The war included the largest clashes of armor since World War II and witnessed the combat employment of American M60 tanks in Israeli hands.

This tank did not prove invulnerable. Israeli tankers preferred the British Centurion tank, since rupture of the M60 hydraulic lines tended to burn crews and turret hits too often ignited the ammunition stored there. Moreover, the high tank-loss rates on both sides indicated that the battlefield had become much more lethal, in part because of the widespread use of anti-tank guided missiles and more powerful RPGs.

This war forced the Army to review critically its assumptions of superiority over the Soviets. The emergence of the T62, *boyeva mashina pekhoty* (BMP) (Russian infantry fighting vehicle) and Sagger anti-tank missile suggested that the U.S. Army might be losing its technical and qualitative edge. By the mid-1970s, the Soviet Union was fielding a new generation of armored vehicles, capitalizing on technical and doctrinal developments since World War II. To American planners, it became clear that the next war would occur with little warning, negating U.S. plans that assumed several months' advance notice in which to mobilize and deploy more forces overseas. The Army would enter combat with whatever forces were on hand.

These realizations led to a series of sweeping military reforms intended to improve Army readiness and ensure its battlefield superiority. A revolution in training began with the establishment of the U.S. Army Training and Doctrine Command in 1973. Training became more realistic and focused on meeting high readiness standards, epitomized by the opening of the National Training Center (NTC) at Fort Irwin, CA, in 1980.

A parallel shift in doctrine and organization generated more capable and combat-ready organizations collectively described as the Army of Excellence. On the battlefield, implementation of AirLand Battle doctrine oriented combat units toward the destruction of enemy forces throughout their depth through the integrated use of air and ground assets. Central to applying this doctrine at the tactical level lay the fielding of the M1 Abrams tank and the M2/M3 BFV in the early 1980s. Designed to operate together in an environment dominated by Soviet armor and

mechanized infantry, these new platforms possessed much greater armor protection, carried more powerful weapons and proved more mobile than their predecessors.

The M1 Abrams was optimized to fight in Central Europe against a Soviet-style threat. Its design reflected the combination of lessons-learned in mounted combat since World War II and the most advanced technology available for fielding. Consequently, the M1 represented a major advance in capabilities, particularly in the areas of lethality and survivability. Armor protection derived from the British development of Chobham composite armor – layers of armor separated by various materials whose precise composition has remained classified. Its gas-turbine engine ensured enough power to achieve a high cross-country speed. The use of blow-off panels, an automatic fire-suppression system and the provision of an armored bulkhead separating fighting compartment and main-gun ammunition all served to ensure the crew's survival. The original 105mm main gun was subsequently upgraded to a 120mm weapon in the M1A1. An array of sophisticated electronics provided much more effective stabilization and permitted a true fire-on-the-move capability. Indeed, when the M1 first participated in NATO maneuvers, it received the nickname "Whispering Death" because of its ability to maneuver quietly and destroy targets consistently without stopping.

Development of the BFV began in response to the M113's and ACAV's limitations. The appearance of the Soviet BMP further encouraged a vehicle with greater combat capabilities than the earlier personnel carriers. Initially designed as an infantry fighting vehicle, a modified version was adopted for cavalry usage and designated the M3 Cavalry Fighting Vehicle (CFV). Both versions carried a 25mm cannon, a machinegun and a tube-launched, optically tracked, wire-guided (TOW) missile launcher. The infantry version carried an infantry squad, while the CFV carried a scout team and more TOW missiles. The M3 CFV entered service in 1984.

Initially, every scout and cavalry platoon was to be equipped with the M3 CFV. However, concerns about the vehicle's size, noise and heavy firepower resulted in a desire for a smaller platform better suited to stealth and the avoidance of combat. A series of tests at NTC during the 1980s finally encouraged the Army to adopt the humvee for scout platoons. Initially designed as a general utility vehicle and replacement to the jeep, the humvee's relatively small size, quietness and ease of sustainment made it attractive as a scout platform, although its lack of armor protection raised concerns about its survivability. Nevertheless, in 1990, Army leadership directed the fielding of humvees to all scout platoons. Armored-cavalry platoons retained the M3 CFV.

