

THE HERITAGE OF ARMOR

Horse Cavalry Roots

In the colonial era America's mounted force consisted of militia mounted on horses to cope with Indian raids or serve with the British in their conflicts with the French in North America. In this early period the continent's heavily wooded terrain and small population limited the size of mounted units and the extent of their operations. During the Revolutionary War, a need emerged for permanent cavalry units to support the Continental Army. On 12 December 1776 the Continental Congress authorized the creation of the 1st Regiment of Light Dragoons. Authorization for an additional three regiments soon followed. Basic issue to each trooper included a coat, cap, leather breeches, and a pair of boots and spurs. Weapons consisted of a saber and flintlock pistol that each man provided for himself, while officers were further expected to supply their own mounts.

These dragoons units faced continuous problems in recruiting, finding suitable mounts, and securing supplies. Dragoons were intended to fight mounted or on foot, but their lack of a long range firearm made them vulnerable when dismounted. These problems led to the reorganization of the dragoons into legions, consisting of mounted dragoons and dismounted light infantry. Born of necessity, legions provided a more versatile battlefield force. They performed raiding, reconnaissance, screening, and foraging operations. Mounted militia units supported these activities through continuous attacks upon British supplies and outposts. In January 1781 dragoons played a central role in the destruction of British forces at the battle of Cowpens. This battle symbolized the growing effectiveness and potential value of a mounted force.

After the Revolutionary War, the dragoons disbanded. Mounted units were created only temporarily to cope with specific threats. Efforts to minimize military expenses and avoid unpopular taxation often left the fledgling U.S. Army with no cavalry at all. Instead, volunteer mounted infantry operated on the frontier, although the War of 1812 witnessed the creation of a small cavalry force.

By the 1830s continued national expansion beyond the Mississippi River brought the United States into direct contact with the Indian nations of the Great Plains. Unlike the sedentary Indians encountered east of the river, the nomadic Plains Indians relied upon the horse for mobility. To secure this ever-expanding frontier, the Army initially possessed few posts with only small garrisons of foot-mobile infantry and artillery. Therefore, the decade marked the Army's organization of the 1st and 2d Regiments of Dragoons. These units possessed speed, mobility, and the ability to fight mounted or dismounted, making them ideal for frontier operations. However, the absence of mounted doctrine forced these regiments to develop and train their own tactics. Expansion of the Army's mounted force soon followed, but confusion surrounding the role and purpose of cavalry plagued doctrinal and organizational development. Consequently, during the 1846-1848 Mexican War mounted forces were broken into small detachments to perform reconnaissance, pursuit, and administrative roles. In these

limited functions, they performed well against the Mexican Army and earned a reputation for dash and vigor.

The war experience did not resolve the uncertainty over the function and composition of mounted units. In 1855, the Army added two cavalry regiments to its mounted force, which now included an array of mounted riflemen, dragoons, and cavalry. Uniform doctrine and organization did not exist. Similarly, weapons varied among unit types. The new cavalry regiments, in particular, carried a variety of experimental muzzle and breech loading firearms.

Nevertheless, the continuing westward expansion of the United States provided ample opportunities for the employment of mounted troops of all types. Scattered across the western plains, small detachments of dragoons, cavalymen, or riflemen escorted wagon trains, surveyed new territories, and served as a buffer between the Indian nations and the growing numbers of settlers. In the 1850s, two regiments also participated in the Army's unsuccessful effort to end violence in Kansas that occurred when the issue of slavery split the state's population into two armed camps.

The start of the Civil War in 1861 broke the integrity of the cavalry regiments. Many soldiers left their units to join the Confederate army. Initially, Union cavalry accompanied infantry divisions, operating in small numbers to provide details and escorts. Such dispersal nullified combat potential. Confederate cavalry, however, was organized in large formations and assigned at the corps and army level. It performed a variety of operations loosely categorized into raiding, reconnaissance, screening, pursuit, and delay. In addition Confederate cavalry also fought on the principal battlefields alongside infantry and artillery. Their larger size, versatility of mission, and aggressive, energetic leadership made Confederate cavalry far more effective than its Union counterpart in the first years of the war, despite nonstandard equipment that included an array of sabers, carbines, pistols, and shotguns. In 1862, for example, J.E.B. Stuart led a cavalry force that circumvented the Union lines, capturing prisoners, creating chaos in the enemy rear area, and securing information that helped shape the subsequent Seven Day's Battle. Following the battle of Shiloh, Confederate cavalry under the separate commands of Nathan Bedford Forrest and John Hunt Morgan helped stop a Union advance upon Chattanooga by continuously attacking the Union supply line and conducting sweeping raids through Kentucky. These actions also set the stage for the Confederate invasion of that state and the subsequent battle of Perryville. Similar cavalry raids against Union supply lines also temporarily halted Union operations against Vicksburg.

Union cavalry noticeably improved in 1863, when cavalry units were removed from infantry formations and grouped into divisions under a separate command. The creation of the Cavalry Bureau provided a central organization responsible for organizing and equipping cavalry units. These changes permitted Union cavalry to conduct raids of its own, symbolized by the Grierson Raid in which 1,000 troopers rode 600 miles through Confederate-held territory in Tennessee and Mississippi. In 1864 Major General Philip H. Sheridan became the principal influence upon Union Cavalry. He emphasized the creation of cavalry corps and independent operations. The larger organization possessed a formidable mix of firepower and mobility, enhanced further with the introduction of the Spencer Repeater, a seven-shot breech-loading

weapon. Sheridan himself demonstrated the power of the larger cavalry organization by leading a raid upon Richmond. In support of army operations, however, larger cavalry formations proved capable of independent action that could decisively influence the outcome of a battle. The actions of Union cavalry helped trigger and shape the pivotal battle of Gettysburg. Following the battle of Five Forks in April 1865, it was Sheridan's cavalry corps that blocked the Confederate army's retreat, captured its supply trains, and encouraged General Robert E. Lee's surrender at Appomattox Courthouse.

The Civil War firmly established the basic cavalry missions of reconnaissance, security, economy of force, exploitation, pursuit, delay, and raid. The war also demonstrated the supremacy of firepower over the mounted charge. Cavalry units tended to use their horses for transport and fight dismounted, conducting mounted assaults only against surprised or broken forces. These same principles found widespread employment in the decades following the Civil War, especially during the numerous campaigns against Indian nations on the frontier.

The end of the Civil War resulted in a sharp decrease in the Army's size. Volunteers returned home at the same time the Army assumed responsibility for occupation of the ex-Confederate states and was called upon to intervene in labor disputes. In the West, expansion and settlement continued, which in turn triggered Indian resistance. Cavalry regiments again became the preferred means of providing security and stability throughout the western territories. Their combination of mobility and firepower made them more effective in dealing with the elusive and nomadic Plains Indians. However, the small numbers of mounted troops available to control a land mass that stretched from the Canadian to the Mexican border and from the Mississippi River to California resulted in regiments operating from multiple posts in squadron and troop-size increments.

Cavalry soldiers, sometimes supported by infantry, sought to prevent violence between settlers determined to develop the West and Indian nations equally determined to resist encroachment upon their tribal lands. The Army became the principal tool for implementing the American government's reservation policy, which relocated Indian nations to designated areas protected from settlement. However, the harsh conditions of these reservations frequently triggered Indian resistance or efforts to avoid resettlement. The Nez Perce Indians, for example, attempted to flee to Canada rather than accept life on a reservation, necessitating a major military operation to apprehend them.

Despite their central role in eliminating Indian resistance, cavalry organizations labored under a number of handicaps. They remained tied to supply wagons, which sharply reduced their speed. Indian warriors exploited their own superior mobility to fight on their own terms. They proved elusive and difficult to fix in place long enough for superior Army firepower to prevail. Consequently, cavalry organizations began to rely upon Indian scouts to track and locate hostile forces. They also resorted to winter operations against Indian villages, which tended to remain in one location throughout the season. Unused to winter campaigning, many Indian nations surrendered after suffering devastating attacks by mounted forces in bitterly cold conditions.

