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The Resilient Defense

Raymond A. Millen

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by

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The Resilient Defense

by Raymond A. Millen

Lieutenant Colonel Raymond A. Millen, USA Ret., completed three tours in Afghanistan, the last as a senior mentor to the Chief of Strategic Plans department in the Ministry of Defense. While on active duty, Professor Millen served as an infantry officer and foreign area officer for Western Europe. From 2001 to 2008, he was the Director of European Security Affairs at the Strategic Studies Institute. Professor Millen is currently the Security Sector Reform analyst at the Peacekeeping and Stability Operations Institute, Carlisle, Pennsylvania. He is the author of the books *Command Legacy: A Tactical Primer for Junior Leaders* and *Burden of Command*, as well as numerous articles and monographs on NATO, counterinsurgency, Afghanistan and Security Sector Reform issues.

Inquiries regarding this and future Land Warfare Papers should be directed to: Director, AUSA's Institute of Land Warfare, 2425 Wilson Boulevard, Arlington VA 22201, e-mail *sdaugherty@ausa.org* or telephone (direct dial) 703-907-2627 or (toll free) 1-800-336-4570, ext. 2627.

Contents

Foreword v
Introduction 1
Historical Perspective of the Tactical Problem 2
World War I 2
The Defensive Concept 2
The Organization of the Defense 4
Interwar Years 8
World War II, Eastern Front 8
North African Front 9
Operation Goodwood, Normandy, 18 July 1944 10
Adaptation of the Elastic Defense for Modern Combat 11
The Outpost Sector 11
Main Line of Resistance 13
First Echelon 13
Second Echelon 15
Deliberate Counterattack 15
Terrain Anchor Points 15
Conclusion 15
Endnotes 17

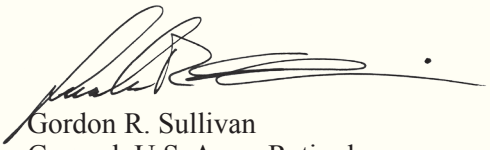
Foreword

The Resilient Defense is an adaptation of the German Elastic Defense doctrine employed in 1917 and, to a lesser extent, during World War II. The study opens by identifying the operational and tactical challenge of dismounted infantry defending in open terrain, such as deserts and plains, against a mechanized attack. Historical evidence indicates that combat in such terrain is more prevalent than assumed at first blush.

Before discussing the Resilient Defense, this study examines the German concept of the Elastic Defense which led the Germans to change their doctrine in the midst of World War I. In essence, the three pillars of the new defensive concept were dispersal and depth, establishment of the "vacant battlefield" and tactical agility. The concept was revolutionary in the sense that it abandoned the linear defense that was anchored on trenches and opted for a defense in depth, which sought to cause the early culmination of the attack, at which point it would be vulnerable to a devastating counterattack. Dispersal and depth were achieved through a series of resistance nests and fortified shell craters with mutually supporting fires. Interspersed among these points of resistance were assault units that formed hunter-killer teams against isolated attacking units. The "vacant battlefield" extended beyond good cover and concealment. It sought to deny enemy reconnaissance from discerning the strength and disposition of the defense through counterreconnaissance, exploitation of intervening terrain and conforming positions to the immediate terrain. Tactical agility described the latitude afforded junior leaders to shift around their assigned sectors so as to avoid lethal effects of fires and to attack targets of opportunity.

In the Elastic Defense there are three sectors—the outpost zone, the battle zone and the rearward zone. The study examines the anatomy of each zone, including designated units and their missions as well as the siting of heavier weapons and units for the counterattack. The cornerstone of the defense resided in the deliberate counterattack, whose objective was to restore the original line. In this manner, resisistance points and units that were cut off from the attack had a reasonable assurance that friendly units would rescue them. While the evolved version of the Elastic Defense was rarely employed in World War II, those instances in which it *was* used validated its effectiveness in mechanized warfare. This was particularly so when the German defenders were at a distinct disadvantage in troop ratios, heavy weapons and airpower.