In 1990, the United States responded to Iraq's invasion of Kuwait with a massive buildup of American and allied forces in Saudi Arabia. In Operation Desert Storm, this force liberated Kuwait and advanced into Iraq, destroying much of that nation's conventional military arsenal. This military action provided the Army an opportunity to apply AirLand Battle concepts and measure the effectiveness of the training reforms and materiel improvements implemented in the 1980s. The result proved a stunning success. The Iraqi army was outmaneuvered, engaged throughout its depth and destroyed in a series of rapid engagements. The application of powerful ground forces, spearheaded by armored units, proved decisive in achieving victory.

The Gulf War demonstrated the effectiveness of the Abrams tank and CFV. Despite pessimistic forecasts of their ability to function in a desert environment, both vehicles proved popular with their crews and generally reliable. Indeed, many potential problems were identified during pre-war rotations in NTC's desert conditions. The combat power and survivability of both platforms tended to surpass expectations. CFVs proved capable of engaging most targets encountered, including Iraqi tanks. The Abrams tank proved greatly superior to the Soviet-built T-72 in combat. It engaged Iraqi tanks in all weather conditions and at night, thanks to the use of thermal sights. Abrams crews repeatedly began engagements at longer ranges than expected by Iraqi tank crews. Without having to stop to fire, Abrams tanks scored a high rate of first-round kills and simply drove through Iraqi positions. Armored-cavalry organizations performed reconnaissance, security and economy-of-force operations. Battalion scouts still equipped with the M3 CFV proved robust, but those employing humvees operated under leadership-imposed constraints. Concerns about the vehicle's vulnerability led to their use in roles that minimized their exposure to hostile fire.

## **Armor in 1990s**

After the Gulf War, the Army's structure and mission set began to change. No longer did defeat of the Warsaw Pact dominate military thinking. The Soviet Union ceased to be a threat, and in fact ceased to exist, but the Army's

deployment rates reached unprecedented levels for a nation at peace. Humanitarian aid, peacekeeping and stability-and-support operations became regular activities. The use of armor in such missions seemed unnecessary, and in the absence of the Soviet threat, critics questioned the need for a heavy mounted force.

However, armor adapted to the changed circumstances and deployment patterns of the 1990s. The tactical agility and versatility that made mounted units effective on the battlefield proved readily applicable to missions other than high-intensity combat. In peacekeeping roles, the commitment of heavy forces proved a powerful demonstration of America's national will. The presence of armor and cavalry units served to deter potential attacks and provide support to lighter troops responsible for security, checkpoint operations, escort duties and weapons inspections. The heavier mounted forces possessed the firepower and mobility to destroy those threats undaunted by the simple presence of American Soldiers.

The reorientation of Armor away from the Cold War's Central-European focus started before the Gulf War. In 1989, Armor participated in Operation Just Cause, which removed Panamanian strongman Manuel Noriega from power and permitted the establishment of a more democratic government in Panama. Sheridans from 3-73 Armor provided fire support, using their 152mm guns to blast Noriega supporters out of concrete buildings. They also eliminated roadblocks, evacuated wounded and used their presence and firepower to discourage escape and counterattack efforts.



**Figure 3. An M551 Sheridan outside the Apostolic Nunciature, the Vatican's embassy, during negotiations for Noriega's surrender. (Photo courtesy of the Center of Military History)**

In 1994, American forces intervened in Haiti to prevent widespread violence and ensure a peaceful transition to a democratic government. Subsequently, U.S. forces supported a multinational force that remained to ensure peace. The 2<sup>nd</sup> ACR deployed to Haiti as part of this effort. Reorganized after the Gulf War into a light-cavalry force equipped primarily with humvees, 2<sup>nd</sup> ACR performed a variety of security missions that included round-the-clock security patrols in the capital city of Port-au-Prince, convoy security and protection of key sites. Its activities required a mix of mounted and dismounted operations. It also maintained quick-reaction forces possessing more firepower and manpower ready to respond to a sudden eruption of violence.