In the Southwest, the Army faced a different Indian threat. There, warriors repeatedly left reservations to conduct raids before retreating to mountain hideouts. To apprehend these Indians, cavalry units utilized scouts to track the raiders and apply pressure upon them. Although contacts proved infrequent, the relentless pursuit tactics often forced the raiders to surrender, starve, or fight in unfavorable circumstances. In these campaigns, conducted under difficult conditions in an unforgiving climate, the 9th and 10th Cavalry Regiments played a prominent role. These regiments were composed of African-American soldiers and noncommissioned officers led by white officers. Their habit of wearing buffalo robes earned them the nickname "Buffalo Soldiers".

For many soldiers service on the frontier was characterized by long periods of boredom and inactivity punctuated by short bursts of intense action and combat. On campaign, complacency and overconfidence, however, proved almost as dangerous as the enemy. In 1876, the 7th Cavalry Regiment sought a rapid conclusion to operations against the Sioux and Cheyenne in Montana. Noted for its dash and aggressiveness, the regiment finally located its quarry and immediately prepared to attack. Without waiting for infantry or artillery support from supporting columns, and without effectively determining the strength of the opposition, the unit attacked. It soon found itself fighting for survival against an unprecedented concentration of over 2,000 warriors. The ensuing battle of Little Big Horn resulted in the destruction of over half of the regiment, including its commander.

Despite this victory, the Indian nations could not stop the expansion of the United States. By the 1890s the frontier had closed and the Indian wars had come to an end. Cavalry units, however, continued to find employment as the nation began to transform into a global power. They fought in the Boxer Rebellion in China, the Spanish-American War, and the Filipino Insurrection. In these conflicts, mounted units faced the conventional forces of Spain, Filipino guerrillas, and the fanatical Boxer mobs intent on killing foreigners. However, cavalry units also provided humanitarian assistance to San Francisco in the wake of the great earthquake and fire of 1906, and they assumed occupational duties in Cuba.

These experiences shaped cavalry development, encouraging greater reliance upon modern firepower, maneuver, and rapid mobility. The principal weapon became a .30 caliber, magazine-fed rifle that used smokeless powder. Drill and service regulations underwent improvements, and new organizations were tested. Machine gun platoons also joined cavalry regiments. Symbolic of the growing importance of cavalry to the Army, permanent mounted divisions and brigades were also established.

In 1910 border unrest resulted from the outbreak of civil war in Mexico. Multiple factions vied for power and sought international support, including American aid. In 1916, the conflict spilled over the border when Pancho Villa, the leader of an anti-American faction, attacked Columbus, New Mexico. The United States responded by sending a 5,000-man column into northern Mexico after the raiders. The column included cavalry, trucks and aircraft to support ground troops. This action became known as the Punitive Expedition. After a pursuit over rugged terrain reminiscent of similar operations conducted during the Indian Wars, the column successfully launched a surprise attack upon Villa and his supporters.

The Punitive Expedition marked the last major action of American horse cavalry. It played only a minor role in World War I. However, the horse cavalry continued to modernize and experiment with new ideas and tactics. Cavalry leaders sought to retain the battlefield relevance of their branch amid an array of new technologies. In the 1920s and 1930s horse cavalry units incorporated a growing pool of motor vehicles for reconnaissance and logistical purposes and increased the number of organic automatic weapons. The horse was retained because no vehicle could yet match its cross-country mobility. Cavalry doctrine stressed the importance of operating in small, dispersed groupings. Coordinating the actions of these groups posed a challenge that encouraged increased use of the radio. In response to the growing threat of armored vehicles, the horse cavalry pioneered antitank tactics based upon firepower, depth, and mobility to channel and destroy enemy tanks. With the development of reliable armored fighting vehicles and the need for heavier weapons to defeat them, however, horse cavalry ceased to be a competitive force on the battlefield. World War II marked the final replacement of the horse with vehicles, and mechanized cavalry replaced the horse cavalry.

The Tank Corps

The onset of World War I in 1914 found the belligerents sharing expectations of a quick war. However, by year's end the German offensive into France had been halted along the Marne River by British and French forces. The combatants began entrenching and the conflict on the Western Front devolved into a war of attrition. Maneuver disappeared as the machine gun and ever-increasing masses of artillery drove the soldier into elaborate trench networks. Offensives intended to breach these trenches often failed with heavy loss of life because of the advantages artillery, machine guns, and fortifications gave to the defender. Attacking troops that managed to reach the enemy's trenches suffered high casualty rates and breakdown of unit cohesion. They also found that they had outrun their artillery support and were vulnerable to counterattack.

After repeated futile assaults on German positions the British and French armies sought a technological solution to the trench deadlock. In Britain, Lieutenant Colonel Ernest D. Swinton developed the idea of a tracked armored vehicle that could deliver firepower directly upon the German trenches while protecting its crew from machine gun fire. He envisioned such a vehicle first reducing the defenses prior to the infantry's assault and then providing continuous fire support to the soldiers once they had secured the trenches. Inspiring Swinton's vision of the tank was his observation of the American-made Holt caterpillar tractor moving through mud with relative ease in its role as a heavy gun tractor. Swinton found support for his vehicle from First Lord of the Admiralty Winston Churchill. With Royal Navy backing, development of the vehicle began amid great secrecy. Initially, the new vehicle received the designation "water tank" to confuse enemy agents. Later this designation was shortened to "tank" and the term remains in use to this day.

The first British tanks intended for combat possessed a rhomboidal shape, two sets of tracks on the outside of the hull, and sponsons that carried either machine guns or 2-pounder

guns. The tank made its combat debut during the British Somme offensive of 1916. Nearly fifty of the new vehicles were deployed to support the ongoing offensive, but only eighteen actually passed through friendly lines and engaged the Germans. The rest succumbed to mechanical failure. Those tanks that did keep running provided invaluable experience that shaped subsequent doctrine and training development. Their presence on the battlefield panicked German soldiers, who found themselves helpless against a metal monster seemingly impervious to their weapons. Henceforth the psychological impact of the tank upon infantrymen became a factor in the tank's employment.

During the British Cambrai offensive of November 1917, tanks played a key role. Nearly 400 spearheaded the assault and rapidly breached German defenses in the first large-scale use of armor. Unprepared for the tank onslaught, resistance disintegrated, and the British found themselves moving into the open country behind the German trenches. This unprecedented success on the Western Front demonstrated the tank's value and spurred further development. The French, too, developed a tank force to provide direct support to infantry alongside the vehicles.

Tank operations attracted the attention of the United States Army. Following America's entrance into the war, the Army organized the Tank Corps to form and train American tank units. Colonel Samuel D. Rockenbach became chief of the new organization and served on the American Expeditionary Force staff as adviser on all tank matters. Lacking tanks and doctrine the Tank Corps borrowed from the French and British. While the British favored the use of heavy tanks to crush resistance in advance of the infantry, the French used light tanks to accompany and support the infantry. American Tank Corps doctrine adopted both concepts, although the absence of heavy tanks resulted in the use of the light, six-ton Renault FT-17 in both roles. The French-built Renault tank featured a two man crew, a 37-mm gun, and a top speed of five miles per hour. Its poor mechanical reliability led to its movement to and from the battlefield on rail cars and truck transporters. Nevertheless, the FT-17 became America's first battle tank. It featured a configuration that became standard for most subsequent tank designs: a main armament in a revolving turret, driver's position in the front hull, engine in the rear hull, and a fully tracked suspension system. Large numbers of these tanks participated in the American offensives at St. Mihiel and the Meuse-Argonne, disrupting the German defenses and supporting infantry attacks. A small number of Americans also served in heavy tank units on the British sector of the front.

