Breakout From the Hedgerows: A Lesson in Ingenuity
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The defeat of Germany was still a long way off for the United States, British and Canadian troops on July 1, 1944. The invading armies of the Western Allies had crossed the English Channel and landed on the beaches of Normandy in Northern France to strike at the heart of Germany and to end the war in Europe. The cross-Channel attack, launched on D-Day, June 6, 1944, had accomplished the first phase of the invasion by July 1, 1944. Ground troops had broken through the German coastal defenses and had established a continental abutment for an eventual bridge that was to carry men and supplies from the United Kingdom to France. At the beginning of July, the Allies looked forward to executing the second stage of the invasion, expanding their continental foothold to a size that could support an assault on Germany. Before the Allies could launch their definitive attack, they had to assemble enough men and material on the Continent to assure success. To expand their foothold, the Allied soldiers had to overcome a tenacious enemy and a stubborn terrain.

Within a few days after the Allied invasion of Normandy, the U.S. Army found itself facing a stubborn terrain that favored the defender. Units fought desperately for hills, towns, and bridges that had become of strategic importance. At every turn, the Americans faced the seasoned veterans of the *Wehrmacht* (German Army). The effects of weather and the terrain of the French countryside had a particularly strong influence on the conduct of operations. A significant tactical dilemma facing the U.S. Army in Normandy was the local terrain, called *Bocage* in French. *Bocage* refers to farmland separated by thick coastal hedgerows. These hedgerows are denser, thicker, and higher in Normandy than elsewhere along the French coast or in the British countryside on the opposite side of the English Channel. From a military perspective, they were ideal for defense, since they broke up the local terrain into small fields edged by natural earthen obstacles. They provide real defense in depth, extending dozens of miles beyond the coast. The *Bocage* undermined the U.S. Army's advantages in armor and firepower, and the hedgerows gave the German defenders natural shelter from attack.

The *Bocage* presented a substantial obstacle to tanks. While it was possible for tanks to charge the hedgerows and push over the top, this exposed their thin belly armor to German anti-tank weapons. Some hedges were so entangled with foliage and small trees that a tank could become trapped if attempting to push through, or could shed a track, effectively immobilizing it. The whole area was drained by the Taute and Vire Rivers, which empty into the English Channel near Carentan and Isigny, respectively. The marshlands are flat, and the ground is soft and moist making travel by foot difficult, with vehicle traffic being almost impossible. Heavy rains make the marshlands even less trafficable, restricting movement to the few asphalt roads that traverse the bogs. On the American right, the terrain was more favorable. Between the marshes in the center of the sector and the coastline on the extreme right flank, a group of hills rose up to dominate the northern end of the Cotentin Peninsula. The most important terrain feature on the American right was the city of Cherbourg with its extensive port facilities.

As American units advanced inland, they had to conduct attacks to dislodge German units from the high terrain features on the rim of the plateau. Some of the bitterest fighting of the Normandy campaign took place around Saint-Lo, as American units confronted German units, such as the 2nd SS Panzer Division, that held the high ground around the village. Several miles inland, the low terrain throughout the First Army sector rose into a plateau with average heights of 200 meters above sea level. The swamplands restricted all cross-country maneuver, making the use and control of the road network a necessity for offensive operations. The natural, uneven lay of the land in the rest of the American sector made command and control of deployed combat forces extremely difficult. Despite these natural obstacles, the most pervasive and formidable barrier in the American sector was man-made.

Of all the factors that influenced Allied operations in the summer of 1944, none was more significant than the German Army's determination and defensive abilities. Since June 6th, German soldiers had fought desperately to contain the expanding Allied beachheads. Most were unaware of heated controversies taking place in the German High Command over the best way to repel the Allied invasion. The German commander in chief in Western Europe, Field Marshal Gerd von Rundstedt, favored a mobile defense. Rundstedt disagreed with his most trusted subordinate, Field Marshal Erwin

Rommel. Rommel commanded Army Group B and bore direct responsibility for the defense of the northern coastlines of France. Rommel favored a strong forward defense that would defeat the Allied invasion on the beaches. Adolf Hitler was aware of the disagreement between his western commanders, but he failed to settle the dispute. Consequently, the Germans adopted neither the forward nor the mobile defense concepts as a distinct course of action.