The modern adaptation, called the Resilient Defense, relies on the same three pillars as the German Elastic Defense. Organized into the combat outpost sector and the main line of resistance (two echelons), the Resilient Defense adapts the most effective features of German defensive doctrine of both world wars. As the United States Army and Marines reorient to conventional operations in the aftermath of the insurgencies in Iraq and Afghanistan, this study will be of particular interest to strategic landpower advocates.



Gordon R. Sullivan
General, U.S. Army Retired
President, Association of the United States Army

15 May 2014

The Resilient Defense

Introduction

One of the greatest tactical challenges for a commander is the defense of open terrain with little or no vegetation and relatively flat landscapes, such as deserts and steppes. Although not a predominant feature in the world, open terrain has often been the battleground in key conflicts of the 20th century—Flanders, Palestine, the Steppes of Russia, North Africa, Sinai and the Persian Gulf. Theoretically, the defense of such terrain is best suited for mechanized forces fighting great mobile battles. The reality, however, is that dismounted forces must often establish defenses in this terrain without the capability or latitude of grand maneuver. Holding a front line or protecting an operational flank, key port, lodgment area or pass dictates that certain areas must be held with little chance for operational maneuver. The great tactical dilemma for dismounted forces is defending in such terrain against the greater firepower and mobility of mechanized forces.

The plight is apparent once the local commander surveys his prospective defensive sector. Conventional defensive dispositions seek to maximize the standoff capabilities of weapon systems. The attacker has little problem identifying these key weapon positions because they are located on prominent terrain and easily pinpointed with the commencement of weapons fire. The vastness of open terrain allows little opportunity for economy of force or secured flanks. To cover a sector adequately, the commander must extend defensive positions, which in turn dilutes the concentration of fires and obstacles. Moreover, the commander must figure a way to cover an open flank if one exists. Correcting these deficiencies by increasing the troop density in the front line may ensure retention of a sector, but it also leads to exorbitant casualties. In short, the defense resembles the proverbial "thin red line."

For a mechanized enemy, the opportunities for success abound. Enemy reconnaissance can observe defensive activities from a distance. Often the openness of the terrain deludes the defender into concluding that intruders will be easily discovered. In reality, competent reconnaissance teams can exploit the many folds and depressions in apparent flat terrain and avoid detection even within the defensive sector.

Once the reconnaissance locates weaknesses in the defense, the attacker takes advantage of the few movement restrictions to close, shift and mass forces rapidly at the decisive point. The ubiquitous support-by-fire (SBF) positions allow the attacker to support the points of penetration at any portion of the defense. A combination of smoke, indirect fire and SBF positions also allows him to obscure and suppress any portion of the defense that attempts to withdraw or support the threatened sector. Moreover, SBF positions normally are part of an intervening

terrain feature (slight ridge, sunken road or inter-visibility line), allowing the attacker to shift his forces under cover. In this manner, the defenders have few opportunities for flank and rear shots. The majority of fires will hence be frontal shots. The importance of this advantage cannot be overstated. With the majority of the force devoted to overwatch, only a small portion is devoted to the assault. Attrition is kept to a minimum, and even if the assault is repulsed, the attacker can simply shift to another point. Once the defensive line is penetrated, the attacker can easily roll up both sides of the breach to widen the shoulders since defensive orientation is to the front and incapable of reorientation. Ground and air reconnaissance can quickly identify the movement of any mobile forces (armor attachments or reserve) and suppress them with aerial, artillery or chemical munitions. At this point, exploitation renders further defense problematic.

None of the aforementioned disadvantages is new. Armies have been grappling with this tactical problem with mixed results since World War I. The Germans appear to have been the most successful and to have devoted the most thought to the development of a successful defensive doctrine in open terrain—the Elastic Defense. The purpose of this study is to examine the evolution of the Elastic Defense and adapt it for modern combat as the Resilient Defense. Executed within the framework of dispersal and depth, cover and concealment and tactical agility, the Resilient Defense will not only repulse a mechanized attack in open terrain but do so with minimum losses.