American tank production focused upon a new design crafted by Ford Motor Company and a US-built version of the FT-17. The Army also pursued development of a heavy tank design with the British. Designated the Mark VIII, it incorporated British armor and armaments and the American Liberty aircraft engine. However, Liberty engine production remained slow, and those built went to meet Air Corps needs. No Mark VIIIs were completed by war's end, and in fact no American-built tanks entered combat. Lack of tank design experience, overly complex coordination between the Army and industry, and shortages of critical components contributed to exceptionally slow production. However, the lessons learned from these early efforts at tank design would be applied during the industrial mobilization for World War II.

For the individual tanker, service in the Tank Corps offered a mix of hardship and opportunity. Tanks represented a new approach to warfighting, but the nature of the early tanks posed difficulties for their crews. The tanks used by the Tank Corps proved prone to mechanical breakdown, necessitating constant work by their crews. Consequently, tankers became known as “rude mechanicals.” In combat, tanks routinely operated with hatches closed. The resultant claustrophobic effect was unrelieved by poor visibility, the combination of engine and cordite fumes, and temperatures exceeding 100-degrees Fahrenheit. Crews carried ammonia ampoules to revive soldiers who fainted. Despite the armor plating—little more than steel bolted onto a frame—small arms fire could still generate a spalling effect on the tank’s interior. To protect against this danger, heavy tank crews often wore a chain mail headpiece and slung chains on the inside of the vehicle to deflect metal shards.

Effective command and control proved impossible. Tank commanders relied upon hand signals, flags, and pyrotechnics, but these measures could not be used once the tank buttoned up for battle. Hence, formations broke down and unit cohesion collapsed. Communication with distant headquarters generally occurred via assigned runners or carrier pigeons. Unfortunately, the pigeon cages often did not survive combat, crushed in the heat of battle by tank gunners intent upon engaging hostile targets. Without an effective means of coordination, the neat tank formations at an attack’s start degenerated into a gaggle of vehicles blundering about the battlefield engaging targets of opportunity until they broke down or were knocked out. The employment of large numbers of tanks partially offset these problems. Moreover, despite the tactical limitations of tanks, they continued to attract willing crew members and became an important asset in the Army’s arsenal.

New Beginnings in the Interwar Era

After the war, Congress restructured the Army based upon a review of its wartime actions. The National Defense Act of 1920 resulted. It defined the Army’s organization and operation throughout the interwar period, and it abolished the separate Tank Corps. The tank’s wartime infantry support role suggested its alignment with the dismounted branch. Therefore, the Infantry received exclusive responsibility for developing new tank designs and the related training and doctrine. While the 1920s would witness significant innovation in tank usage by other nations, American tank development occurred within the relatively narrow confines of the Infantry mission of seizing and holding ground.

The Infantry developed the tank as one of several support weapons for the rifleman. In particular, it sought the close integration of tanks and infantry at the small unit level. This capability suited infantry needs and constituted an important role for the tank. In the early 1920s Rockenbach continued to lead the tank force. He supported efforts to build a more powerful and reliable medium tank. However, prototype models tended to be too heavy, and the desired balance of firepower, mobility, and protection proved beyond the technology available. This failure coupled with the Army’s interest in fighting a war of maneuver rather than

trenches shifted tank design emphasis to light, fast tanks that leveraged major advances in suspension, track, and engines.

British experimentation with the use of tanks in multiple roles finally prompted similar testing in the United States. Between 1928 and 1931 the Army created two experimental units that mixed tanks with other combat and support elements. Each one comprised a motley collection of vehicles and weapons with limited tactical value. However, the experience acquired by these organizations prompted Army-wide discussion of new roles and tactical organizations for the tank. The notion of a separate mechanized arm emerged, but in the absence of additional funding and personnel, the Army could only create such a force by diverting resources from the existing combat arms. This course of action met with resistance that intensified with the Great Depression's onset and Congressional unwillingness to increase military spending.

The impasse between interest in creating a new mechanized arm and resourcing it was resolved in 1931 by Army Chief of Staff General Douglas MacArthur. In a new mechanization policy, he directed the combat arms to pursue separate mechanization efforts using their own resources. No longer would each combat arm face the specter of losing funding and personnel to a rival organization. This decentralization proved less efficient than the centralized mechanized programs of Germany and Russia, but MacArthur's policy ensured that the Army would adopt mechanization rather than be threatened by it.

The new mechanization policy had little effect on Infantry tank development, but it permitted the Cavalry to begin experimenting with tank usage. Throughout the 1920s, the mounted arm had had to limit its interest in motor vehicles to armored cars, which proved mechanically fragile and road bound. In 1931, however, the Cavalry established the 7th Cavalry Brigade (Mechanized). Initially little more than a paper organization, the brigade included the 1st Cavalry Regiment (Mechanized). This unit exchanged its horses for vehicles, and relocated from the Texas border to Fort Knox, Kentucky, in 1933. This post was one of the largest in the United States, but other than summer training by National Guardsmen and reservists, it lay unused. With the arrival of the 1st Cavalry, Fort Knox began its long association with mechanized development.

The 1st Cavalry initially served as a tactical laboratory to help determine the optimal organization, doctrine, and materiel for a cavalry organization built around vehicles. Through maneuver participation, field exercises, and analysis, its personnel evolved the unit into a flexible organization, capable of performing the full range of Cavalry missions. By the mid-1930s, the regiment had been joined at Fort Knox by the 13th Cavalry Regiment (Mechanized) and attachments of artillery and engineers. Collectively, these forces transformed the 7th Cavalry Brigade (Mechanized) into a powerful, combined arms force. Tanks assigned to this unit received the designation "combat cars." This nomenclature change ensured that the mechanized cavalry adhered to the letter of the National Defense Act of 1920 and left the Infantry's exclusive responsibility for tanks unaltered.

Cavalry doctrine envisioned mounted elements operating in small groups dispersed over a broad frontage. To offset the vulnerability of small numbers of tanks operating alone,

they were supported by troopers, engineers, and mortar teams. Continued experimentation and field exercises led to the integrated action of these elements and the beginnings of a modern American combined arms tactical doctrine. Rapid movement of these teams reinforced Cavalry emphasis upon outmaneuvering the enemy rather than engaging in sustained and costly firefights. Hence, mobility and speed became critical attributes. In armored vehicle design, the mechanized cavalry consistently opted for speed and mobility over firepower and armor protection. Organizational and tactical concepts that slowed operational tempo were discarded.

In its efforts to coordinate the actions of multiple fast-moving combined arms teams, the 7th Cavalry Brigade (Mechanized) revolutionized command and control procedures. Visual signals and wire-based communications proved too slow to facilitate rapid decision making and sustain the high operational tempo desired. Therefore the mechanized cavalry embraced widespread radio usage. It established radio nets that conformed to a unit's tactical organization, and abandoned the Army's rigid emphasis upon encoded transmissions. Before a mission began, key participants were briefed on the overall objectives and their specific tasks. When operations began, subordinate leaders received short radio messages sent in the clear to update them on changing conditions. While these transmissions might be intercepted, mechanized cavalry personnel believed that rapid communication coupled with fast action outweighed potential security risks. Moreover the cryptic nature of the radio traffic provided a degree of signal security, since an opponent lacked the context of the mission order. The pioneering efforts of the 7th Cavalry Brigade (Mechanized) at Fort Knox marked the introduction of mission-type orders and fragmentary orders (FRAGOS) into the Army.

In maneuvers and field exercises the mechanized cavalry discovered that it could increase its battlefield effectiveness by altering the composition of its combined arms teams to meet changing tactical conditions. The 7th Cavalry Brigade (Mechanized) and its subordinate regiments rarely operated as a single mass. Instead, they operated as a collection of combat teams, each one organized according to their objective, expected enemy resistance, and terrain. The composition of these teams changed according to the tactical situation and gave the mechanized cavalry a high degree of organizational flexibility. Task organization marked a departure from the Army's traditional reliance upon rigid tactical groupings and marked the foundation for the later World War II era combat command.

