



A readable summary of the history and use of mounted combat units leads off our 125th-anniversary commemorative articles

Trends in Mounted Warfare

by LTC Kris P. Thompson

Reprinted from ARMOR's May-June 1998, July-August 1998 and September-October 1998 editions; the original was a three-part series.

Part I: mounted combat units in early land campaigns

Think back to 1977. Think about the then-existing concepts of conducting land warfare. Think about the weapons we had for mounted combat. Think about the combat-unit organizations we had at that time. Now reflect on the concepts, weapons and organizations of today. It is simply amazing how much the nature of land warfare has changed in the last 20 years.

We are at the threshold of the “new millennium.” We are also in the midst of a transition in mounted warfare. Literally thousands of years passed with only incidental changes in mounted warfare – how many ways are there to use a horse? But in the last century there has been a fundamental change in mounted warfare with the advent of the tank, infantry fighting vehicle and helicopter. Because these weapons are still being improved, changed and developed, we are still in this transitional period. How will it play out? In 1815, at the close of the Napoleonic Wars, no one wondered whether the horse was going to change in the next 20 years. Yet we have all come to expect dynamic changes in mounted warfare in every decade.

This article will describe some key trends in the use of mounted units during this transitional period. Since the article will focus on land armies, I will concentrate on the operational setting. This is where campaigns are won and lost.

Part I will illustrate examples of how mounted forces have been used to win campaigns. I do not pretend to make this a detailed presentation of all mobile combat in the last century – obviously, such a project would be a multi-volume work. I have selected events and combat leaders as subjects of discussion that seem particularly appropriate as examples of key aspects of this transition. Analyzing these examples, I will identify trends and develop several theses or principles that are key indicators of successful uses of mounted combat units.

First mounted forces

On March 3, 1855, the federal government of the United States authorized the fielding of two “cavalry” regiments, thus establishing the first Active Component mounted units in our history.¹ Spread around the nation in small detachments, these units were little more than a mounted territorial police for the frontier and western regions of the country. The officers in these detachments, kept busy with frequent deployments and widely divergent “peace-keeping” operations, could not have had training or even a thought process that considered anything above small-unit combat. Even the manual on cavalry tactics then in use devoted a scant three pages to maneuver of a cavalry division.

With appreciation but detachment, these officers probably listened to stories from Europe about the huge legions of cavalry employed in the Napoleonic Wars, not being able to conceive of how such formations would be relevant or practical in the future. (Perhaps in the same way we today look back on World War II.)

At the outbreak of the Civil War, the Union Army's mounted arm remained muted because of a belief that rifled cannon would trump cavalry off any battlefield,² and that American terrain was uniquely unsuited for cavalry. The first two mobilization efforts in the North called for only one cavalry regiment. How much this was to change! By the end of the war, only four years later, the Union raised 272 regiments of cavalry, and the Confederacy raised more than 137 regiments.³

The overall use of cavalry by the belligerents in the early years of the war is well known. The South used cavalry in mass, and with more sophistication and aggressiveness. The North fragmented its cavalry, employing it for guarding logistics sites, picketing encampments and providing reconnaissance patrols.

Cavalry reorganization

After two years of disaster, disappointment and finger-pointing concerning the deplorable state of the Union cavalry, senior leaders in the Army of the Potomac reluctantly realized the current system was not working. On Feb. 5, 1863, the new commander of the Army of the Potomac – MG Joseph “Fighting Joe” Hooker – put all cavalry in his army into a cavalry corps.⁴ The new commander of this unit, BG George Stoneman, organized it into three cavalry divisions.

For the next 14 months, the cavalry corps launched a series of attacks and raids, which were of a magnitude unheard of on the Union side up to that time. This period was a bloodletting of the North's mounted arm, attempting to play catch-up after nearly three years of misuse. With each hard lesson learned, Union leaders became bolder and bolder in using larger cavalry formations. Finally, the much-awaited clash between opposing mounted main bodies (on the flanks of their respective armies) took place at Brandy Station in June 1863. The battle was a hard-fought, face-to-face brawl. The Union cavalry had arrived. While the Southern cavalry leader, J.E.B. Stuart, claimed victory based on the Northern cavalry's retreat from the battlefield, all present realized the Northerners had achieved parity. Hooker's reorganization was a landmark event, no doubt, but Stoneman and his successor – Brigadier Alfred Pleasonton – were not the personalities to complete the evolutionary process of the Union cavalry.

Coming of age

LTG U.S. Grant took charge of the entire land force of the Union in Spring 1864. Grant put MG Philip Sheridan in charge of the cavalry corps. At the time he took over, he was 5 feet, 5 inches tall and weighed 115 pounds.⁵ Despite his size, however, Sheridan had tons of fight in him and has been described as “a short, bandy-legged, quick-tempered, foul-mouthed Irish bantam, with a massive torso, dangling arms and an infinite capacity for making men want to fight.”⁶

Sheridan had an immediate run-in with his new commander, LTG George Meade, who was still nominally in charge of the Army of the Potomac. Sheridan was insistent on two fundamental changes in the employment of the cavalry. First,

he wanted to emulate the Southern enemy who “had organized his mounted force into compact masses ... husbanding the strength of his horses by keeping them to the rear. ...”⁷ This philosophy was in stark contrast to the Union philosophy of using cavalry to continually “cordon” the infantry corps with cavalry pickets. This constant deployment caused the horseflesh to go thin and wear down.

Secondly, Sheridan refused to be a martinet stationed at Meade's headquarters, as had his predecessors. They had been “an adjunct at army headquarters – a sort of chief of cavalry...”⁸ Because of this, and the outpost duty, he felt the cavalry corps was a corps “in name only.”

Sheridan wanted to free his cavalry corps from being tied to the maneuver and pace of the infantry corps. Meade protested and argued the cavalry was the only available force for security of the infantry, trains and artillery. Sheridan explained to Meade his philosophy: “I told him that if he would let me use the cavalry as I contemplated, he need have little solicitude in these respects, for, with a mass of [10,000] men, it was my belief that I could make it so lively for the enemy's cavalry that, so far as attacks from it were concerned, the flanks and rear of the Army of the Potomac would require little or no defense, and claimed, further, that moving columns of infantry should take care of their own fronts. I also told him that it was my object to defeat the enemy's cavalry in a general combat ... that would enable us after a while to march where we pleased, for the purpose of breaking Lee's communications and destroying the resources from which his army was supplied.”⁹

Initially, Sheridan did not get his way. In early May 1864, Grant tried to outflank Lee's position on the Rapidan River by moving around the position on the weakly held east side. The Rapidan is an east-west waterway about halfway between the Potomac River and Richmond. Sheridan's cavalry led the way but was still tied to the main body of infantry. While the infantry corps slogged it out in the wilderness, the cavalry sparred with the Confederate cavalry and outposts. The tight linkage between the cavalry corps and the infantry caused a number of problems in movement: intermingling during night road marches, lost opportunities for snatching key terrain and general confusion.

Sheridan was irritated, and his quick Irish temper soon got the better of him. After Meade chastised him for impeding the progress of an infantry corps, Sheridan lashed out: “I told him that I could whip Stuart if he (Meade) would only let me. ...”¹⁰

At the end of his rope, Sheridan finally told Meade to command the cavalry himself. Meade then went to Grant's headquarters and complained about his insubordinate cavalryman. The story goes that Grant (a friend of Sheridan's) then asked if Sheridan really said he could whip Stuart. After being assured that he did say this, Grant replied, “Then let him go out and do it.”