After D-Day, Rundstedt and Rommel cooperated in concentrating forces to eliminate the Allied beachheads. They proposed to Hitler that the Germans fight a series of defensive battles while assembling forces for a massive counterattack. However, on June 25th, a major British attack near Caen forced the Germans to commit all of their reserves. The Germans now found themselves defending along a static line with few forces left to mount any large-scale counterattacks. Both Rundstedt and Rommel's previous operational concepts for the defense of Normandy were now irrelevant. On June 29th, Adolf Hitler himself intervened and announced a new plan for the defense of France. The *Fuhrer* believed that German forces had to prevent the Allies from gaining an opportunity to conduct mobile warfare in the west. Before they could conduct a blitz campaign, the Allies needed sufficient space to deploy their formations and favorable terrain on which to maneuver. Hitler believed the best way to prevent an Allied blitzkrieg was to contain the expansion of the British and American beachheads. He ordered German forces to engage the Allies in a savage battle of static warfare along a strong line that would capitalize on the defensive characteristics of the *Bocage* . Hitler knew his units occupied extremely favorable defensive positions, so he ordered the German Army to stay and fight to the last in Normandy. The German Seventh Army, under the command of General Paul Hausser, opposed the U.S. First Army. The German Seventh Army consisted of three fresh infantry divisions, the remnants of four more infantry divisions that had suffered heavy casualties during the early fighting in Normandy, a parachute regiment, and three regimental-size combat teams. The Germans lightly manned their forward defense line, keeping the bulk of their combat troops in reserve. These reserves were grouped into counterattack units and were supported by tanks and assault guns. Once the German forward lines identified the main American assault, reserves would counterattack the flanks and rear of the Americans. Well aware of the hedgerows that favored their defensive efforts, the Germans coined their tactics bush warfare.

Landing in France on June 6th, the U.S. First Army under General Bradley quickly consolidated its foothold on the Normandy beaches. Elements of VII Corps seized Utah Beach, while units of V Corps assaulted Omaha Beach. Moving to complete the first phase of Allied strategy by securing and expanding their beachheads, the V and VII Corps began to push inland. By June 12th, the Americans had captured Carentan and affected a linkup between the separate beachheads. Meanwhile, combat units of XIX Corps arrived in France to reinforce the U.S. effort. Confident that the First Army had sufficient forces in France to prevent the Germans from eliminating the beachheads, General Bradley moved to implement the second phase of Allied strategy. On June 14th, VII Corps launched an offensive to seize the badly needed port facilities at Cherbourg. The offensive was successful, and Cherbourg fell on June 26th. While VII Corps moved against Cherbourg, consuming the majority of available supplies, the remainder of the First Army stood on the defensive warding off German attacks and preparing for future operations. By July 1st, with the American beachheads secure, the First Army prepared to resume the offensive. The U.S. Army was deployed along a wide area that stretched from Chaumont to the west coast of the Cotentin Peninsula near La Haye-du-Puits. General Bradley's mission was to continue the expansion of the area and to relieve German pressure against the British by conducting a full offensive against the German Seventh Army. Scheduled for July 1st, the attack was designed to push the Germans out of Normandy and to open the way for American operations into Brittany. For the attack, Bradley had available the equivalent of thirteen divisions organized into four separate corps.

The successful breakout of the low country would depend on the ability to overcome the *Bocage*. The urgency of the situation resulted in the development of improvised methods that allowed tanks to maneuver in the *Bocage*. The first field-expedient solution to the mobility problem came from the 747th Tank Battalion assigned to the 29th Infantry Division. The 747th was not equipped with dozer tanks, so instead of trying to drive directly over the hedgerows, someone suggested that demolitions be used to blow gaps in the hedgerows. After experimentation, the tankers discovered that demolitions could indeed breach the hedgerows. Two 24-pound explosive charges placed eight feet apart and eighteen inches above ground level blew a sizable hole in a hedgerow. On June 24th, engineer squads from the 29th Division's 121st Engineer Combat Battalion emplaced demolition

charges on hedgerows during a limited attack by elements of the 747th Tank Battalion and the 115th Infantry. The attackers discovered that the 24-pound charges did not always create a hole large enough for the Sherman tanks. After the attack, the engineers decided to increase the size of the explosive charges from twenty-four to fifty pounds. They hoped the increased charges would consistently blow breaches large enough to accommodate the attacking tanks. Several problems resulted from increasing the size and weight of the explosive charges. The commander of the 121st Engineer Combat Battalion, Lieutenant Colonel Robert R. Ploger, conducted an informal study of the logistics involved in supporting a tank attack with fifty-pound explosive charges. Ploger assumed that in a typical attack, a tank company moving a distance of one and one-half miles through the *Bocage* would encounter thirty-four separate hedgerows. As a result, each tank company needed seventeen tons of explosives. Demolitions were not readily available in such quantities, and the problems involved in the transport and emplacement of enough explosives seemed insurmountable. Apparently, other techniques were needed to breach the hedgerows. The engineers then suggested that the explosives be buried within the hedgerow embankments. Burying the charges would greatly increase the efficiency of the demolitions, allow the use of smaller charges, and alleviate problems associated with availability, transport, and emplacement. Unfortunately, other conditions prevented the burying of explosive charges. Digging holes large and deep enough for the explosives in earthen embankments covered with vines and filled with roots proved too laborious. During an attack, digging holes and emplacing charges would simply take too long. Since an attack could proceed only as fast as charges were emplaced and detonated, slow moving American attacks would allow the Germans to coordinate their hedgerow defense better. Engineers and infantrymen would also be dangerously exposed to German mortar fire while planting demolitions. Though technically feasible, burying explosives by hand was a procedure both too difficult and tactically unwise.