A principal player in these developments was Adna R. Chaffe, Jr. an outspoken advocate of mechanization in the interwar years. Commissioned in the Cavalry, he served on the American Expeditionary Forces staff in World War I. Afterward, he became an instructor at Fort Leavenworth's Command and General Staff School and attended the Army War College. In 1927 Chaffee became a staff officer in the G3 Section of the War Department General Staff, where he became immersed in the study of tanks. Through a personal friendship with the American military attaché to Britain, he acquired accurate information regarding the latest British mechanized developments. In the 1930s, he became closely associated with mechanized cavalry development, commanding the 1st Cavalry and later the 7th Cavalry Brigade (Mechanized). In 1940, he became the first chief of the Armored Force, shaping the nature of American future armored doctrine before his death in 1941.

Chaffee commanded the 7th Cavalry Brigade (Mechanized) during the First Army maneuvers of 1939. This event demonstrated how a fast-moving mechanized force could decisively influence a battle. The critical action occurred when the unit conducted a sixty-mile night road march under blacked-out conditions to launch a dawn flanking attack. The brigade burst into the rear area of the opposing force, creating sufficient mayhem to trigger the end of the maneuvers. Within days of the maneuvers' conclusion, Germany invaded Poland. The high profile use of combined arms formations in that campaign served to vindicate the tactical ideas developed by the 7th Cavalry Brigade (Mechanized) and spurred efforts to expand that unit into a mechanized division.

Increasing the Army's mechanized might, however, suffered from lack of funds and materiel. Only small numbers of new combat vehicles were produced before 1939. Numerically, the most significant vehicle in the Army's inventory remained the Mark VIII heavy tank and an American version of the FT-17, both dating from World War I and obsolete. The inability to secure newer tanks in quantity led one tank officer to conclude: "The best solution for the present mechanized means for the U.S. Army is to get the biggest transport we have, load it all on it, and dump it into the middle of the Atlantic Ocean." However, the interwar years did witness steady improvements in the reliability and durability of tracks, engines, and suspension systems. By 1939, the prospect of another war in Europe led the Army to order the production of over 300 M2A4 light tanks equipped with 37-mm. guns. For mechanization, this action signaled the end of the Great Depression's lean years.

The Armored Force and World War II

On 10 May 1940 German armored formations spearheaded an invasion of France, triggering that country's surrender within six weeks. This conquest shocked the American Army, which had held the French military in high regard. However, through the efforts of the American military attaché staff in Berlin, headed by Major Truman Smith from 1935-1939, the U.S. Army possessed considerable information regarding the organization and operation of the German panzer division. After France's defeat, German armored trends became the standard of comparison for American mechanized development. The absence of American armored divisions and corps fuelled interest in merging mechanized cavalry and infantry tank development under a single organization. The War Department responded by establishing the Armored Force on 10 July 1940. This organization bore responsibility for building a credible American armored capability. Fort Knox, home of the mechanized cavalry, became the location of the Armored Force's headquarters. Infantry tank units and the 7th Cavalry Brigade (Mechanized) merged to form the 1st and 2d Armored Divisions and the separate 70th Tank Battalion.

The Armored Force reflected the influence of the mechanized cavalry. Chaffee was selected as the first Chief of the Armored Force, and other officers with cavalry or mechanized cavalry backgrounds served in key command positions. Consequently, the Armored Force stressed maneuver and speed in its operations. Armored divisions would envelop the enemy

and engage soft targets in his rear rather than engage in deliberate assaults upon his strongest positions. Tank versus tank combat was to be avoided if possible, since it wasted armored resources in costly firefights. The Armored Force also assumed responsibility for organizing and training separate tank battalions for infantry support, though its initial focus lay upon the more powerful armored divisions and corps.

The Army embarked upon a major expansion of its mechanized capability simultaneous with implementation of Selective Service and widespread efforts to improve combat readiness. It took time to train the new armored formations, manned as they were with many soldiers and officers unfamiliar with mechanized operations. Consequently, large-scale maneuvers late in 1941 did not showcase a mature Armored Force capable of emulating German successes abroad. Instead, armored operations demonstrated the steep learning curve facing mounted soldiers of all ranks. Poor tactical decisions resulted in unsupported tank attacks upon towns, fortified positions, and antitank guns with consequent high loss. Reconnaissance became noticeable by its absence, while logistical, air defense, and traffic management issues underscored the complexity of maneuvering combined arms mobile divisions. However, the maneuvers provided invaluable experience in the integration of artillery, infantry, engineers, and tanks.

During the course of the war, the Armored Force grew from its initial two to sixteen armored divisions. Much of this expansion occurred in 1941 and 1942, years in which the Armored Force worked to establish an effective training base and develop optimal organizations for mounted units. The division became the primary focus of this attention. It became the largest American armored formation fielded in World War II, despite early interest in creating an armored corps. The division underwent continuous modification until the establishment of a permanent structure in September 1943. Basic components included three armored battalions, three armored infantry battalions, three artillery battalions, one engineer battalion, one reconnaissance battalion, one medical battalion, and one maintenance battalion.

The size of the division reflected the Armored Force emphasis upon organizational flexibility and deployability. Deliberate efforts were made to keep the formation from becoming too bulky or unmanageable. To facilitate command and control, the new division dispensed with rigid brigade and regimental headquarters. Instead, it relied upon subordinate combat commands that possessed a permanent staff but no fixed troop assignments. They were assigned units according to their mission, and their composition changed with the tactical situation or the division commander's intent. Each combat command in turn organized its assets into up to four task forces, similarly flexible in their structure and operation.

Exploitation of the combat command concept initially suffered from a shortage of officers familiar with combined arms operations and comfortable with the absence of organizational rigidity. Armor officer training therefore focused upon fundamentals to ensure a basic competency level. Standard combat command organizations and solutions for "typical" tactical situations provided essential guidance, but too often they became rigidly applied in combat theaters. A deeper understanding of combined arms operations and the utility of the combat command structure tended to occur only as a result of combat experience. The Army did not

truly possess a combined arms culture when it entered the war, but it recognized the importance of combined arms action by war's end.

The fighting around Arracourt in September 1944 represented a high point in this learning curve. The battle was part of the Lorraine Campaign in which the German LVIII Panzer Corps mounted a series of counterattacks to stem the avalanche of Allied troops that had poured across France following their breakout from the Normandy beachhead. The principal fighting involved elements of the 4th Armored Division led by Lieutenant Colonel Creighton Abrams. The flexible organization and combined arms nature of this formation permitted it to attach and detach units as necessary to meet enemy threats. This flexibility allowed U.S. forces to employ combined arms teams to outmaneuver and outfight German forces equipped with superior tanks whose frontal armor could not be penetrated easily by American tank guns. The 4th Armored Division shifted forces as much as 8 to 10 kilometers to meet German probes. American forces also launched local attacks wherever possible against flanks and weak points thereby retaining the element of surprise. The battle concluded with the repulse of the German attack and the destruction of two entire panzer brigades at a cost in materiel of just 21 American tanks.

The Armored Force focus upon developing and fielding armored divisions resulted in less attention devoted to the separate tank battalions intended for infantry support. These armored units were not permanently assigned to infantry formations and had few opportunities to train with riflemen. Many tank battalions were broken into company teams and assigned to support different infantry units. Tank-infantry coordination thus became a battalion and company commander's problem, made worse by the early lack of doctrine for the operation of tanks in urban and complex terrain. In the Normandy hedgerows, for example, the close terrain reduced engagement ranges and forced the employment of tanks in small groups rarely larger than a company and more often a platoon or section. Communication between tank units and supported infantry too often degenerated into a company commander banging on a tank commander's hatch. The need for better communications between tanks and infantry resulted in tanks being equipped with a field phone on the outside rear of the vehicle. This permitted a direct link between infantry and tank commanders. To facilitate tank movement through hedgerows, many benefited from the attachment of steel prongs made from German beach obstacles.