Sheridan then did exactly what he said he would do. Grant's official order was simple: “proceed against the enemy cavalry. ...”¹¹ Sheridan then explained his plan: “Moving in one column around the right flank of Lee's army to get in its rear

At the outbreak of the Civil War, the first two mobilization efforts in the North called for only one cavalry regiment. By the end of the war, only four years later, the Union raised 272 regiments of cavalry, and the Confederacy raised more than 137 regiments.

... it was my intention to fight Stuart wherever he presented himself. ... Our move would be a challenge to Stuart for a cavalry duel behind Lee's lines..."¹²

There is no doubt the defeat of the enemy mounted arm was the "principal object" of the raid.¹³ The formation was three cavalry divisions in a column of "fours," 13 miles long.

Stuart rose to the bait. In the resulting battle of Yellow Tavern, Stuart was killed by a Michigan cavalry trooper under George Armstrong Custer, and the Confederate cavalry was "badly broken up." Thereafter, Sheridan's cavalry caused disruption and great alarm in the heart of Confederate Virginia. The "most intense excitement" stirred in Richmond with Sheridan running loose. The cavalry corps tore up miles upon miles of Virginia railroad, burned several railroad bridges, captured and destroyed 2 million rations and other commissary stores, and overran small rear garrisons.

This success led to further employment of the cavalry corps to rip apart Lee's communications network. It was now much easier to convince Meade's and Grant's staff of the advantages of having the cavalry "cut loose"¹⁴ from the main body. The raid on Trevillian Station again had the double goal of drawing out the enemy cavalry and tearing up railroad lines. In a replay of Yellow Tavern, Sheridan's cavalry defeated cavalry under Hampton and disabled more stretches of railway. (Wilson alone accounted for 60 miles of destroyed railroads and rolling stock.) Sheridan, of course, was then sent to a larger command in the Shenandoah Valley and the rest of the war, as they say, is history.

What lessons did the Union cavalrymen learn at the birth of the mounted arm in the United States? The major points on the employment of mounted units from Sheridan's standpoint were:

- The cavalry of an army must be employed as a distinct, separate, completely mounted entity.
- It must be "cut loose" from other branches that would slow its maneuver.
- Its first object should be to gain superiority over the enemy's mounted arm, and the secondary object is to disrupt his communications and destroy resources upon which the enemy army depends.
- It should be moved around the enemy army's flank and meet the enemy cavalry in the enemy's rear area.

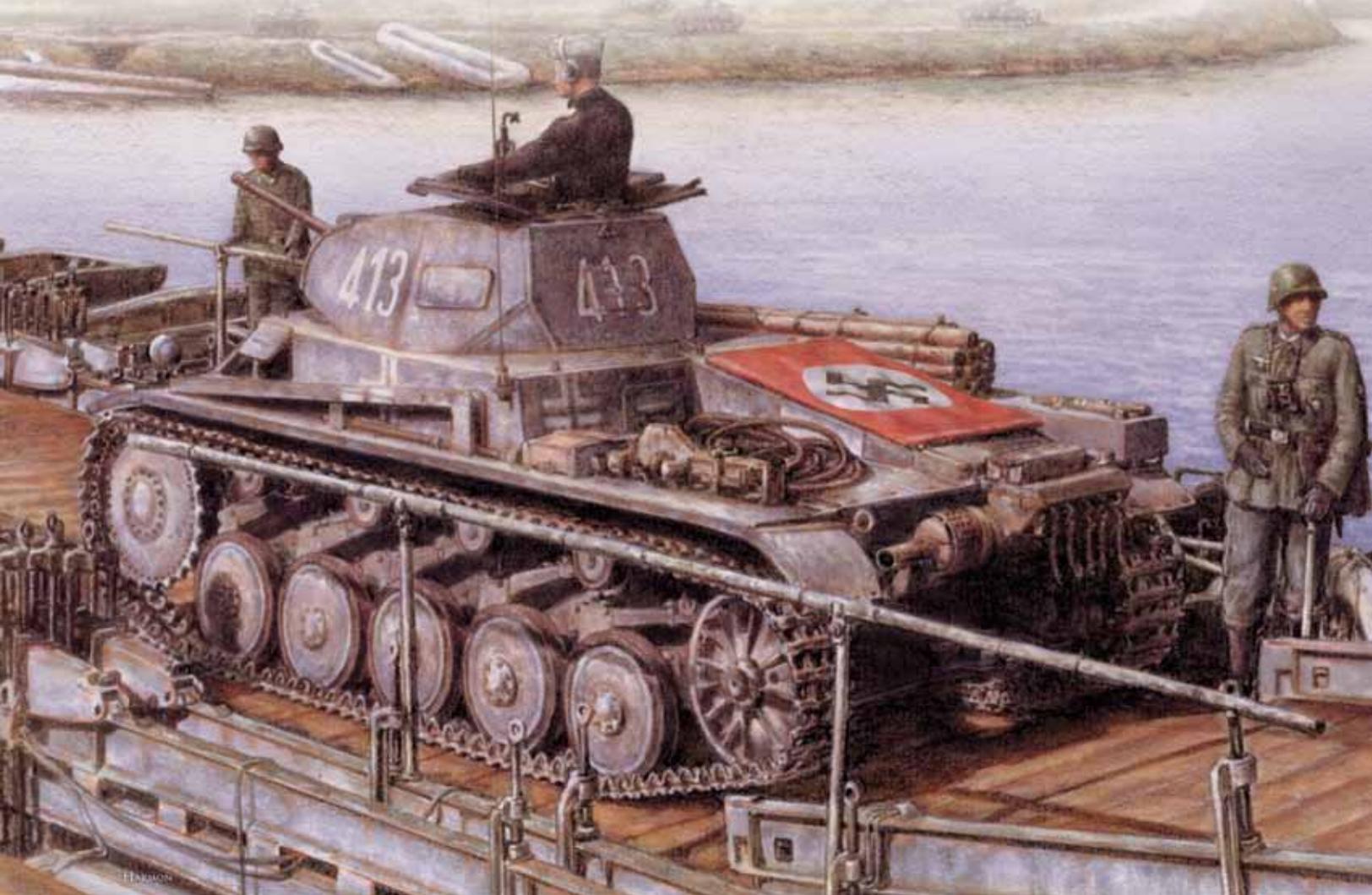
These were important lessons, as they surely made their way into the minds of the future American mounted leaders of World War II. This takes us to the heart of the transitional period of mounted warfare.

Part II: blitzkrieg and the operational level of war

The introduction of the internal combustion engine into the military at the beginning of [the 20th Century] changed warfare in a fundamental way. Mobility and mounted warfare took on a new meaning. The ability to use the engine to power all sorts of vehicles caused military theorists to compete in developing the best way to employ this new way of waging war. In the previous 2,000 years, only the advent of gunpowder had such a revolutionary effect.

Blitzkrieg, the theory

After World War I, which proved to be a bloody experiment for the proponents of tanks, there was rigorous debate in every country that was a major power about the proper



employment of motorized and mechanized forces. One man eventually dominated the debate: Heinz Guderian.

He had a friendly face with piercing eyes and a close-cropped, graying mustache. He had a lopsided smile with a dimple in one cheek when he smiled – which was not often. It was said of him that he was a difficult officer to work with, a poor listener, critical and direct to those (even his superiors) who disagreed with him, and that he had little feeling or tact. Yet, at the same time, he was imaginative, analytical, energetic and tenacious.¹⁵

Guderian had originally been an infantry officer. He was appointed to the Motorized Transport Department of the German army as a captain in January 1922. For the next 15 years, Guderian studied, analyzed, experimented, reasoned and finally developed a concept for using mounted forces to win campaigns.