In the wake of the Gulf War, the Army faced a series of new challenges. With the Cold War ended and military threats to American national interests diminished, downsizing and budget reductions followed. The Army's stance changed from forward-deployment from bases overseas to force projection from the United States. Peacetime deployments reached an unprecedented high as troops deployed to support peace and humanitarian actions worldwide. These commitments placed a drain on the Army's ability to respond to a large-scale conventional conflict. In the absence of more troops and money, the Army needed to increase significantly the combat

effectiveness of its available forces.

The Army initiated a re-engineering of its institutional and operational forces. Known as Force XXI, this process sought to exploit new technology – especially information technology – and command concepts. In particular, it sought to apply new information technology to increase the situational awareness of battlefield leaders. Through reliance upon global positioning systems, a tactical Internet and digital communications, commanders would receive more accurate and timely information regarding friendly and enemy forces. It would then be possible to conduct precision maneuver, massing combat power on critical targets and weak points without necessarily massing men and materiel. Continuous and near-real-time updates of battlefield information would permit operations to occur at a pace faster than the enemy's ability to react.

The inherent Armor characteristics of mobility and firepower lent themselves easily to this environment. Indeed, many early Force XXI initiatives focused upon integrating digital technologies into heavy-force organizations. Digitization possessed the dual potential of improving overall combat effectiveness and reducing the danger of fratricide.

Force XXI concepts were tested during a series of advanced warfighting experiments that occurred throughout the 1990s. Collectively, these experiments established the baseline for the creation of a digital force with an enhanced ability to influence the battlespace.

Force XXI concepts remained in a developmental state throughout the 1990s, but tangible evidence of their adoption could be found in the M1A2. This platform constituted the Army's first tank intended to fight in a digital environment. Fielded in 1993, it outwardly resembled the M1A1. However, the M1A2 proved unique in its internal electronics. Its automated architecture comprised multiple linked subsystems associated with navigation, tactical operations and fire control. This information was displayed automatically to the crew and to other electronically linked vehicles. The M1A2 also ran continuous self-diagnostic tests to determine mechanical or electronic failures. The commander's independent thermal viewer permitted the gunner and commander to search separately for targets, greatly increasing the speed at which targets could be identified and acquired.

An upgraded version, the M1A2 System Enhancement Program, appeared in 1999. It incorporated multiple improvements over the original M1A2. Heavier armor improved survivability, while overall operability increased with a pulse-jet system. Lethality increased by upgrading the commander's independent thermal viewer, including a second-generation forward-looking infrared-imaging capability. Communications also benefited from the addition of Force XXI Battle Command Brigade and Below (FBCB2). This device automatically shared information among elements of a brigade combat team (BCT) and gave them an identical view of the battle area. It dramatically improved the ability to track battlefield developments and share a wide range of data, including graphics. FBCB2 also provided connectivity to a wide range of digital communication systems used by division and brigade components.

The expense associated with procuring new vehicles ensured the Abrams tank would remain in service for the foreseeable future. Hence, sustaining its combat effectiveness became a priority focus. In 1999, the Abrams Integrated Management Program resulted. Under this program, tanks were rebuilt, worn parts replaced and new components inserted. At Anniston Army Depot, AL, each tank was disassembled and its turret shipped to Lima Army Tank Plant, OH. Both turret and hull were separately overhauled and then reassembled at Anniston. This process returned tanks to near-brand-new condition and greatly extended their service life.

Light armored platforms did not fare as well. The M551 Sheridan finally left active service, although it continued to equip the opposing force at NTC. Its replacement, the M8 Armored Gun System (AGS), was ready for fielding in 1996 when budgetary considerations resulted in its cancellation. The loss of both platforms eliminated Armor support for airborne/air-assault units altogether, symbolized by the deactivation of 3-73 Armor, which performed this role. Similarly, AGS cancellation ended plans to modernize the humvee-equipped 2<sup>nd</sup> ACR. An uparmored version of the humvee began to enter service in 1996. It provided greater protection for its crew and passengers, but it could not replace the capabilities associated with AGS.