Determined to find a way to get through the hedgerows, the tankers and engineers finally developed an effective technique for using explosives. In a conference between officers of the 747th Tank Battalion and Lieutenant Colonel Ploger, someone suggested that the tanks be equipped with a mechanical device to gouge holes in the hedgerows for the explosives. After some experimentation, the tankers finally equipped an M-4 Sherman with two pieces of commercial pipe, each four feet long and six and one-half inches in diameter. The tankers welded the pipes onto the front side of the Sherman's final drive assemblies and reinforced the weld with angle irons. Sherman’s, equipped with the device, simply rammed into a hedgerow embankment, and then backed away leaving two sizable holes for the explosives. Ploger's engineers also learned to pack the demolitions into expended 105-mm artillery shell casings, thereby greatly increasing the efficiency of the charges. The engineers found that two charges of only fifteen pounds each could blow a gap large enough for a Sherman tank. Placing explosives in shell casings also made the transport and handling of charges much easier. The method proved so successful that the 747th outfitted numerous tanks with the pipe devices.

By late June, many units throughout the First Army had developed a variety of means to breach the hedgerows. The 83rd Infantry Division in VII Corps used two 25-pound explosive charges. Engineers packed the explosives in a sandbag, buried them by hand two feet into the hedgerow embankment, and then tamped the hole full of dirt to increase the effectiveness of the charge. Other units copied the techniques developed in the 29th Division. The 703rd Tank Battalion, attached to the 4th Infantry Division in VII Corps, adopted the 747th's hedgerow busting techniques and found them highly successful. In VIII Corps, the 79th Infantry Division also developed another type of hedgerow cutter for use on its Sherman tanks. Soldiers of the 2nd Armored Division's 102nd Cavalry Reconnaissance Squadron invented the hedgerow device that gained the widest publicity. During a discussion between some of the 102nd's officers and enlisted men, someone suggested that they get saw teeth, put them on their tanks, and cut through the hedgerows. Many of the troops laughed at the suggestion, but Sergeant Curtis G. Culin took the idea to heart. Culin designed and supervised the construction of a hedgerow-cutting device made from scrap iron pulled from a German roadblock.

Testing showed that the device allowed a Sherman to cut easily through the hedgerows. Because the hedgerow cutter's blades made a tank resemble a large pachyderm with tusks, troops called the device a rhinoceros, and Sherman’s equipped with Culin's invention became known as rhino tanks.

Culin's device soon got the attention of the chain of command within 2nd Armored Division and V Corps. On July 14th, General Bradley attended a demonstration of Culin's hedgerow cutter. Bradley watched as Sherman’s mounting the hedgerow device plowed through the hedgerows "as though they

were pasteboard, throwing the bushes and brush into the air." Very impressed by the demonstration, Bradley ordered the chief of the First Army's Ordnance Section to supervise the construction and installation of as many of the hedgerow cutters as possible. The First Army Ordnance assembled welders and welding equipment within the beachhead and from the rear areas in England to assist with the project. Welding teams used scrap metal from German beach obstacles to construct most of the hedgerow cutters. In a remarkable effort from 14th to the 25th of July, the First Army Ordnance Section produced over 500 hedgerow cutters and distributed them to subordinate commands for installation. By late July sixty percent of the First Army's Sherman's mounted the hedgerow-cutting devices. Though the most famous of the hedgerow-reducing devices, Culin's rhinoceros was only one of many such contrivances invented and employed throughout the First Army.