Historical Perspective of the Tactical Problem

World War I. The origin of the Elastic Defense stems from World War I. By 1916, the Germans had recognized that a fundamental change in their defensive doctrine was essential in order to counter the Allied Powers' superiority in troops and firepower. In the first two years of fighting along the Western Front, German defensive doctrine dictated that units occupy the front trenches in strength without regard to ensuing casualties. The result was that the defender suffered nearly as many casualties as the attacker. In order to mass sufficient forces for decisive operations against Russia, Romania and Italy, the German High Command needed a defensive doctrine that would allow it to conduct economy of force on the Western Front. The dilemma for the Western Front commanders was not simply to repulse and inflict heavy casualties on the attacker but to do so without losing terrain and suffering frightful losses. The developers of the Elastic Defense sought to resolve this dilemma.[1]

The Defensive Concept. The foundation of the new defense rested on three synergistic pillars: dispersal and depth, establishment of the "vacant battlefield" and tactical agility. In essence, the new doctrine was built on Carl von Clausewitz's defensive concept of parry and thrust.[2]

Abandoning the linear system of continuous trenches, the Germans embraced a defensive concept based on dispersal and depth. The bedrock of the defense rested on independent fortified points that were articulated in breadth and depth. Although conceptually disposed in a checkerboard pattern, they conformed to the characteristics of the terrain. The fortified points afforded 360-degree coverage, with the gaps among the neighboring points forming fire sacks. The fortified points were expected to continue resistance even if isolated until relieved by the counterattack. Consequently, each fortified point maintained a supply cache. The fortified points closer to the front were designated as resistance nests and accommodated one or two squads, some augmented with one or two heavy machine gun teams.

As the defense progressed rearward the fortified points increased to the size of strong points, with larger garrisons and heavier-caliber weapons. The construction of the fortified points also

fell into two categories—the concrete structure and the fortified shell crater. Although more resilient, the concrete resistance nest was more difficult to conceal during construction. Hence, forward battalions constructed only four to five positions with concrete structures and relied on fortified shell holes for the majority of the resistance nests.

Converting shell crater clusters into resistance nests was clever and effective. The Germans would fortify designated shell holes with bunkers and burrow tunnels to other nests to form a resistance nest complex. The collective effect of the resistance nests was to disrupt the momentum of attack "like rocks in the surge of a flowing tide, devastating and disorganizing the lines of attack within their field of fire."[3] Ranging among these fortified points were the assault teams and squads, which emerged from their hidden bunkers or ordinary shell holes to strike any intruder that entered their sector.[4]

Establishing a "vacant battlefield" depended on denying the enemy the ability to identify the disposition of the defense and individual resistance nests. The combination of a deep outpost zone and a large, active counterreconnaissance severely hampered the attacker's ability to collect tactical intelligence on defensive dispositions. Without distinctive trench lines, it was difficult for aerial reconnaissance to collect detailed intelligence on the defensive disposition. Fortified shell craters were particularly difficult to identify because the existing spoil and debris in the surrounding area obscured the telltale signs of activity. In accordance with operational security, the Germans restricted their activities to the night and camouflaged their finished positions. Concrete nests had very low signatures and, with blankets of dirt, easily blended into the surrounding terrain. All resistance nests were sited behind minor intervening terrain features, not only for cover but also to engage attacking units in the flank and rear.

As a result, it was nigh impossible for the attacker to identify positions by their weapons fire. Additionally, the Germans incorporated old wire obstacles with the new ones, normally weaving them in and out of nearby shell craters to reduce their signature. The battle zone—main battle area—was, if possible, located several kilometers from the enemy front lines and along a reverse slope. In effect, the Germans dropped a curtain between their defense and Allied eyes.[5]

The integration of dispersal, depth and establishment of the "vacant battlefield" significantly degraded the effects of artillery fire. Presented with obscure knowledge of dispersed positions, Allied artillery could not mass fires against tangible targets. The artillery resorted to rolling barrages through the whole zone of attack in an attempt to destroy everything, but in reality this only dispersed the fire effects.