What was blitzkrieg, as Guderian envisaged? Everyone has his or her own version. Len Deighton in *Blitzkrieg* focused on the materiel side, listing infiltration tactics, tanks and the radio as the three vital components.¹⁶ Bryan Perret lists tanks, the use of air power, the indirect approach and the effort aimed at a strategic objective, with the “keystone” of blitzkrieg being a breakthrough with pursuit of the routed army until its will to fight had been broken.¹⁷ Of course, both Deighton and Perret, as well as many other authors who have written on the subject, are correct in some aspects. But because of the fascination with the materiel side, analysis often gets bogged down on tactics. Many writers focus on how the panzer division conducted business. This approach, I think, misses a major component of the blitzkrieg philosophy – which is at the operational level of war.

Guderian’s concept

Guderian’s refined ideas were published in 1937 in *Achtung, Panzer!* This is a remarkable book, and is “must” reading for every armor officer. His true genius was demonstrated by

his conceptualizing how tank and motorized forces could bring about tactical victory “and then exploit it into the operational dimension.”¹⁸

He placed great emphasis on this basic theme. Winning rapidly in the operational dimension was necessary because of the economic stress of warfare. Guderian viewed mounted warfare as a “means to bring an armed conflict to a rapid and tolerable end.”¹⁹

Guderian’s basic principles for employment of tank forces were:

- Surprise – attained through speedy and well-concealed movements or new technology.
- Deployment en masse – the concentration of tank forces where we seek to gain the decision.
- Suitable terrain – enough to allow the tank forces to move through it in sufficient breadth and depth.

Guderian also pounded away at several other main points. He stressed combined arms in mounted units. He believed all combat arms necessary to support the tank formations had to be mechanized or motorized and able to move at the same speed. This brought about the forming of panzer and panzer-grenadier divisions that were, at least in theory, completely mounted.

His writing strongly stressed the use of joint air-ground operations. He repeatedly emphasized the use of close air support in halting or delaying the movement of enemy reserves. He also repeated a Sheridan theme: the maneuver of mobile forces, now mounted in tanks rather than on horses, should not be tied to the infantry and artillery:

“Tanks will lose the capacity to concentrate on the decisive spot if they are incorporated as organic elements of all the infantry divisions. ... The possibility of speed is killed stone dead, and we forfeit all real hope of attaining surprise and decisive success in combat. ... We will ... lose thereby the means of exploiting at speed any



successes on the part of the first echelon. We will grant the enemy time to bring up reserves, re-establish themselves in rearward defenses, beat off our enveloping movements and concentrate for counterattacks.”²⁰

Of course, by concentrating tanks en masse for breakthrough and exploitation, moving them deep into the enemy rear at speed, the enemy does not have time to commit reserves, construct new defensive positions in depth, or launch counterattacks. Guderian predicted this would result in operational-level success. It is interesting that German panzer leaders such as Guderian and Von Thoma routinely favored lighter, faster tanks with longer ranges (able to go deeper and faster in penetrations to the operational level) for the main armor force.²¹

Guderian was somewhat vague on what would be the principal target of the mounted forces. Given the raging debate going on at the time, he probably did not want to tie himself down. At one point, Guderian suggested the tanks were meant to “execute deep breakthroughs aimed at reaching the enemy command centers and reserves and destroying the hostile artillery.”²² At another place, Guderian added in the necessity of victory over the enemy anti-tank defenses and tank reserves as the gateway to a pursuit. At still another point, he lists the tank forces’ “principal foes” as hostile tanks, antitank guns and artillery, in that order.²³ But then Guderian returned to his theme of having an impact at the operational level:

“One could imagine how at the beginning of a war the armored forces could strike at vital enemy airfields or other relevant objectives close to the border; again, after successes on the ground at a later stage of the war, the tactical aircraft, air-landing troops and tank forces could be assigned common objectives deep in the enemy rear, with the aim of breaking the enemy’s power of resistance with the least loss of life. This is a concept of warfare which has so far received little attention.”²⁴

Thus, “blitzkrieg,” in Guderian’s mind, was a mounted force centered on the tank (supported by mounted infantry, ground-attack bombers and mobile artillery), used to break through enemy defenses with mass and speed, and then exploit to break the enemy’s will, resulting in operational-level victory. Indeed, Guderian’s subtitle for the book was “The Development of Armored Forces, Their Tactics and Operational Potential.”

1940 campaign in France

We all know the story of how the German army ran roughshod over France in 1940. This campaign was certainly conducted very close to Guderian’s blueprint for success. This campaign gives us a stark comparison of two ways to employ mounted forces.

The Germans adhered to Guderian’s principle of mass. The Germans attacked with 2,400 tanks and around 2,600 aircraft. The French and allies defended with some 3,400 tanks and 1,700 aircraft. The Germans concentrated their armored units into compact, all-mounted forces with five of the 10 available panzer divisions concentrated in a panzer group (two corps) at the main point of attack. Three motorized

“Blitzkrieg,” in Heinz Guderian’s mind, was a mounted force centered on the tank (supported by mounted infantry, ground-attack bombers and mobile artillery), used to break through enemy defenses with mass and speed, and then exploit to break the enemy’s will, resulting in operational-level victory.

infantry divisions followed these divisions. The French and British frittered away their tanks by scattering them among the infantry corps, for the most part. Of the 3,400 tanks available, about half were penny-packaged in battalions to the infantry; one quarter were formed in cavalry divisions for security missions; and the remaining quarter were formed into small tank divisions.²⁵ Even this small tank reserve was not under a corps headquarters.

The Germans also achieved surprise. The French, much like the Americans four years later, negligently ignored many intelligence indicators of an assembly of German forces in the area of the main attack.²⁶ They were banking on the assurances of the French intelligence service that they would give the army 24 hours’ warning of any invasion.²⁷ One aspect of the surprise was the terrain considered by the Germans to be suitable for a large armored thrust. The attack came through a “no-go” area: the Ardennes. The French had declared this region “impenetrable.”²⁸ In the German planning process, however, Guderian had personally certified the area as feasible for the maneuver of the armored forces. Another aspect of the surprise was the use of airborne and air-landing units in surprise pre-invasion assaults on key enemy positions.

Further, the Germans directed their main attack to avoid the most strongly held portion of the French position: the Maginot Line to the south of the intended decisive point. It also avoided the area in Belgium to the north where the Germans expected the Allies to advance and occupy defensive positions. The main effort of the attack came in the middle, against Sedan, which the Germans knew was the boundary between two second-class divisions. This was an operational-level weak point. And although the invasion planners were not counting on political turmoil in the Allied governments to aid them, the launching of the attack happened the day after both the English prime minister, Neville Chamberlain, and French prime minister, Paul Reynaud, had offered their resignations.²⁹

Mechanisms of defeat

The employment of the German panzers clearly resulted in the rapid, operational-level victory Guderian promised. What were the mechanisms of defeat in the way the panzers carried out the exploitation and pursuit? There were both physical and psychological effects that reduced, and eventually broke, the enemy’s will and ability to carry on the fight.

Physical effects. There were two significant physical effects. The first was isolation. The penetration by the German main effort was designed to go all the way to the coast and thereby cut off the Allied forces in Belgium. These isolated units would be destroyed in an attack from the rear,³⁰ while the French reserves to the south were prevented from massing by spoiling attacks from forces on that flank of the penetration. Then, after defeating these isolated units, France would be on its own. This plan was strikingly similar to Napoleon’s “central position” concept. It was key that the penetration occur quickly, preventing the two Allied wings from re-establishing ground lines of communication with each other. It also cut lines of communication within the French army on the southern flank of the penetration.