The tanks that equipped armored units reflected the intended role of the armored division. This formation was designed to envelop enemy positions and operate throughout an opponent's rear area. Tank designs therefore emphasized maneuver and mobility over firepower and armor protection. Indeed, light tanks constituted much of the tank strength of the early armored divisions. The M3 light tank (Stuart), later upgraded to the M5, carried a 37-mm. gun, could achieve tactical speeds of thirty-five miles per hour, and proved easy to maintain. However, as the war progressed and the armor and armament of German tanks and self-propelled guns increased, the light tank became increasingly vulnerable. It became relegated to reconnaissance and security roles, and its numbers within the armored division fell in favor of more medium tanks.

The M4 medium tank (Sherman) became the principal American tank of World War II. Over 70,000 were built during the war, equipping both American and Allied armies. Like the M3/M5 light tanks, it proved mechanically reliable and mobile. It became the workhorse of the U.S. Army, providing close infantry support, spearheading armored attacks, performing antitank missions, and acting as auxiliary artillery. However, its 75-mm main gun lacked sufficient armor-piercing ability, and it sacrificed firepower and armor for greater mobility. Even when upgraded to a 76-mm, the M4's armament could not penetrate the frontal armor of the more heavily armored German tanks and assault guns. Standard tactics for a five-tank platoon engaging German Tiger and Panther tanks required one section to draw the Germans' fire, while the other section maneuvered to the flank and engaged the German tanks from the side or rear. Such tactics were not morale builders for tank crews. Nor could the M4's armor protect it from the high velocity 75-mm and 88-mm guns commonly carried on German tanks. In such engagements, American tank units relied upon support from aircraft, artillery, and tank destroyers. Efforts to field a more powerful tank finally resulted in the M26 (Pershing) Heavy Tank, but only 20 entered combat before the war's end. For most tank units, combined arms tactics became vital to success against German armor.

Although the Armored Force considered the German Army its principal opponent, tank operations also occurred throughout the Pacific Theater of Operations. During the initial Japanese invasion of the Philippines in 1941, the 192d and 194th National Guard Tank Battalions formed the Provisional Tank Group and became the first American tank units to enter combat. They conducted a series of freewheeling counterattacks against Japanese forces to cover the American withdrawal to Bataan. The Tank Group was finally forced to surrender in April 1942 along with the remaining survivors of the American Philippines garrison. When the United States began its island-hopping campaign across the Pacific Ocean, tank units participated in nearly every operation. Several such units belonged to the Marine Corps, and they developed and practiced effective close support tactics in conjunction with Marine riflemen. Tank firepower helped to neutralize Japanese machine gun nests, while flamethrower-equipped tanks proved exceptionally effective in destroying bunkers and fortifications.

Mechanized cavalry also served in large numbers in World War II, but their nature and composition differed from the general purpose organization represented by the interwar 7th Cavalry Brigade (Mechanized). Instead, mechanized cavalry groups and squadrons provided reconnaissance at the corps and division levels. These units were optimized for stealthy reconnaissance and lacked combat power. These characteristics reflected their Cavalry alignment. The Armored Force assumed responsibility for mounted maneuver combat actions, leaving reconnaissance as the primary function for mechanized cavalry units. Unfortunately, once deployed, they were often thrust into a much broader range of missions, requiring considerable improvisation. Mechanized cavalry units included a collection of armored cars, light tanks, jeeps, and half-tracks. These platforms generally proved weak in armor protection and antitank capability, although they performed effectively against non-tank targets. Despite their light nature, mechanized cavalry organizations proved versatile and served in every major campaign from the Normandy landings to the conquest of Germany.

When the war ended, armored organizations had demonstrated their value in every theater in which American forces fought. The armored division constituted a powerful, mobile combined arms mix. Its organizational flexibility, combat power, high operational tempo, and command arrangement ensured it a place in the postwar Army. The tank was considered the optimum antitank system, and its versatility led to the abolition of specialized tank destroyer units and the emergence of the main battle tank concept. Conversely, the mechanized cavalry experience revealed a universal desire for more effective reconnaissance organizations and equipment that would ultimately result in the creation of the armored cavalry regiment and more robust divisional cavalry squadrons.

Constabulary to Cold Warrior

The years immediately after World War II were marked by efforts to analyze the wartime experience and incorporate lessons learned into mounted maneuver training, organization, materiel, and doctrine. In 1946 Fort Knox hosted the first of many annual conferences dedicated to armor issues. Future development, however, hinged upon the creation of a permanent armored branch. The Armored Force had been created by the Army leadership in World War II as a “service test” to permit the rapid creation of the mechanized forces considered necessary for the war effort, but the organization lacked the legal foundation of the other combat arms. Hence, Army leaders now focused upon the creation of a permanent branch, its impact, and whether it would include the Cavalry. In 1948, the Patton Museum of Cavalry and Armor opened on Fort Knox to train and educate soldiers. Its name reflected both a desire to honor General George S. Patton Jr. and the uncertain branch status. Similarly, the Cavalry Journal became the Armored Cavalry Journal.

In 1950 the Army Organization Act resolved the branch question. Under this legislation, a single Armor Branch emerged to govern both tank and cavalry development. A separate Cavalry branch ceased to exist. The new branch bore responsibility for the development of armored formations, separate tank battalions, and cavalry units. The Armored Cavalry Journal became Armor and the branch’s birthdate became 12 December 1776 to reflect its combined cavalry and armored heritage.

Overseas the years following the end of World War II provided a different type of challenge for mounted maneuver organizations. In Europe, the Army found itself responsible for governing a large section of Germany and Austria. The war-induced chaos in these areas coupled with a potentially hostile population generated the need for a means of providing security and maintaining order. To assist in these tasks the Army created the Constabulary in July 1946. It bore responsibility for providing area security throughout the American Zone of Occupation. Through reliance upon mounted patrols, it sought to maintain a presence to deter acts of violence and sabotage. Its basic missions included maintenance of law and order, checkpoint operations, the interdiction of black market activities, and apprehension of Nazi and SS personnel.

The Constabulary initially comprised nine Constabulary regiments organized into three brigades. Component elements came largely from mechanized cavalry squadrons and armored divisions due to their familiarity with mobile, dispersed operations. The link with armored organizations was reinforced by the adoption of insignia that incorporated the same colors of the Armored Force. However, the police function assigned to the Constabulary differed markedly from traditional combat actions. Moreover, new recruits constituted much of the force's enlisted strength, following the demobilization of many combat veterans. The creation of a Constabulary School modeled upon the Armored School at Fort Knox helped to immerse soldiers in German language, culture, and the legal responsibilities associated with their duties.

By 1948 a reorganized German police force began to assume many of the functions initially conducted by the Constabulary. The onset of the Cold War and the growing threat of Soviet aggression triggered a change in the Constabulary's mission and organization. A number of Constabulary units were restructured to form the Army's first armored cavalry regiments. Patrols along the East German border assumed much greater importance. The Constabulary continued to support major law enforcement activities, but it also began to increase its combat capability through the acquisition of medium tanks and increased tactical training. These changes reflected a growing desire for more combat power in Germany to protect Central Europe from Soviet aggression. The Constabulary headquarters was finally inactivated in November 1950, although two Constabulary squadrons remained in service until 1952.

Growing Soviet might and the creation of the Warsaw Pact posed new challenges to the Army in Europe. American military planners envisioned a possible Third World War opening with a rapid Soviet/Warsaw Pact invasion of West Germany on a massive scale. Stopping this mechanized avalanche quickly became the dominant concern of the U.S. Army. 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 ten 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.