With the problems of armored mobility largely solved, infantry commanders finally realized that firepower from their supporting M-4 Sherman's could place heavy suppressive fires on the Germans, thus allowing their units a chance to maneuver. Properly employed, the machine guns of an M-4 Sherman delivered the direct fire needed to suppress German machine guns, while a Sherman's main gun, used at point-blank range, substituted for indirect artillery fire. As tanks suppressed the German defenders, infantry units could clear out the hedgerows and maneuver to assault the main German defensive positions. Infantry could also provide tanks with protection against German close assaults. Throughout the First Army, units worked to develop new combined arms tactics. Commanders at all levels began to experiment with methods that permitted infantry and tanks to work closely together. Units trained and conducted rehearsals in rear areas before trying new tactics in combat. The result was the implementation by the First Army units of several methods that allowed the combined arms team to overcome the enemy. Frustrated by their failures in the hedgerows, leaders within the 29th Division realized they had to find ways to defeat the Germans. The division commander, General Gerhardt directed the assistant division commander, Brigadier General Norman D. Cota, to supervise the development and implementation of tactics to overcome the German method of hedgerow defense. The tactics developed by the 29th Division were a departure from normal Army doctrine in that neither the tanks nor the infantry led the attack but fought closely together and protected one another while closing with the enemy.

On July 11th, XIX Corps attacked southward toward Saint-Lo as part of a First Army offensive to push the German Seventh Army out of Normandy. The attack started at 0600 on July 11th after a furious twenty-minute preparatory bombardment by five battalions of artillery. Initial progress was slow and discouraging. The 2nd Battalion advanced with two companies abreast and encountered determined resistance from enemy positions in the first hedgerows. The tank-infantry-engineer teams, however, continued to push forward, and by 1100 they finally broke through the organized German defense, which eased and then collapsed. The 2nd Battalion then made rapid progress, seized the ridgeline to its front, wheeled to the right, and continued to move. Before nightfall, the 2nd Battalion advanced another mile toward Martinville and was in an excellent position to continue the attack toward Saint-Lo.

In late June the 3rd Armored Division devised hedgerow tactics that emphasized coordinated, combined efforts by tanks and infantry. Mobility and firepower were the key elements in the tactical formula. Like other units in the First Army, the 3rd Armored Division discovered that dozer tanks and engineer teams with demolitions could breach the most formidable hedgerows. Tank platoons operating with infantry squads and supported by artillery and mortar fire were expected to deliver enough direct firepower to root out the most determined defenders. Unlike infantry divisions that developed hedgerow tactics for single tanks and infantry squads, the 3rd Armored Division devised a method of assault based on the coordinated action of a tank company and an infantry company. Units attacked on a front usually three fields wide and always assaulted the center field last. The attack began as engineer teams or dozer tanks gapped the first hedgerow and indirect fire fell on and behind the forward German positions. An entire tank platoon then attacked with one section moving forward along each hedgerow paralleling the axis of advance. The Sherman tanks put main-gun fire into the hedgerow to their front and sprayed the side hedgerows with heavy machine-gun fire. During the early phase of the assault, the tanks moved slowly enough so that supporting infantry could move with them and provide local security. The tanks also tried to protect themselves against German close infantry assaults by always staying at least twenty yards away from the nearest hedgerow. After reaching the main German defensive position, the tanks turned inward and worked their way toward the center of the field, covering the hedgerows with heavy machine-gun fire. Together, the tanks and

infantry cleared the German defensive position and then prepared to continue the attack.

The 2nd Armored Division also developed special tactics for use in the hedgerows, but its techniques differed radically from those developed by other divisions within the First Army. In mid July 2nd Armored Division began to prepare for its role in Operation Cobra, the First Army's offensive designed to rupture the defenses of the German Seventh Army and precipitate a major breakout into the Brittany peninsula and the interior of France. In the Cobra plan, the First Army assigned a rapid exploitation mission to the 2nd Armored Division. The tactical challenge facing the 2nd Armored was to develop techniques that allowed infantry and armor to work closely together during high-speed maneuvers through the *Bocage* . By July 25th, Combat Command A of the 2nd Armored and the 22nd Infantry had developed a novel way for tanks and infantry to cooperate during fast-moving operations. The infantry rode on the back decks of tanks and only dismounted when the attack met stiff enemy resistance. The overall tactical plan developed by Combat Command A and the 22nd Infantry called for units to attack in three assault waves. The first echelon consisted solely of tanks and relied on its own mobility and firepower, along with supporting artillery, to eliminate enemy positions. A second wave of tanks and infantry closely followed the lead elements. Eight infantrymen rode on the back deck of each Sherman in the second wave. The infantry had two main purposes. They provided tanks in the second wave with local security, and whenever the tanks in the first wave encountered stiff resistance, the infantry dismounted and worked with the lead tanks to conduct a coordinated combined arms attack. The third echelon also consisted of tanks and infantry and had the mission of eliminating positions bypassed or not detected by the leading elements.