After the penetration by the massed mounted units of the German army, there was no delay or slowing. Just the opposite occurred – the pace of the maneuver quickened. The average rate of advance was about 30 miles per day, with some units achieving a staggering 60-mile advance.

The second physical effect was exposure and destruction/displacement of command, communication, logistics and other “soft” assets. By penetrating faster than the defending army could prepare a cohesive defense-in-depth, all the “soft” targets and installations necessary for an army to function were continually subject to direct attack by tanks, infantry and dive-bombers. These soft targets include logistics sites, command posts, transportation assets and airfields.³¹ The exposure to direct attack caused these soft targets to be destroyed, or to continually be displaced, which greatly reduced their effectiveness. It is very clear that it was the intent of the German plan to destroy the isolated Allied units in the north by attacking their vulnerable rear areas and destroying or cutting them off from their ports.³² Thus, the “target” of the penetrating mounted units was the “soft” assets of the Allied units in Belgium.

Rommel reported that French soldiers from artillery and supply units “tumbled headlong into the woods at the approach of our tanks. ...” Such units cannot provide fire support or supply hard-pressed combat units. The displacement led to destruction as the panzer troops fired on the move, destroying military vehicles, and sending soldiers and civilians alike into “wild flight.”³³ Artillery units disappeared without ever firing a shot after unexpected encounters with Rommel’s tank columns.

When the Allied air assets were forced to displace, their usefulness eroded quickly as secondary airfields were not as good as the original airfields, and the transportation and supply organizations were not quite up to the task.

Psychological effects. Field Manual 100-5 defines “shock” to mean firepower, armor and speed.³⁴ Yet shock emanates

from the psychological makeup of soldiers, not the physical. It was the psychological effect of the German attack that caused the French will to fight to “spring a leak,” then gush, then flow away as a raging torrent. What sprung the leak was the fear in the hearts of those soldiers at the “soft” targets – the artillery gunners, the truck drivers, the headquarters personnel – of having to undergo an attack from tanks with no real means of defense.

The decisive point in the campaign occurred shortly after the assault crossing by the infantry at Sedan. A colonel from the French corps artillery in the area issued a report that he was displacing his headquarters and some heavy batteries to the rear, and that “German tanks were arriving” as he was moving out.³⁵ This officer’s rumor spread like wildfire. An officer from a French infantry unit in-depth then witnessed:

“A wave of terrified fugitives, gunners and infantry, in transport, on foot, many without arms but dragging their kitbags, swept down the Bulson Road. ‘The tanks are at Bulson!’ they cried. Some were firing their rifles like madmen. ... Gunners, especially from the corps heavy artillery, and infantry soldiers from the 55th Division were mixed together, terror-stricken and in the grip of mass hysteria. All these men claimed actually to have seen tanks at Bulson and Chaumont. ... Panic brooked no delay; command posts emptied like magic.”³⁶

In fact, no German tanks were actually in that area, although they were preparing to cross the Meuse.³⁷ This “leak” quickly impacted the French center of gravity: its artillery. For 150 years it had been the case that if the guns stood fast, the army stood with it. When the guns pulled out, so did the rest of the army. The hysterical mob grew as word spread the guns had pulled out. The rumors became worse. Everyone started spreading reports of panzers in the rear areas. Command posts displaced without warning their subordinate headquarters. Officers began assuming there was a general withdrawal and issued orders to pull out. Communication centers were



The employment of the German panzers clearly resulted in the rapid, operational-level victory Guderian promised. The mechanisms of defeat were both physical and psychological effects that reduced, and eventually broke, the enemy’s will and ability to carry on the fight. (Bundesarchiv photo)

abandoned. Demolitions were triggered prematurely. Jittery infantrymen shot first without confirming targets, resulting in fratricide. All this displacement, of course, took place on the road, which made these units great targets for the dive-bombers and fighters to strafe. Commanders issued conflicting, indecisive orders.

This is breaking the enemy's will to fight.

Blitzkrieg refined

For the rest of World War II, commanders on all sides attempted to emulate the 1940 campaign. There were notable successes such as Operation Cobra, the breakout from Normandy; the initial stages of the campaign in Russia in 1941; and the Afrika Korps' initial campaigns. There were also notable failures such as Operation Goodwood, Operation Market Garden and the Ardennes campaign of 1944. The successes were generally characterized by Guderian's recipe of mass, surprise and suitable terrain, together with attacking a weak point, exposing "soft" targets to attack, speed in the penetration and penetration to operational-level depths. One or more of the following caused the failures: attacking strength or locations where the enemy had positions in depth; failure to have local air superiority; terrain difficulties; or by having a slow rate of penetration (allowing the enemy to maneuver reserves to defeat the attacking units).

American experience

Of course, GEN George S. Patton, the "godfather" of the armor force and the most successful practitioner at the operational level of using American armored forces, was very much influenced by Guderian's concepts. He read *Achtung, Panzer!* immediately after the book was translated,³⁸ along with many other books and treatises on German armored doctrine. After the Carolina Maneuvers of 1941, he railed about being "reduced to the speed ... of the infantry" by having the armored force under the control of an infantry headquarters.³⁹ His train of thought on the use of armored forces, expressed prior to his involvement in World War II, mirrored Guderian's concepts in many ways:

- 1940 – The brigade he commanded was "designed to strike and penetrate weak points in the enemy's defensive line, or else outflank and envelop the enemy's defenses. In either case, the brigade was to destroy enemy command posts, communications centers, supply dumps behind the front and thereby paralyze the enemy's ability to react."⁴⁰
- 1940 – Patton addressed a lawyers' club in Columbus, GA, and noted that once a defensive line is pierced, tanks could pour through the hole to "give the enemy a spanking from behind. You can kill more soldiers by scaring them to death from behind with a lot of noise than you can by attacking them from the front."⁴¹
- 1941 – He wrote an umpire for an upcoming wargame that "the primary function of an armored force is to disrupt [enemy] command, communications and supply."⁴²

Our opponents, the Germans, gave Patton high marks for his skill in mobile warfare. Von Mellenthin praised Patton as a commander "who thoroughly understood the character of armored warfare. ..."⁴³ Rundstedt said Patton and Montgomery were the two finest commanders he dealt with.⁴⁴ But while Americans had a "keen sense of mobile action,"⁴⁵ the American leaders at the operational level, including Patton, did not "mass" their armored divisions for any operation. Even Operation Cobra, which most historians view as a massing of armor, was a relatively small operation in terms of mobile

units taking part in the penetration. The final plan called for three non-motorized infantry divisions to make the initial penetration, followed by two armored divisions and one motorized infantry division completing the penetration and exploitation. This pales in comparison to the concentration of armored forces by the Germans in 1940 and during the Ardennes campaign of 1944.

Operation Cobra was not even designed to result in a successful campaign upon completion – it was merely to set the stage for further exploitation. By way of mitigation, it must be said that this concentration of forces was certainly powerful compared to the opposing forces, especially when enhanced in combat power with air power and sustained artillery bombardment. And, the impact of the three mobile divisions used in the exploitation was very great, and far out of proportion to the number of battalions involved.