With the Army focused upon 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 US 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 US 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 38th Parallel witnessed several tank-versus-tank actions that generally favored American tank crews and resulted in the destruction of much of the North Korean mounted force.

When offensive operations continued into North Korea, tank units and divisional reconnaissance companies again found themselves in the forefront. Although these units lacked the capabilities inherent to an armored division or armored cavalry regiment—none of which served in the Korean War—they proved versatile and effective. When Chinese Communist Forces intervened in late 1950, they quickly infiltrated through the widely dispersed United Nations forces and created several pockets. Again, tank battalions and reconnaissance companies played a central role in the efforts of isolated units to escape down routes subjected to repeated ambushes. Armored vehicles provided the firepower and mobility to protect the United Nations columns as they retreated southward. At times they conducted local counterattacks to permit friendly forces to make good their escape.

When United Nations military organizations returned to South Korea, they continued to experience heavy fighting. Chinese and North Korean formations launched several major offensives in 1951 that were matched in intensity by American-led operations. In these bloody engagements, tank battalions provided fire support, bolstered the defenses of frontline outposts, counterattacked when necessary, and acted as supporting artillery. American tanks found themselves employed in companies and platoons working in close conjunction with infantry, sometimes carrying supplies and wounded soldiers. Terrain and the nature of the conflict resulted in an emphasis upon small unit actions by tank units to an unexpected degree. Armored doctrine oriented upon the use of tank masses in a European setting had to be adjusted to the realities of Korea. Nevertheless, American armor performed effectively and demonstrated an ability to operate in rugged terrain.

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 upon 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 the summer of 1950 became so intense, that vehicles only recently placed on display at Fort Knox as monument vehicles were pressed back into service.

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 numerous teething troubles, but the Army considered it more important to field

quickly a satisfactory tank rather than await perfection of the design. The M48 featured a dome-shaped turret that improved ballistic protection, a 90-mm gun, and an improved fire control system. Continuous improvements based upon engineering reviews and soldier feedback resolved early problems, resulting in a tank both reliable and popular.

After the Korean War American armored development focused upon 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 U.S. 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 systems that improved the ability to hit and kill a target 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 WWII, 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 upon 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 105-mm 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 T 95 and the MBT 70, however, proved too expensive and complex. They never advanced beyond a developmental stage, but 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 76-mm gun and improved armor compared to the M24. Efforts to field a satisfactory armored car, however, failed. Achieving the right combination of desired qualities in a wheeled platform 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 squadrons assigned to divisions and separate 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.

The Vietnam War

Despite its focus upon 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 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.

Doctrinal guidance, however, remained oriented upon 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 counterinsurgency. 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. To disrupt ambush and sabotage of principal roads, armor units conducted "Thunder Runs." In these operations armored columns 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 upon 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 road marches, 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 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 machine gun, the vehicle underwent modification in the field. Two additional machine guns were mounted and gunshields 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 machine guns proved deadly. However, it remained vulnerable to mines and RPGs, resulting in a variety of improvised measures intended to boost survivability.

The M551 (Sheridan) also made its combat debut in Vietnam. It 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 152-mm 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 road wheels 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 152-mm 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 resultant destructive power became evident in offensive actions like those performed during Operations Cedar Falls and Junction City. Armor also provided a rapid

response to hostile actions. During the 1968 Tet Offensive armor provided relief and counterattack forces that contributed to the overall American military victory. The combined arms nature of division cavalry squadrons and the 11th Armored Cavalry Regiment also proved highly effective in a counterinsurgency environment, validating the organizational and doctrinal principles embedded in their design.

From 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 in use by the Arab armies. The war included the largest clashes of armor since WWII 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 antitank guided missiles and more powerful rocket propelled grenades.

This war forced the U.S. Army to review critically its assumptions of superiority over the Soviets. The emergence of the T62, BMP, and Sagger antitank 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 U.S. planners, it became clear that the next war would occur with little warning, negating U.S. plans that assumed several months of advance notice in which to mobilize and deploy additional 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 Training and Doctrine Command in 1973. Training became more realistic and focused upon meeting high readiness standards, epitomized by the opening of the National Training Center 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 Bradley Fighting Vehicle 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 sufficient 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 the fighting compartment from the main gun ammunition all served to ensure the crew's survival. The original 105-mm main gun was subsequently upgraded to a 120-mm 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 Bradley Fighting Vehicle began in response to the limitations of the M113 and ACAV. 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. Both versions carried a 25-mm cannon, a machine gun, and a TOW missile launcher. The infantry version carried an infantry squad, while the cavalry fighting vehicle carried a scout team and additional TOW missiles. The M3 entered service in 1984.

Initially, every scout and cavalry platoon was to be equipped with the M3. 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 the NTC during the 1980s finally encouraged the Army to adopt the High Mobility Multi-Wheeled Vehicle (HMMWV) for scout platoons. Initially designed as a general utility vehicle and replacement to the jeep, the HMMWV'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, the Army leadership directed the fielding of HMMWVs to all scout platoons. Armored cavalry platoons retained the M3.

In 1990 Iraq invaded and occupied Kuwait, triggering a large-scale military build-up of American and allied forces in Saudi Arabia. Early the following year, this coalition began military operations against Iraqi in Operation Desert Storm. An air campaign followed by five days of ground combat left much of the Iraqi conventional forces destroyed and liberated Kuwait. 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 Cavalry Fighting Vehicle. 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 the desert conditions of the National Training Center. The combat power and survivability of both platforms tended to surpass expectations. Cavalry Fighting Vehicles 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 drive through Iraqi positions. At 73 Easting, the 2d Armored Cavalry Regiment drove into an ambush established by the Iraqi Republican Guard in conditions of poor visibility. Within a short time the Iraqi tanks had been destroyed and the armored cavalry continued its advance. For many Iraqi tank crews, the first indication of the American presence came from the explosion of their wingman's tank.

Armored cavalry organizations performed reconnaissance, security, and economy of force operations. The combined arms nature of both armored cavalry regiments and division cavalry squadrons again proved effective both in determining Iraqi defenses and in overcoming them. Battalion scouts still equipped with the M3 proved robust, but those employing HMMWVs 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 the 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, 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 at all. 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 152-mm 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.

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 2d Armored Cavalry Regiment deployed to Haiti as part of this effort. The potential for sudden outbreaks of violence remained high. Therefore, the regiment's primary role became one of locating and defusing trouble spots before they escalated into a crisis. Reorganized after the Gulf War into a light cavalry force equipped primarily with HMMWVs, the 2d 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 additional firepower and manpower ready to respond to a sudden eruption of violence.

Operation Restore Hope placed mounted troops in Somalia on the opposite side of the world in a much more volatile environment. Intended to ensure the safe arrival of food convoys to starving masses, this operation pitted American and United Nations soldiers against a mix of bandits and armed factions. The 3-17 Cavalry deployed with its parent formation, the 10th Mountain Division. It helped to provide a military presence intended to deter interruption of the relief effort. It established visible checkpoints intended to control traffic and conduct searches for weapons, and it conducted reconnaissance patrols in its area of operations. In addition, the unit was required to be capable to mount raids, armed reconnaissance, and air assault operations should fighting flare up.

Political considerations initially blocked the deployment of American tank units to Somalia. However, in October 1993, fighting broke out in Mogadishu when a raid by Ranger forces escalated into sustained combat. Relief columns sent to extract the Rangers encountered great difficulty negotiating hostile city streets in unarmored, wheeled vehicles. The absence of American tanks resulted in further delay before an international armored force could be assembled and dispatched into the city. This experience resulted in the subsequent deployment of heavy forces, including a company team from the 24th Infantry Division (Mechanized) and 1-64 Armor. Nevertheless, in the wake of the fighting in Mogadishu, the U.S. opted to withdraw from the Somali relief effort.