In addition to its support for Force XXI and platform upgrades, the Armor Branch played a leading role in the design of a contingency reaction force. The prevalence of stability and support operations in the 1990s often led to the creation of *ad hoc* task forces built from units taken from different division and corps. This solution proved an

effective temporary measure, but it disrupted the training activities of the formations involved. The Army therefore sought to create a permanent strike force to which units could be assigned for a given mission. Built on 2<sup>nd</sup> ACR, the strike force incorporated the concepts and materiel emerging from the Force XXI process and related advanced warfighting experiments. Plans for this organization remained in development when they were superseded by Army Transformation.

## **Army Transformation**

In 1999, Army Chief of Staff GEN Eric K. Shinseki unveiled a new vision for adapting the Army to the expected operational environment of the 21<sup>st</sup> Century. He was particularly concerned about the Army's ability to deploy forces into a real or potential crisis in a timely fashion. He believed early intervention in a crisis could prevent its escalation and reduce overall troop commitments. However, the heavy force possessed combat power but could not deploy rapidly. Light forces lacked survivability, especially if faced with an armored threat. Therefore work began on a medium force that merged rapid deployability with lethality and survivability. This force evolved into the Stryker BCT (SBCT), named for the common platform the unit used. The first Strykers were delivered to the Army in 2002, and the first SBCT became operational in 2003.

The SBCT did not replace heavy or light units. Optimized for contingency and low-intensity combat, the new organization could not function in a high-intensity combat environment without significant augmentation. The SBCT was designed to be self-sufficient for 72 hours – enough time to shape its environment. It possessed a much-reduced logistical footprint, but it exploited digital communications and the tactical Internet to provide an unprecedented level of situational awareness. The bulk of its combat power lay in infantry battalions. Armor bore responsibility for developing the brigade's communications architecture and the reconnaissance, surveillance and target-acquisition (RSTA) squadron, a cavalry unit whose primary mission lay in gathering information and intelligence. The RSTA squadron proved unique among cavalry organizations. It was not configured to perform traditional security and economy-of-force operations without support.

The wheeled Stryker vehicle made the SBCT distinct from other mounted combat units. It marked a break with the Army's traditional reliance on tracked vehicles. Moreover, the Stryker did not carry the maximum ballistic protection. Its survivability was embedded in the combined-arms nature of the brigade and the latter's ability to secure accurate, timely information on enemy dispositions. The bulk of Stryker vehicles carried infantry, but Armor combat developers also worked on the Mobile Gun System (MGS) and a reconnaissance vehicle. The former carried a 105mm gun on a Stryker chassis to support dismounted action. Its unique design, however, delayed the fielding of the first few MGS platforms until 2007. The reconnaissance vehicle possessed a suite of sensors and surveillance equipment to assist information gathering.

Simultaneous with SBCT development, the Army began work on a brigade-size force that could be tailored to fit varied environments and designed to close with and destroy enemy forces. The projected use of unmanned ground and air vehicles, unattended sensors and smart munitions made it possible to envision far fewer personnel simultaneous with improvements in combat effectiveness. The Future Combat System (FCS) constituted the centerpiece of this futuristic BCT. The FCS included 18 different systems all connected through an advanced communications network. Robotic assets and a variety of line-of-sight, non-line-of-sight and beyond-line-of-sight weaponry completed the ensemble of technologies. The FCS intended to package lethality equivalent to or better than that of the Abrams tank with a reduced logistical support into a platform capable of air deployment.

Armor played a central role in developing FCS. The importance attached to Transformation, however, resulted in increased funding for the SBCT and FCS at the expense of more conventional forces. Planned upgrades to the Abrams and Bradley fleets, for example, were either cancelled or scaled back. This shift in emphasis also narrowed the focus of digitization from the entire fleet of armored vehicles to those organizations in a single corps. In effect, digitized forces would be consolidated in lieu of extending the full range of digital capabilities to all platforms.

## **Operation Iraqi Freedom**

In 2004, several locations in Iraq considered terrorist strongpoints became the target of major operations by American forces. Fallujah, An Najaf and Sadr City all witnessed significant fighting. In these instances, terrorists sought to use the urban landscape to offset the technological superiority of American troops. The resultant battles occurred at short range amid streets, houses and marketplaces. Terrorists sought to use mosques and holy sites as

shields. Such tactics failed when confronted with the intelligent use of combined-arms tactics and aggressive maneuver.