Patton and other operational leaders have been criticized for failing to mass armored units. The U.S. Army in France habitually assigned one armored division and two infantry divisions in each corps. There were no armored corps formed, which is clearly distinguished from the German practice. The German battle studies at the end of 1944 attributed this organization to an abundance of caution and hyper-methodical thinking.⁴⁶

This demonstrated a tendency on the part of Americans to think at the tactical level when employing mobile units. Corps commanders parceled out the combat commands of their armored divisions for independent attacks. This, in turn, resulted in dramatic tactical success – such as CCA and CCB, 4th Armored Division, in the encirclement of Nancy – and a failure to turn the tactical successes into operational-level victory because of a lack of mass. The "broad front" strategy must also be labeled as a culprit in encouraging this organization. The Germans felt that American armor usage had deteriorated by World War II's end, as compared to mobile units' breakout during Cobra. Von Mellithin commented on the use of armor in the Lorraine campaign:

"I think that Patton would have done better if the 4th and 6th Armored Divisions had been grouped together in a single corps, reinforced possibly by the French 2nd Armored Division. These were all very experienced formations and were ably commanded. ... I think the Americans made a grave mistake in coupling their armored divisions too closely with the infantry; combined as a tank army under one commander, these three armored divisions might well have achieved a decisive breakthrough."⁴⁷

Apologists for this employment of armor will contend that the high degree of truck transportation available to the normal infantry division prevented it from being a "drag" on the armored divisions. Yet, a number of incidents occurred where the "drag" effect or parceling hampered the effectiveness of the mobile divisions.

Surprisingly, Patton did not regard mass, in the literal sense, as a requirement. To him, a "charge" with tanks, especially against a defense with antitank weapons, was "futile and suicidal."⁴⁸ The widespread belief that the function of the armor division was to attack and destroy the enemy was "erroneous."⁴⁹ Like Guderian and Von Thoma, he viewed the armor force getting into the enemy rear by attacking a weak point, and then disrupting the command and supply systems. What was critical was not so much that the armored units move or attack together, but that they have impact at the decisive place at the proper time. In this sense, he was somewhat in



accord with the Guderian approach march technique whereby the attacking armored units start in dispersed assembly areas, move forward toward the enemy “front line,” then converge on a breakthrough point. Thus, Patton was more like Stonewall Jackson – able to move everyone (no matter whether they were mounted or dismounted) faster – rather than J.E.B. Stuart or Phil Sheridan, who massed their cavalry.

The American experience in World War II resulted in discarding the concept that the tank was an offensive weapon not intended for defensive combat against other tanks.⁵⁰ The inability to find a feasible way to employ tank destroyers led to their phasing out. From that point forward, it has been the U.S. Army mindset that the best and primary antitank weapon is another tank. This resulted in a “heavying” and upgunning of the American tank fleet.

The end of World War II led to a great deal of study and debate about the future of the armored forces. This period proved that mounted combat units, when used correctly, were the dominant force in warfare. They were the campaign winners. In the coming years, their dominance would be tested in a variety of terrain and modes of warfare.

Part III: Korea, Vietnam and Desert Storm

After the refinement of mobile warfare in World War II, all nations in the civilized world breathed a collective sigh of relief and proceeded to dismantle their military forces. National will, eroded by costly world wars in two successive generations, caused a loss of priority, resources and public support in the U.S. armed forces. In the midst of this degenerative period, the Army was asked to fight two undeclared wars.

Korea: constrained by terrain

The failure to properly employ mobile units in both Korea and Vietnam serves as an example that an army can make the same mistake in two consecutive conflicts. Armor was helpful to the infantry in Korea but was not employed in enough numbers to be a campaign winner. The armored units sent to Korea were broken up and employed by platoon or company the vast majority of the time. Even the breakout from Pusan in September 1950 – which could have and should have been a great opportunity for a blitzkrieg or Operation Cobra-type breakout – was characterized by small armored task forces leading (mostly) motorized infantry divisions up mobility corridors. After a delayed breakthrough on the Naktong Line, MG Hobart Gay, commander of 1st Cavalry Division, said “From now on, it’s a tank battle.”⁵¹

Wishful thinking.

The spearhead of the Pusan breakout was Task Force Lynch, consisting of 70th Tank Battalion and 3/7th Cavalry. Hardly the concentration of mobile forces one would hope for to make an operational-level exploitation and pursuit. Three days after TF Lynch began operations, GEN Walton Walker, commander of Eighth Army, formed two other armor task forces hoping for a Cobra-type breakout. It was not to be.

TF Lynch provides examples of the variety of problems faced by mobile combat units during the Korean War. The first problem was that TF Lynch’s mission was to link up with the Inchon invasion force, in furtherance of Eighth Army’s mission statement – which was to pressure the North Koreans to their front, preventing them from moving north to defend Seoul, and to link up with the invasion forces. This was not an inspired concept, as it did not contain a defeat mechanism,

nor did it result in decisively winning a campaign.

MacArthur intended for the Seoul invasion forces to “cut the enemy’s supply line and seal off the entire southern peninsula.”⁵² Only the first part of this purpose was accomplished. The problem here was that most of the few available mobile forces were not assigned to the enveloping force landing at Inchon, but instead they were with the direct-pressure force, Eighth Army, inside the Pusan perimeter.

There is no doubt the Inchon invasion was highly effective in many respects. It cut the North Korean supply routes through Seoul, captured the largest airfield in the country and had great psychological effect on both sides. But the failure to seal off the peninsula allowed large numbers of North Koreans to retreat northward, prolonging the war until the Chinese could intervene.

The main problem, of course, was lack of mass. TF Lynch accomplished the final linkup after a hard firefight just south of Seoul. That was it. No sweeping movements across the enemy rear. No overrunning of enemy command posts and supply bases. No blocking of enemy retreat routes. No destruction of enemy artillery units. It sounded good in the press but, in reality, it did not have much effect at the operational level.

Vietnam: operational chaos

Because of the experience with Pacific Rim terrain in Korea, and the unfortunate results of the French in Indochina, planners for the Vietnam War initially ignored armored forces. Engineers completed an early terrain analysis which was very conservative in labeling “go-no go” terrain. This stands in marked contrast to the Germans having Heinz Guderian, an armor officer, personally certify the Ardennes as trafficable for the 1940 campaign. In 1967, revised terrain studies indicated that armor could move cross-country through most of South Vietnam. Battlefield experiences verified the decisiveness of armor in close combat, and the deployment of armor to Vietnam steadily increased between 1966 and 1970. By 1970, 46 percent of the combat troops were armored battalions.⁵³ This rose to 54 percent in 1971.

A new type of platform for mobile warfare came to fruition in Vietnam: the helicopter. Initially, helicopters were used primarily as transports, but their tactical effectiveness led to innovative, aggressive development of many other ways to employ them. Because of their high value, both armor and aviation units found themselves being broken up and employed piecemeal. Better motor and suspension technology for tracked vehicles, along with the increased mobility of supporting aviation assets, gave mobile combat units even greater speed of movement than in World War II. The 3rd Squadron, 11th Armored Cavalry Regiment, moved 200 miles in two days to be at the line of departure for the attacks into Cambodia in May 1970 during Operation Toang Thang 43. This particular operation illustrates the problems caused by piecemeal commitment and indecisiveness at the operational level.

The difficulty and desperation of the close fighting in Korea and Vietnam sometimes tend to cause [people] to mitigate the magnificent success of mobile forces in Operation Desert Storm. Yet the result of Desert Storm and the resulting low casualty rate is a strong indication that the use of mobile forces in this campaign was of a very high order — by far the best use of mobile forces in the U.S. Army since the invention of the tank.