It is to prevent such events or intervene decisively that Armor participates in operations other than war. Hence, tanks were among the first elements to cross the Sava River into Bosnia in December 1995 as part of Operation Joint Endeavor, intended to end the ethnic violence there. It was no accident that the 1st Armored Division constituted a major part of the American military presence. In Bosnia, tank and cavalry units again symbolized American intent to enforce adherence to the peace terms agreed upon by the ethnically divided population. While M3 Cavalry Fighting Vehicles conducted patrols throughout the countryside, quick reaction forces built around the M1A1 tank supported them. The same vehicle, equipped with mine rollers, also cleared roads of anti-tank mines. The rugged terrain of Bosnia posed difficulties to mobile operations, but it did not prevent them.

In 1999 Serbian ethnic cleansing in the Yugoslavian province of Kosovo triggered the outbreak of hostilities between Yugoslavia and NATO. The latter mounted an air campaign designed to erode Serbian combat power and force a Serbian withdrawal from Kosovo. These objectives were met and combat operations ceased. Although ground forces played little active role in the war itself, afterward they assumed responsibility for maintaining peace within Kosovo. The challenge lay in the instability, continued ethnic violence, and the absence of an effective government. Armor personnel deployed to Kosovo to promote peace quickly found themselves in an environment characterized by violence. However, the sustained presence of American ground troops helped to stabilize the province and permit rebuilding and reconstruction efforts.

Despite Armor's growing involvement in peacekeeping and relief operations, the need for sharply honed combat skills remained high. Nowhere did this become more apparent than in Korea, where elements of North Korea's mass army stood poised close to the demilitarized zone and within twenty kilometers of the most advanced American tank positions. The simultaneous presence of Armor in Bosnia and Korea symbolized the branch's versatility and continuing importance. It also fed efforts to increase the combat effectiveness of Armor.

Toward a Digitized Force

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 interest 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 ability of the Army 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 reengineering 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 upon 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. In 1994 Desert Hammer VI tested a digitized battalion task force at the National Training Center (NTC). This unit was thrust into the experiment with a variety of prototype equipment and limited training time. Its performance suffered accordingly, but the results proved sufficient to encourage further testing of digital materiel and concepts. In 1995 the Army designated a brigade of the 4th Infantry Division at Fort Hood, Texas, as a permanent Experimental Force (EXFOR) to provide continuity to subsequent digital developments and warfighting experiments. The same year witnessed Focused Dispatch, which demonstrated the ability to link live and virtual forces at different locations in a single maneuver environment. By 1997, several years of development had resulted in more robust and effective digital equipment and their incorporation into more refined and viable doctrinal concepts. These were tested during Advanced Warfighting Experiment Task Force XXI. This event featured an NTC rotation by the EXFOR, using updated equipment and personnel trained in digital concepts. The results clearly demonstrated the increased effectiveness of a digital combat force, particularly in situational awareness, tactical maneuver, and the ability of commanders and staffs to track battlefield events. The same year the Division Advanced Warfighting Experiment focused upon the operation of a digital division and related command and control issues. 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 (SEP) 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 to include 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 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 that 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 in Alabama, each tank was disassembled and its turret shipped to the Lima Army Tank Plant in Ohio. 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.

The M3 Cavalry Fighting Vehicle also benefited from technology enhancement. It received the TOW 2 missile, improved ballistic protection, and better communications. Upgrades focused upon making the platform compatible with the M1A2 SEP, particularly through the inclusion of a digital communications suite. Lethality improved through the inclusion of the Improved Bradley Acquisition System (IBAS) and commander's independent thermal viewer. These systems improved target identification and acquisition.

Light armored platforms did not fare as well. The M551 Sheridan finally left active service, although it continued to equip the OPFOR at the National Training Center. Its replacement, the M8 Armored Gun System, 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 HMMWV-equipped 2d Armored Cavalry. An up-armored version of the HMMWV began to enter service in 1996. It provided greater protection for its crew and passengers, but it could not replace the capabilities associated with the 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 those formations involved. The Army therefore sought to create a permanent Strike Force to which units could be assigned for a given mission. Built upon the 2d Armored Cavalry, 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.

Armor and Army Transformation

In 1999, Army Chief of Staff General Eric K. Shinseki unveiled a new vision for adapting the Army to the expected operational environment of the 21st century. He was particularly concerned about the Army's ability to deploy forces into a real or potential crisis in a timely fashion. Earlier that year, NATO operations in Kosovo finally drove Serbian troops out of the province. The stage seemed set for a NATO resolution of the province's fate. The sudden intervention of Russian forces, however, permitted Russia to participate in the settlement process. The extent of the intervention included only a small motorized force that had driven into Kosovo from Bosnia, where international peacekeeping efforts continued. This action

demonstrated the disproportionate effect that a rapidly deployable combat force could have upon international affairs.

Shinseki sought a similar capability for the U.S. Army. He believed that 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 Brigade Combat Team (SBCT), named for the common platform used by the unit. 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 upon 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 the Stryker vehicles carried infantry, but Armor combat developers also worked upon the mobile gun system and a reconnaissance vehicle. The former carried a 105-mm 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 sported a suite of sensors and surveillance equipment to assist information gathering.

Simultaneous with SBCT development the Army began work upon 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 brigade combat team. 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. 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 the 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.

Combating Terrorism

On September 11, 2001, Al Qaeda terrorists attacked the World Trade Center and the Pentagon, killing nearly 3,000 Americans. This event resulted in widespread efforts to improve security and forestall other terrorist actions. It also led to the declaration of a global war on terror and related actions intended to thwart terrorism world-wide. Faced with the brutality of terrorist action, the United States adopted a policy of preemptive strikes against known enemies considered likely to use violence to oppose American interests.

Within a month Afghanistan became the focal point of the new American policy. There military operations began to overthrow the ruling Taliban regime and destroy the Al Qaeda cells that it harbored. Initially, Special Forces operatives working with local anti-Taliban forces and supported by airpower played a key role. However, these efforts alone proved insufficient to accomplish American objectives. The commitment of more conventional forces followed, and by the end of 2002 the Taliban ceased to be a major influence in Afghanistan. Roadside bombings, ambushes, kidnappings, and intermittent mortar barrages continued throughout the country, but they failed to prevent the emergence of a new government or derail efforts to transition toward a democratic state. Armor soldiers played little direct role in combat operations, but they did serve as advisers to the Afghan government and army, particularly in the creation of an Afghan mounted force.

While operations in Afghanistan continued, tension between the United States and Iraq increased. American intelligence considered the regime of Saddam Hussein a likely sponsor of terrorism. Already suspected of violating United Nations' resolutions and secretly building a stockpile of weapons of mass destruction, its apparent link with terrorism made Iraq an especially dangerous threat. While American diplomats waged a campaign to convince NATO allies and the United Nations to take strong measures against Iraq, the U.S. began preparations for possible military action.

On March 19, 2003, following the failure of diplomatic initiatives, American and coalition forces attacked Iraq. Operation Iraqi Freedom aimed to overthrow Saddam Hussein's government, destroy his military forces, find and secure weapons of mass destruction, and

facilitate Iraq's transition to a democratic state. Military action sought to employ overwhelming military power to shock and awe opposition. Planning envisioned a key role for American heavy forces, with the 3d Infantry Division leading a drive toward Baghdad from Kuwait and the 4th Infantry Division invading Iraq from Turkey. The Turkish government, however, refused to allow the 4th Infantry Division to move through its country, necessitating its redeployment as a follow-on force in the drive to Baghdad. The Marine Corps and British also employed armored units to support their related operations.