Between the 19th and the 25th of July, the 22nd Infantry and Combat Command A's 66th Armored Regiment conducted mock attacks and rehearsals in preparation for Operation Cobra. Tankers conducted classes on the proper distribution of main-gun and machine-gun fire and the correct way to use the rhinoceros hedge cutters mounted on 75 percent of the 66th's tanks. Platoons from the 22nd Infantry constantly practiced tank-infantry coordination with the 66th Armored. Infantry units learned how best to mount, dismount, and ride on tanks and taught their soldiers how to use the new external telephones mounted on most of Combat Command A's tanks. Infantrymen also found ways to camouflage themselves with vegetation while riding on the Sherman’s. Leaders generally found that infantrymen easily adapted to the new tasks involved in working with armor.

On the morning of July 26th, the day after the saturation bombing that marked the opening of the Operation Cobra offensive, Combat Command A, applying some of its new techniques, conducted a forward passage of lines through the 30th Infantry Division and attacked southward. Their mission was to seize high ground in the vicinity of Hill 193 and le Mesnil-Herman and then establish defensive positions to repel German counterattacks aimed at American follow-on forces. Combat Command A's attack was the type of action most preferred by American commanders, a highly fluid situation in which mobile forces overran or bypassed enemy resistance. As a result of their new tactics and an intensive pre battle-training period, Combat Command A and the 22nd Infantry made spectacular gains during the attack. The combined arms team worked closely together. Artillery observers rode in the lead tanks and brought accurate, indirect fire down on the enemy. Infantry battalion commanders rode in command tanks with man pack radios to better coordinate tankers and riflemen. The commander of the 22nd Infantry reported that his soldiers were enthusiastic about riding the tanks. The infantry found that riding on tanks gave them several advantages. The height of the tanks put the riflemen above grazing fire and gave them better observation. Riding on tanks that moved at irregular speeds also made the infantry more difficult targets. In two days, Combat Command A penetrated more than six miles into the German Seventh Army's sector. Cobra's preparatory bombardment, sporadic German resistance, and the coordination and swift execution of Combat Command A's attack resulted in light casualties for the Americans. By nightfall of July 27th, the infantry and tanks were on the objective, having lost only 3 tanks and less than 200 men.

Since landing in France, the First Army had devised numerous technical and tactical solutions for the conduct of battles against the German Army. The greatest transformation took place in combat units where tankers, infantrymen, engineers, and artillery forward observers became close knit partners in a coordinated effort. In the pre-invasion period, tankers probably could not have visualized the hedge cutters and back-deck telephones that were to be on most of their tanks by the opening of the Cobra offensive. Nor could commanders have imagined the tactical combinations that had to be developed for combat in the *Bocage*. By the end of July, the First Army routinely used a large number of combat

techniques and procedures that were unheard of in the pre-invasion period. Ideas on how to achieve better results against the Germans came from a wide variety of sources. In general, ideas flowed upward from the men actually engaged in battle and were then either approved or rejected by higher commanders. Within the bottom ranks of the Army, individual soldiers suggested ways that enabled their units to move against the enemy. Sergeant Culin's hedgerow cutter is the best example of a single soldier's idea that influenced all of the First Army. At the top end of the chain of command, general officers also produced ideas on how to defeat the Germans. General Cota's supervision of the development of hedgerow tactics in the 29th Division typifies the contributions made by general officers. The effort to gather ideas on how to beat the Germans was decentralized. There was almost no effort to work out an Army wide solution to the tactical problems of combat in the *Bocage* . The First Army staff made no distinct attempt to devise tactical solutions for the whole command to use in overcoming the German defenses. The First Army did publish and distribute to all units a series of Battle Experiences, reports that contained information and lessons learned in battle. The bulletins were not directive in nature, but subordinate commanders were expected to use the information to assist them in finding ways to defeat the Germans. In fact, in only one area did the First Army headquarters take an active role in dealing with tactical problems, the production and distribution of Sergeant Culin's hedgerow cutter.

More than anything else, the Normandy campaign is an excellent example of how the U.S. Army adapted itself to unforeseen circumstances and a hostile environment. Individual soldier initiative and injunity were welcomed and fostered. American operations in the *Bocage* prove that a successful army must have the ability to change and adapt under fire in order to develop correct methods for overcoming the enemy. In this respect, the First Army performed well in Normandy and laid the foundation for operations that eventually carried U.S. armies beyond the Rhine River and to victory.

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