The operation’s purpose was to attack enemy sanctuaries in Cambodia, which had been previously off-limits. U.S. forces involved in the operation included 1st Cavalry Division (Air Assault), 25th Division and 11th ACR. Brilliant use of aviation and armor in mobile warfare led to success at the tactical level. Surprised enemy units were encircled and annihilated. Huge stocks of individual weapons, crew-served weapons, ammunition and rice were captured. The penetrating forces overran an extensive logistics base with a fully equipped motor park, complete with grease racks and spare parts.⁵⁴ The 11th ACR was assigned two more engineer companies to handle all the added demolition work.

By the end of the operation, almost 10,000 tons of materiel and food had been destroyed and more than 11,000 enemy soldiers killed.

Not all went well, though. One armor battalion had to be withdrawn after only a few days in the fight. This was in large part due to the piecemeal employment of the battalion previously with resulting logistical breakdowns. And, in the midst of this devastation on the enemy base of operations, President Richard Nixon declared he was satisfied with the results and that American forces would be pulled out of Cambodia within seven weeks. This prevented the operation from having decisive effect at the operational level. The value of the operation was to provide time for the South Vietnamese forces to build up and the U.S. forces to continue redeployment out of Vietnam — important, but certainly not a campaign winner.

We all remember the post-Vietnam era as the lowest point for mobile warfare since the early 1930s. Everyone thought the tank was a “has-been.” The 1973 Arab-Israeli war supposedly proved that the anti-tank guided missile was now the dominant tactical weapon. The artillery arm and the Air Force were still claiming they could win a war by themselves with new technology. Light-infantry tactics were the “in” thing. Grenada and Panama were touted as blueprints for all future conflicts.

There was constant pressure to conduct simulations, experiments and studies on how to make the armor force relevant in a low-intensity, light-infantry fight.⁵⁵ The light-cavalry regiment, AGS and light/heavy concepts were the hot, current ideas. We felt we were on the verge of being ignored out of existence.

Desert Storm

When older veterans compare Korea, Vietnam and Desert Storm, the difficulty and desperation of the close fighting in Korea and Vietnam sometimes tend to cause them to mitigate the magnificent success of mobile forces in Operation Desert Storm. Yet the result of Desert Storm and the resulting low casualty rate is a strong indication that the use of mobile forces in this campaign was of a very high order — by

far the best use of mobile forces in the U.S. Army since the invention of the tank.

Because Saddam Hussein and the Iraqi senior leaders exercised very centralized control, the theater commander-in-chief, GEN Norman Schwarzkopf, felt Hussein's national communications facilities were a center of gravity. He also felt the Republican Guard, as the heart and soul of the army, was its center of gravity. Destruction of the Republican Guard would leave Hussein without a means of enforcing his will – and, as a result, national will would quickly deteriorate. Thus, the target of the mobile forces was the Republican Guard. This is somewhat reminiscent of Sheridan's first attack against Stuart's cavalry. But there is an important distinction between the two, as Stuart's cavalry was not a center of gravity, while the Republican Guard certainly was.

Schwarzkopf's method was a four-phased plan:

- Disrupt enemy command and control with air/smart weapons power;
- Gain air superiority;
- Cut enemy supply lines with air/smart weapons;
- Destroy the Republican Guard.⁵⁶

The concept involved massing of mobile forces, surprise, indirect approach and destruction of the enemy center of gravity.

First, despite doubts as to whether surprise was feasible in the Information Age, both the fact of the attack and the location of the attack were totally unexpected by the Iraqis. Schwarzkopf intentionally waited until the air campaign had stopped Iraqi reconnaissance flights to displace VII Corps and XVIII Airborne Corps to the west. This prevented the Iraqis from detecting the movement.⁵⁷ The lack of a road net in the intended area of attack probably also led the Iraqis to discount the chances of an envelopment from the west.

Second, the plan called for an unprecedented massing of mobile forces in the main effort. To put things in perspective, in VII Corps – the main effort – LTG Fred Franks commanded more than 1,200 M1-series tanks and 1,400 Bradley Fighting Vehicles in U.S. formations as well as 1st Armored Division (United Kingdom). This represented more than 3,000 armored fighting vehicles – more than the entire German Wehrmacht fielded on the Western Front in 1940, and more than were in Patton's Third Army. In addition, XVIII Airborne Corps (paired with VII Corps in the envelopment) had

a mechanized division, a light armored division, a light (motorized) division and an air-assault division. Since they were on the outside arc of the turning movement, it made sense for this corps to have predominantly lighter, faster units.

The maneuver concept for Desert Storm, according to Franks, came from GEN Colin Powell, who sketched the scheme of maneuver on hotel stationary for Schwarzkopf.⁵⁸ (This episode somehow did not find its way into Schwarzkopf's book, where Schwarzkopf takes credit for the idea.⁵⁹) The scheme of maneuver called for the mobile forces in VII and XVIII Airborne Corps to envelop the Iraqi forces by moving through the lightly defended inland positions. This allowed the two corps to move around the main Iraqi linear positions along the Kuwait-Saudi border and into the Iraqi rear toward their main target: the Republican Guard. They avoided the strongly held enemy positions between their launch point and their objective. This put them into the enemy rear areas quickly, before the enemy could react.

The speed of the movement into the enemy rear was unparalleled. VII Corps attacked 170 miles in 89 hours – or about 45 miles a day.⁶⁰ One unit, 1st Cavalry Division, moved almost 150 miles in one day during the attack. The 24th Infantry Division (Mechanized) probably moved further than any other division. It moved 60 miles into Iraq on the first day alone. These units moved at this incredible speed through sandstorms, rain and the Republican Guard. And this, while each armored division was consuming 500,000-750,000 gallons of fuel per day.⁶¹ This rate is comparable to the daily consumption of First and Third U.S. Armies in World War II of 850,000 for all 18 of their divisions combined. The corps as a whole consumed 6.2 million gallons of diesel fuel and 2.2 gallons of aviation fuel in 89 hours.⁶²

Projecting into future

In 1936, the new French chief of staff, GEN Maurice Gamelin, smugly asserted, "All our information shows that it is our doctrine [as compared to the German panzer doctrine] which is correct."⁶³ Gamelin's smugness was based on the doctrine of defense, continuous front, containment and fortification that had proved successful in World War I. Yet, only four years later, Gamelin said he was utterly "surprised," "shocked" and "astonished" by the German method of mobile warfare.⁶⁴



When prodded by Churchill about when he was going to counterattack the penetration of the panzers, Gamelin responded, “‘Inferiority of numbers, inferiority of equipment, inferiority of method’ — and then a hopeless shrug of the shoulders. There was no argument. Here was the admission of the bankruptcy of a whole generation of French military thought and preparations.”⁶⁵

Our Army certainly has justification for patting ourselves on the back for recent success as well as for a rich history of successful campaigns. We must not be drawn, however, into the same rigid mindset as the pre-World War II French high command, which relied on recent success to ignore developments in mobile warfare at the operational level.

What do the trends of mobile warfare tell us about the characteristics of successful mobile warfare in the next generation?

Use mobile units in mass. One lesson that seems to be continually relearned is that mobile units are most effective when massed at the operational level. That is to say, mobile units have decisive impact at the operational level where corps or armies are formed with units that move at the same speed, with the same level of mobility. It seems there is a countertrend of “critics” who appear after each war and pronounce the day of the tank and mobile warfare over. This train of thought normally appears very attractive to budget analysts and exponents of artillery or air power. Yet, time and time again, this has been proven wrong.

Thus, our force planners must stay focused at the operational level when task-organizing mobile forces for a campaign. The vast majority of available armored and mechanized divisions in a theater should be massed into a corps or multiple corps operating together. The smaller the deployed force is, the more important it is to mass mobile units.