The 3d Infantry Division's drive to Baghdad captured international attention. Led by the 3d Squadron, 7th Cavalry Regiment, the formation advanced toward the capital. It confronted and overcame a variety of threats, including Iraqi army forces, the paramilitary Saddam Fedayeen, pickup trucks loaded with armed men, and civilian vehicles that tried to ram American combat platforms. Ambushes with small arms, rocket propelled grenades, and mortars became frequent occurrences. These attacks often occurred at close range with little warning.

The continuous attacks upon the 3d Infantry Division did not stop its advance. The division generally bypassed major urban areas, leaving them to be cleared by the 101st Air Assault and 82d Airborne Divisions. It reached and penetrated the Karbala Gap, a natural chokepoint that channeled movement onto only two principal roads. Aggressive action seized a bridge across the Euphrates River that permitted direct access to Baghdad. Although initial plans called for the capital's encirclement, the speed with which the city was reached led to an armored reconnaissance in force into the city to test opposition. Dubbed "thunder runs," two such operations were conducted by the 2d Brigade Combat Team, 3d Infantry Division. Despite sometimes intense fighting, these actions demonstrated the ability of American armor to move at will inside the Iraqi capital.

By April 10, just three days after the second thunder run, organized resistance in Baghdad collapsed together with Saddam Hussein's government. U.S. forces began to move into northern Iraq. However, although the 4th Infantry Division had been barred from entering Iraq from Turkey, an airborne brigade had been inserted into the region to work with Special Forces and the Kurds. This force seized the cities of Mosul and Kirkuk. South of Baghdad, the 2d Armored Cavalry Regiment assumed responsibility for securing lines of communication under the operational control of the 82d Airborne Division. Additional forces moved west of the capital toward the Syrian border, while the 3d Armored Cavalry Regiment and the 4th Infantry Division prepared to enter Iraq.

With the war apparently ending, operations shifted to stability and support. On May 1, major combat operations were declared ended in Iraq. The nation lay in disarray, with its political machinery and economy destroyed. Saddam Hussein no longer held sway, but the threat of sectarian violence soon began to emerge among Sunni and Shiite Muslims. Providing security and restoring—in some cases rebuilding—basic services became priority missions for the coalition forces. The Coalition Provisional Authority assumed leadership over the nation, pending the creation of a new Iraqi government.

Violence continued. Periodic shootings, criminal activity, random attacks on coalition forces, and roadside ambushes occurred amid the chaos of postwar Iraq. At first these actions lacked organization and purpose. Yet over time the frequency of these incidents rose. A resistance movement had arisen, aimed at removing Coalition forces from Iraq. Foreign terrorists joined with ex-Saddam Hussein supporters to incite further violence and undermine American-led nation building efforts. Improvised explosive devices became the trademark of this resistance, but shootings of government officials, attacks on police stations, and ambushes of convoys from Kuwait became regular occurrences.

Armor personnel found themselves helping to rebuild communities and infrastructure. Civilian interaction occurred simultaneous with counter terror operations. In the latter case, missions often included convoy security, cordon and search, raids against suspected terrorist strong points, and the apprehension of known terror leaders. Senior members of Saddam Hussein's regime were also tracked down and arrested. The most significant capture was made in December 2003 by members of the 4th Infantry Division. In Tikrit, they found and secured Saddam Hussein.

Rebuilding Iraq's police and military forces required time. Equipment proved in short supply. American and allied soldiers provided training, but they could not entirely prevent Iraqis serving in these nascent institutions from being the targets of terror. Civilians waiting outside police and government buildings seeking employment too often became victims of suicide bombers. Checkpoints and roadside searches interfered with but did not stop terrorist action.

In 2004, however, several locations considered terrorist strong points 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 market places. 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.

In these battles the Abrams and Cavalry Fighting Vehicle 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 upon 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 upon terrorist safe havens at unexpected times. To provide improved protection against rocket propelled grenades, 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, permitting its passengers to survive.

The HMMWV, however, proved too vulnerable to terrorist attacks, particularly IEDs. Increased fielding of the up-armored version helped to improve survivability of the crew and passengers, 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 (MRAP) 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 HMMWV. In the interim, survivability was improved by integrating the HMMWV and M3 Cavalry Fighting Vehicle in the same platoon.

Platform modifications did not alter the nature of operations undertaken by Armor soldiers in Iraq. They continued to execute both combat missions against known terrorist targets simultaneous with helping the Iraqi populace rebuild their nation and transition to a government no longer dominated by a single strongman. Elections in 2005 established a transitional Iraqi government, but violence continued. The following year sectarian violence between Shiite and Sunni threatened to plunge Iraq into chaos. American and coalition forces struggled to suppress this violence while sustaining reconstruction projects.

A surge of American forces into Iraq began late in 2006 and continued into 2007. Their focus lay in reasserting coalition control over the capital. This objective was accomplished in part through combat operations and the establishment of combat outposts throughout the city, which inserted coalition soldiers into neighborhoods on a permanent basis. In addition, efforts to work with Sunni leaders disenchanted with the brutality of Al Qaeda terrorists resulted in growing Sunni support for a more stable Iraq. American soldiers benefited from the support of Sunnis in their counterinsurgency efforts, while the Iraqi government began to assert its authority. Conditions in Iraq improved dramatically. The year 2010 marked the withdrawal of most US combat troops. The remaining forces focused upon training Iraqi soldiers and security elements.

Armor played a key role in these positive developments. Armor and cavalry organizations became more adept at apprehending insurgents and preventing IED attacks. Often Armor soldiers conducted dismounted operations, interacting with the local populace and helping with a host of reconstruction projects in their areas of operation. They also actively supported and trained Iraqi soldiers. These activities contrasted sharply with the execution of combat operations, and they highlighted the versatility of the mounted soldier and his adaptability. In Iraq, Armor demonstrated its relevance to counterinsurgency and reconstruction operations, which complemented its more traditional combined arms maneuver capabilities.

As combat operations in Iraq became less frequent, the Army's focus shifted to Afghanistan. There the Taliban and their Al Qaeda allies had begun to reestablish their presence through suicide bombings, conventional attacks upon American and NATO positions, and a continuous campaign of terror aimed at undermining the credibility of the Afghan government and discouraging loyalty to it. The complex ethnic landscape of Afghanistan coupled with a poor economy and a harsh landscape complicated efforts to eradicate terrorism and build a new, viable state. The US, however, committed itself to this goal, increasing its military forces by 30,000 additional soldiers. It also worked directly with Pakistan to stop cross-border operations by terrorists while pursuing the deployment of more civilians to assist in rebuilding Afghanistan and assist in the creation of a more effective government.

Armor soldiers continued to train elements of the Afghan National Army and served as advisers to their Afghan counterparts. They also began to see service in Afghanistan in American combat units. Stateside training of Armor units therefore began to reflect a greater orientation toward Afghanistan rather than Iraq, although basic combined arms skills remained central to mounted force training. Clearly the basic principles associated with armor and cavalry organizations would be applicable to Afghanistan together with the lessons learned from Iraq.

The Army's continued focus upon counterinsurgency operations and the immediate needs of soldiers serving overseas led to the cancellation of the FCS. 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/Bradley Fighting Vehicle 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 counterinsurgency 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 brigade combat teams intended either for independent action or as part of a larger formation. Heavy brigade combat teams included armor and mechanized infantry integrated into combined arms battalions and supported by a reconnaissance squadron, while infantry and Stryker brigade combat teams provided capabilities suited for light force environments. These new brigade elements shaped the nature of training programs and doctrinal developments.

A significant institutional change also began to occur. In 2005, the Base Realignment and Closure Commission announced the relocation of the Armor Center/School to Fort Benning by 2011, where it would become part of the Maneuver Center of Excellence. This action placed Infantry and Armor development under a single headquarters intended to forge a tighter bond between these traditional members of the combined arms team. In 2010 the Armor School

headquarters began operations at its new home at Fort Benning, while the movement of training and all Armor-related activities from Fort Knox continued into 2011.