**Figure 4. M1A1 Abrams main battle tanks of 3<sup>rd</sup> Armored Division move out on a mission during Operation Desert Storm. An M2/M3 Bradley can be seen in background. (Photo by PHC D.W. Holmes II, U.S. Navy)**

In these battles, the Abrams and CFV team fared well. Tactics were developed to exploit the superior armor protection of both vehicles. Their firepower and survivability made them the weapon of choice to lead attacks into urban areas. They provided effective fire support to the Soldiers charged with clearing individual structures. In locations where artillery and air support could not be employed without significant risk to civilians, Armor was used to provide precision fires.

The proven value of these platforms, even in urban areas, resulted in renewed Army interest. Heavy-force programs began to receive greater attention and funding than they had before the war. Development work on the FCS continued, but its pace slowed as funding shifted to support more conventional combat vehicles. Upgrade programs previously in danger of cancellation were now restored. Platform modifications based on the Iraq experience resulted, and a canister round for the Abrams main gun entered the theater in 2005.

The Stryker also proved effective in Iraq. It began operations there in late 2003. Its speed and quietness of operation made it ideal for rapid raids on terrorist safe havens at unexpected times. To provide improved protection against RPGs, Strykers in Iraq were fitted with slat armor, which caused the premature detonation of shaped charge projectiles. Mine and suicide-bomber attacks tended to damage rather than destroy the Stryker, enhancing crew survivability.

The humvee, however, proved too vulnerable to terrorist attacks, particularly improvised explosive devices (IEDs). Increased fielding of the uparmored version helped improve survivability of the crew, but the vehicle itself often suffered extensive damage. The Army sought a better-protected vehicle, especially for use in supply convoys, which became frequent insurgent targets. The mine-resistant, ambush-protected platforms resulted. These vehicles were fielded in different configurations, but all shared much better ballistic protection and a unique shape that made them less vulnerable to IED attacks. However, these platforms were not intended for tactical operations. Armor sought a more effective scout platform to replace the humvee. In the interim, survivability was improved by integrating the humvee and M3 CFV in the same platoon.

The Army's continued focus on COIN operations and the immediate needs of Soldiers serving overseas led to FCS' cancellation. Although many of the technologies associated with this program continued to evolve, the family of vehicles that constituted its backbone did not. Instead, the senior military leadership sought a new ground-combat vehicle with greater applicability to the types of conflicts in which the Army was already engaged and would likely

continue to be into the foreseeable future. This decision underscored the importance of the proven Abrams/BFV team, supplemented by the Stryker platform.

These vehicles also reinforced Armor training efforts intended to ensure that mounted Soldiers retained the ability to execute combined-arms maneuver even as they mastered COIN principles and applied them in Iraq and Afghanistan. This balance found reflection in doctrinal developments and in organizational changes intended to ensure that Armor retained its traditional versatility and decisiveness. Army Transformation efforts included the creation of standard BCTs intended either for independent action or as part of a larger formation. These modular organizations made the BCT rather than the division the Army's principal maneuver unit. Armored BCTs included armor and mechanized infantry integrated into combined-arms battalions and supported by a reconnaissance squadron, while infantry and Stryker BCTs provided capabilities suited for light-force requirements. These new brigade elements shaped the nature of training programs and doctrinal developments and helped establish Armor's path of future development.



**Figure 5. Soldiers from 2<sup>nd</sup> Battalion, 5<sup>th</sup> Cavalry Regiment, 1<sup>st</sup> Brigade Combat Team, 1<sup>st</sup> Cavalry Division, scan for threats atop an M1A1 Abrams tank during Exercise Combined Resolve II at the Joint Multinational Readiness Center in Hohenfels, Germany, May 19, 2014. Combined Resolve II is a multinational decisive-action training environment exercise occurring at the Joint Multinational Training Command's Hohenfels and Grafenwoehr training areas that involves more than 4,000 participants from 15 partner nations. The intent of the exercise is to train and prepare a U.S. led multinational brigade to interoperate with multiple partner nations and execute unified land operations against a complex threat while improving the combat readiness of all participants. (U.S.**

*Army photo by SPC Bryan Rankin)*

## Now and future

This is a time of significant change in the Armored Force. Not since we traded in our horses for tanks have we made such significant and far-reaching changes to our formations, training and leader development. However, regardless of ongoing changes, the enduring mission sets that have made Armor and Cavalry forces the “combat arm of decision” will continue to make the Armor Branch an indispensable part of the combined-arms team.