There are force developers who claim longer ranges for direct-fire weapons mean fewer weapons systems are needed in a given space. While this theory holds true when comparing Napoleonic weapons systems and battles to weapons systems and battles in the 20th Century, this theory has a limit imposed by terrain. If the average line-of-sight in Europe is 1,500 meters, the utility of ground or near-ground (e.g., helicopters in nap-of-the-earth mode) systems able to fire 4,500 meters is minimal.

Even Desert Storm, conducted in terrain that favors longer-range weapons, proved that mass is still a necessary component of mobile warfare. Mass enables the attacking force to overcome enemy fires, the friction of movement — such as maintenance breakdown and inefficiency in road marches — and it enables the attacking force to attack along multiple supporting thrust lines.

Also, the drastic downsizing in the size of our active-duty armored force severely hampers our ability to project a massed, mobile force of significant “weight” into a combat theater, let alone two theaters, while retaining a strategic reserve. We all recognize that we do not have the size of

army necessary to even conduct one Desert Storm-type of operation. Mobility, and the ability to shift combat power rapidly in a theater of war, is of critical importance in this environment.

Is surprise at the operational level still possible? One need only consider the number of campaigns launched in the last 30 years that were a surprise to the opposing side: the Israeli pre-emptive strikes of 1967, the Tet Offensive of 1968, the Yom Kippur assault of the Egyptians in 1973, the Russian incursion into Afghanistan, the Panama invasion, the Iraqi invasion of Kuwait and the Desert Storm offensive. Indeed, the improvements in communications, transportation, mobility and speed of weapons systems have enhanced the ability to achieve surprise in a campaign.⁶⁶

Always, always, always use the indirect approach. Until Desert Storm, the American fixation on firepower has repeatedly been a distraction from our development of mobile warfare. Of course, there is certainly nothing wrong with using

firepower to inflict damage on the enemy, but firepower by itself — without movement — cannot win a campaign. One trend of mobile warfare is the repeated success shown in campaigns where the opening penetration by mobile units was through an enemy weak point. Manstein did not think his plan for the invasion of France in 1940 was anything particularly brilliant: “After all, we just did the obvious thing; we attacked the enemy’s weakest point.”⁶⁷

One area to be on guard about is the tendency to underrate the ability of terrain to carry mounted forces. This turned out to be a critical factor in a number of campaigns including the 1940 campaign in France, the Ardennes in 1944, Korea and Vietnam. Our terrain analysts at the strategic and operational levels must strive to include experienced armor officers and practical experience with armored vehicles in their studies.

Faster, deeper penetrations or envelopments to operational depth. There is no doubt that the mobility and speed of mounted forces during penetrations and envelopments has consistently increased during modern warfare. We need to make changes that enhance our ability to take advantage of this trend:

- *Cut the aviation units loose in their own corps and divisions.* The air-assault and attack helicopter units should be used in mass (in divisions and even corps) to lead breakouts and envelopments into the enemy rear. They would fulfill the same function of light-horse cavalry and the light tank units in World War II. Using aviation in mass in the soft areas of the enemy rear — against command and control centers, logistics sites and enemy reserves — would set the stage for massed armored thrusts following on the ground. While the aviation units are not as well-armored as armor and mechanized units, their speed of movement is obviously much higher. We should use each arm in a way that takes advantage of its respective strengths.
- *Smaller, more mobile headquarters and staffs.* Our headquarters at all levels are too fat. Reviewing the size of

The attack plan [for Operation Desert Storm] called for an unprecedented massing of mobile forces in the main effort. ... The speed of the movement into the enemy rear was unparalleled. VII Corps attacked 170 miles in 89 hours — or about 45 miles a day. One unit, 1st Cavalry Division, moved almost 150 miles in one day during the attack.

headquarters and the method of command used in successful mobile operations in the past discloses the need for small, very mobile headquarters. Desert Storm was a rude awakening for many battalion and brigade executive officers forced to operate out of command posts on the move. Franks' method of commanding his corps was very similar to Rommel, Guderian and Patton: forward with his subordinate units, giving saddle orders on the spot. The utility of a huge headquarters apparatus in the rear is significantly less in the mobile environment.

Armored divisions now have about the same number of tanks and tank battalions as their predecessors in World War II. Yet headquarters are bigger, and there are more combat-service-support soldiers in the divisions. Further, technology has made leaps and bounds in communications and information management since World War II. One would think all this progress would reduce the number of people necessary to run a headquarters. Could we form more tank battalions by cutting headquarters personnel at all levels by 50 percent? You bet.

Also, we should eliminate any 2½-ton, 5-ton or Heavy Expanded Mobility Tactical Truck that is supposed to carry "baggage" for headquarters, or any unit for that matter. By this, I mean trucks that carry duffel bags, tents, plywood map boards, folding chairs, tables, cots, etc. Fewer trucks in march units means greater throughput of units on routes of march.

- *Reduce fuel consumption.* Our Achilles' heel in mobile warfare with our current and projected combat vehicles is fuel. The engines that propel tanks, Bradleys and helicopters achieve unprecedented speed for weapons systems while consuming unprecedented amounts of fuel. Fuel will no doubt be, and always has been, necessary for movement. But any reduction in the consumption rate would enhance overall speed of movement and make losses incurred by our fuel-truck fleet less devastating. We need a new tank engine that significantly cuts fuel consumption. Reducing consumption also means fewer fuel trucks moving on a route, which would again increase throughput of units on the route.
- *Train for operational-level penetrations and envelopments.* We have an absence of training for operational-level penetrations in the units that must execute them. Neither combat training centers nor warfighter exercises train operational-level movements. We need a training mechanism that complements these great tactical training events with training in long-range, sustained movement. We have all heard stories about horse cavalry and armor units before World War II conducting road marches hundreds of miles long. We should do the same periodically. We should have some simulation exercise for staffs at brigade, division, corps and army level to conduct penetrations and envelopments with mobile units to operational depth.

What should mobile units aim for when they penetrate or envelop an enemy force? There seems to be no clear agreement or trend on "the best" target for mobile units after they have penetrated or enveloped an enemy force. Sheridan and Swartzkopf aimed at the enemy mobile reserve. Guderian and

Since each potential enemy may have a different center of gravity, perhaps there is no "right" target for mobile combat units. Having said that, planners must take advantage of the relative strengths of armor/mechanized units and aviation units.

Patton preached avoiding enemy strengths and aiming at isolating enemy units, destroying or displacing the "soft" targets, and disrupting enemy command and control.

Our current operational doctrine says that the essence of operational art lies in being able to mass effects against the enemy center of gravity.⁶⁸ Since each potential enemy may have a different center of gravity, perhaps there is no "right" target for mobile combat units. Having said that, planners must take advantage of the relative strengths of armor/mechanized units (characterized by heavier armor, moderate

mobility and heavier firepower) and aviation units (characterized by lighter armor, higher mobility and lighter firepower).

We should also continue to develop anti-tank missile technology. Having ATGM units available which can provide defense against enemy tanks will allow us to mass armored units at the operational level for attacking the enemy. If our light infantry is unable to defend itself against tanks, and requires attachment of tanks in a defensive mode, it will reduce our ability to concentrate forces at the operational level. The further our drawdown goes, the more important this phenomenon becomes.