There are key and dynamic areas of change that are impacting the Armored Force: Army Transformation to modular units, restructuring Active Component (AC) and Reserve Component (RC) forces, and establishment of the Maneuver Center of Excellence (MCoE).

**Army transformation to modular units.** The Armored Force is converting from a tank-heavy to a reconnaissance-heavy branch, with the conversion to combined-arms battalions and the inclusion of a reconnaissance squadron in all maneuver brigades. The projected Fiscal Year 2017 endstate is now 15 heavy, 20 infantry and eight Stryker BCTs. In addition, there will be three AC reconnaissance and surveillance brigades.

**AC/RC force mix.** The Army National Guard (ARNG) is currently undergoing a significant transformation concurrent with the AC. This transformation will result in a significant transition of maneuver formations. The ARNG structure will consist of 28 ARNG maneuver brigades. The current proposed mix will be seven heavy, 20 infantry and one Stryker BCT. The transformation has eliminated the “enhanced brigade” concept of the past.

**MCoE.** Based on the 2005 Base Realignment and Closure decision, the Armor School moved to Fort Benning to create the MCoE. This move ensures that we train and develop Soldiers as we fight: as a combined-arms team. Much of the development mission – doctrine, training, organization and materiel systems – will be combined at the MCoE level.

An area that observers have said the United States needs to develop is in our lack of effective short-range, mobile air-defense vehicles to accompany armored units. The United States’ reliance on air supremacy is demonstrated in this area, but most other countries accompany their armored forces with highly mobile self-propelled anti-aircraft guns such as the German Gepard or the Soviet 9K22 Tunguska; short- and medium-range surface-to-air missile (SAM) systems such as the SA-6, SA-8 and SA-11; or both on the same vehicle combined (the Tunguska, for example, can also host SA-19 SAM missiles). The usage of anti-aircraft rounds fired from the main gun of a tank has been increasing over the years. An example is the HE-FRAG round from the T-90, which can be detonated at a set distance as determined by its laser rangefinder.

*Adapted from U.S. Army Armor School Pamphlet 360-2, **This is Armor**, and other sources.*

## Further reference

U.S. Army Armor School Pamphlet 360-2, **This is Armor**.

Armor Museum Director Len Dyer discusses tank development in “Tank Talk” on Fort Benning TV, <https://www.youtube.com/watch?v=tSXR72MUruM>.

The Sheridan tank dedication on Eubanks Field July 10, 2015 is featured at [https://www.youtube.com/watch?v=kZf3L\\_5pXfl](https://www.youtube.com/watch?v=kZf3L_5pXfl).

More historical articles can be found in the “Armor” section of e**ARMOR**’s heritage page, <http://www.benning.army.mil/armor/eARMOR/Heritage.html>.

## Acronym Quick-Scan

**AC** – Active Component

**ACAV** – Armored Cavalry Assault Vehicle

**ACR** – armored Cavalry regiment

**AGS** – Armored Gun System

**ARNG** – Army National Guard

**BCT** – brigade combat team

**BFV** – Bradley Fighting Vehicle

**BMP** – *boyeva mashina pekhoty*

**CFV** – Cavalry Fighting Vehicle

**COIN** – counterinsurgency  
**FBCB2** – Force XXI Battle Command Brigade and Below  
**FCS** – Future Combat System  
**IED** – improvised explosive device  
**MBT** – main battle tank  
**MCoE** – Maneuver Center of Excellence  
**MGS** – Mobile Gun System  
**NATO** – North Atlantic Treaty Organization  
**NTC** – National Training Center  
**RC** – Reserve Component  
**RPG** – rocket-propelled grenade  
**RSTA** – reconnaissance, surveillance and target acquisition  
**SAM** – surface-to-air  
**SBCT** – Stryker brigade combat team  
**TOW** – tube-launched, optically tracked, wire-guided