One must also acknowledge that the characteristics of armored forces and aviation are slowly drifting toward each other. The tank and infantry fighting vehicle is getting faster, and the helicopter is carrying heavier armor and weapons than previously. Perhaps 50 or 100 years from now the difference will not exist – there could be one platform able to operate on the ground with heavy armor and firepower, but able to move through the air. That, as they say, is another story.



LTC Kris Thompson commands 2-185th Armor, California Army National Guard. He previously served as cavalry troop commander, squadron S-4 and troop executive officer with 1/11th Armored Cavalry Regiment; headquarters troop commander for 4/11th ACR (Air Cavalry); staff officer with VII Corps during Desert Storm; brigade S-3 for 2nd Brigade, 40th Infantry Division (Mechanized); and battalion executive officer for 2-185th Armor. He is a graduate of Command and General Staff College and the Canadian Land Forces Command and Staff Course. He received a bachelor's of science degree in accounting from Kansas State University and a juris doctor (law) degree from the University of Kansas.

Notes

¹ Urwin, *The United States Cavalry, An Illustrated History*, Blandford Books Ltd., 1983.

² Stackpole, *Sheridan in the Shenandoah Valley*, second ed., Stackpole Books, 1992.

³ Urwin.

⁴ Ibid.

⁵ Sheridan, *Civil War Memoirs*, Bantam Books, 1991.

⁶ Urwin. Lincoln claimed jokingly that Sheridan could "scratch his shins without having to stoop over..." (Stackpole).

- ⁷ Sheridan.
- ⁸ Ibid.
- ⁹ Ibid.
- ¹⁰ Ibid.
- ¹¹ Ibid.
- ¹² Ibid.
- ¹³ Rodenbough, "Sheridan's Richmond Raid," *Battles and Leaders of the Civil War*, Vol. IV, Castle.
- ¹⁴ Rodenbough, "Sheridan's Trevillian Raid," *Battles and Leaders of the Civil War*, Vol. IV, Castle.
- ¹⁵ Cooper, *The German Army 1933-1945*, Bonanza Books, 1984.
- ¹⁶ Deighton, *Blitzkreig*, Ballantine Books, 1980.
- ¹⁷ Perret, *A History of Blitzkreig*, Jove Books, 1983.
- ¹⁸ Guderian, *Achtung, Panzer!*, Arms and Armor Press, 1995.
- ¹⁹ Ibid.
- ²⁰ Ibid.
- ²¹ Ibid; Liddell Hart, *The German Generals Talk*, Quill, 1979.
- ²² Guderian.
- ²³ Ibid.
- ²⁴ Ibid.
- ²⁵ Horne, *To Lose a Battle*, Penguin Books, 1988.
- ²⁶ Ibid.
- ²⁷ Ibid.
- ²⁸ Ibid.
- ²⁹ Ibid.
- ³⁰ Manstein, *Lost Victories*, Presidio Press, 1984.
- ³¹ J.F.C. Fuller went so far as to advocate the designation and forming of a special mounted unit called a "disorganizing force" which would penetrate to destroy the enemy's headquarters before the main attack was launched. From Perret.
- ³² Perret.
- ³³ Horne.
- ³⁴ FM 100-5 (1993).
- ³⁵ Horne.
- ³⁶ Ibid, quoting French general Ruby.
- ³⁷ Horne suggests the tanks were probably French tanks belong to a reserve tank battalion.
- ³⁸ Nye, *The Patton Mind*, Avery Publishing Group Inc., 1993.
- ³⁹ Blumenson, *The Patton Papers 1940-1945*, Houghton Mifflin Co., 1974.
- ⁴⁰ Ibid.
- ⁴¹ Ibid.
- ⁴² Ibid.
- ⁴³ Von Mellinthin, *Panzer Battles*, Ballantine Books, 1973.
- ⁴⁴ Liddell Hart.
- ⁴⁵ Blumentritt, as quoted in Liddell Hart.
- ⁴⁶ H.M. Cole, *U.S. Army in World War II: the Lorraine Campaign*, U.S. Army Center for Military History, 1984.
- ⁴⁷ Von Mellinthin.
- ⁴⁸ Blumenson.
- ⁴⁹ Ibid.
- ⁵⁰ Gabel, *The Lorraine Campaign: An Overview, September-December 1944*, Combat Studies Institute, February 1985.
- ⁵¹ Hoyt, *On to the Yalu*, Jove Books, 1991.
- ⁵² MacArthur, *Reminiscences*, Crest Books, 1965.
- ⁵³ Starry, *Armored Combat in Vietnam*, Arno Press, Inc., 1980.
- ⁵⁴ Ibid.
- ⁵⁵ CPT John Wintels and I authored an article for the September-October 1990 issue of *Infantry* magazine entitled "Tanks with Infantry" in large part due to this type of mindset.
- ⁵⁶ Schwarzkopf, *It Doesn't Take a Hero*, Bantam Books, 1992.
- ⁵⁷ Ibid.
- ⁵⁸ Clancy and Franks, *Into the Storm: A Study in Command*, G.P. Putnam's Sons, 1997.
- ⁵⁹ Schwarzkopf said the plan he briefed his commanders on was "a fully realized version of the envelopment I'd proposed to Powell three weeks before." (Schwarzkopf, *It Doesn't Take a Hero*.) Schwarzkopf, after making snide remarks about Franks throughout his book, admitted that "... I'd been too harsh in my criticism of VII Corps' slow progress during the ground battle." Franks led the largest armored corps in U.S. Army history in the fastest penetration in history. Clancy and Franks address Schwarzkopf's criticisms in fine style in their book – which is a much better read, too.
- ⁶⁰ Clancy and Franks.
- ⁶¹ Ibid.
- ⁶² Ibid.
- ⁶³ Horne.
- ⁶⁴ Ibid.
- ⁶⁵ Ibid.
- ⁶⁶ Ephraim Kam, as quoted in Summers, *On Strategy II: A Critical Analysis of the Gulf War*, Dell Publishing, 1992.
- ⁶⁷ Horne.
- ⁶⁸ Field Manual 100-5, *Operations*, 1993.

ACRONYM QUICK-SCAN

ACR – armored cavalry regiment
ATGM – anti-tank guided missile
TF – task force



“ An avalanche hit six Army soldiers undergoing mountain-warfare training near Vermont's highest peak Wednesday, sending five to the hospital. Rescuers worked to evacuate the six soldiers training at Smugglers Notch, a narrow pass at the northern edge of Mount Mansfield. The base of the notch is surrounded by steep cliffs on both sides. Five soldiers were taken to the University of Vermont Medical Center in Burlington. Their injuries were not considered life-threatening. The sixth soldier returned to duty. There is no word on what triggered the avalanche that hit about 1 p.m. The soldiers Mounted Warfare TestBed (MWTB) at Fort Knox, Kentucky, was the premier site for distributed simulation experiments in the US Army for over 20 years. It used simulation systems, including fully manned virtual simulators and computer-generated forces, to perform experiments that examined current and future weapon systems, concepts, and tactics. "In name only, Cyberspace had its origins in science fiction: its historical beginnings and technological innovations are clearly military (from NASA's primitive flight simulators of the 1940s to the ultra-modern SIMNET-D facilities in Fort Knox imperial army in the mountains. Although limited, it had the potential to provide valuable lessons for future wars.Â the strategic, tactical, and logistical challenges presented by mountain warfare. The following survey of Russian military endeavours in the mountains shows the extent of knowl-edge about mountain warfare available to the Red Army on which it could lean while preparing for actions during the interwar period. The Swiss Campaign (1799). In the summer of 1799, Russia and Austria, members of the Second Coalition against revolutionary France, planned to counter the French invasion of Switzerland.