Since the original trench lines were located near the front line, German units continued to use them for shelter but moved to resistance nests—ordinary shell holes and hidden bunkers forward of and behind the trenches—and stayed alert for news of an attack. This daily activity in the trenches encouraged the Allies to focus the majority of artillery fires against them. The Germans also constructed dummy resistance nests on prominent terrain to induce the Allies to waste ammunition. As a profound measure of flexibility, leaders of independent assault teams and squads had the authority to withdraw in any direction in the event of receiving or being in danger of receiving effective artillery fire. General Erich Ludendorff epitomized this revolution in tactical philosophy, stating, "The infantryman would no longer have to say to himself, 'Here I must stand or fall.'"[6] Assault squads would evade immediate dangers and then engage the penetrating infantry from ordinary shell holes in the flanks and rear. For the first time in the war, artillery—the greatest killer on the battlefield—was neutralized.[7]

Tactical agility represented the dynamic component of the defense. Counterbattery fire received priority during the preparatory phase of the Allied attack, but at the moment of assault, German artillery and light mortars bombarded the Allied front trench system and suspected assembly areas. Short barrage fires along the German front line of shell holes were designed to help canalize and splinter the attack. However, the ordeal of fire did not end once the Allied formations cleared this curtain of fire. As the waves of Allied soldiers advanced into the depths of the outpost zone, concealed resistance nests arrested the advance with withering fire from the rear and flanks. The Germans had long noted that "sudden surprise fire, rather than prolonged long-range engagements, defeated attacks."[8] Adding to the chaos, the assault teams and squads beset isolated groups and employed hit-and-run tactics on the larger formations.

The prospect of Allied success diminished as the attack penetrated the outpost zone. Beyond this belt, German defenses grew in scope and size. Once the penetrations entered the battle zone, units found themselves beyond the range of their own supporting artillery fires while facing the concentrated fires of the Germans. Because the battle zone was normally located behind a ridge and was relatively unobscured by battle effects, German forward observers had optimal observation for friendly artillery fires. From fortified observation points located on prominent terrain, forward observers could place accurate fires on the hapless attackers.

Opposed now by strong points bristling with heavy machine guns and assault companies launching immediate counterattacks, even the strongest of offensives would culminate. In a sense, the interplay among fortified points and assault formations resembled a microcosm of hammer-and-anvil tactics. The end result on the attacking leviathan was exhaustion through a million cuts followed by the deathblow of the deliberate counterattack.[9]

The Organization of the Defense. The organization of the defense consisted of the outpost zone, the battle zone and the rearward zone. The regiment arrayed its battalions in depth with a frontage of between 1,000 and 1,500 meters and a total depth of about eight kilometers.[10]

The battalion occupying the outpost zone divided the defense into three sectors: the security line, the resistance line and the main line of resistance. The depth of the outpost zone ranged from 500 to 3,000 meters, with 1,000 meters as the average (figure 1). The fact that the Germans devoted an entire battalion to the outpost line reflects the importance they attributed to denying the attacker information on defensive dispositions. Presenting the attacker with a "vacant battlefield" meant that the counterreconnaissance fight was as important as the main fight.[11]

The security line contained two to four two-man listening posts/observation posts (LPs/OPs) (ten to 12 at night) occupying shell holes roughly 250 meters from the enemy front lines. The front companies provided altogether six pickets, which administered the LPs/OPs. Located on the crest of a hill or ridge whenever possible, the posts not only provided early warning of attacks but also alerted the company of enemy reconnaissance patrols.[12]

The resistance line was located about 500 meters from the enemy front lines and consisted of one to two resistance nests and assault teams—about 150 to 225 men. The task of the assault teams and squads was to intercept enemy reconnaissance and to patrol the sector for infiltrated surveillance posts. Additionally, designated assault teams occupied bunkers behind the line of pickets to provide assistance for attacked LPs/OPs.

An overview of the assault squad organization reveals its effectiveness. The new assault squad organization consisted of a light machine gun team (two gunners and two ammunition

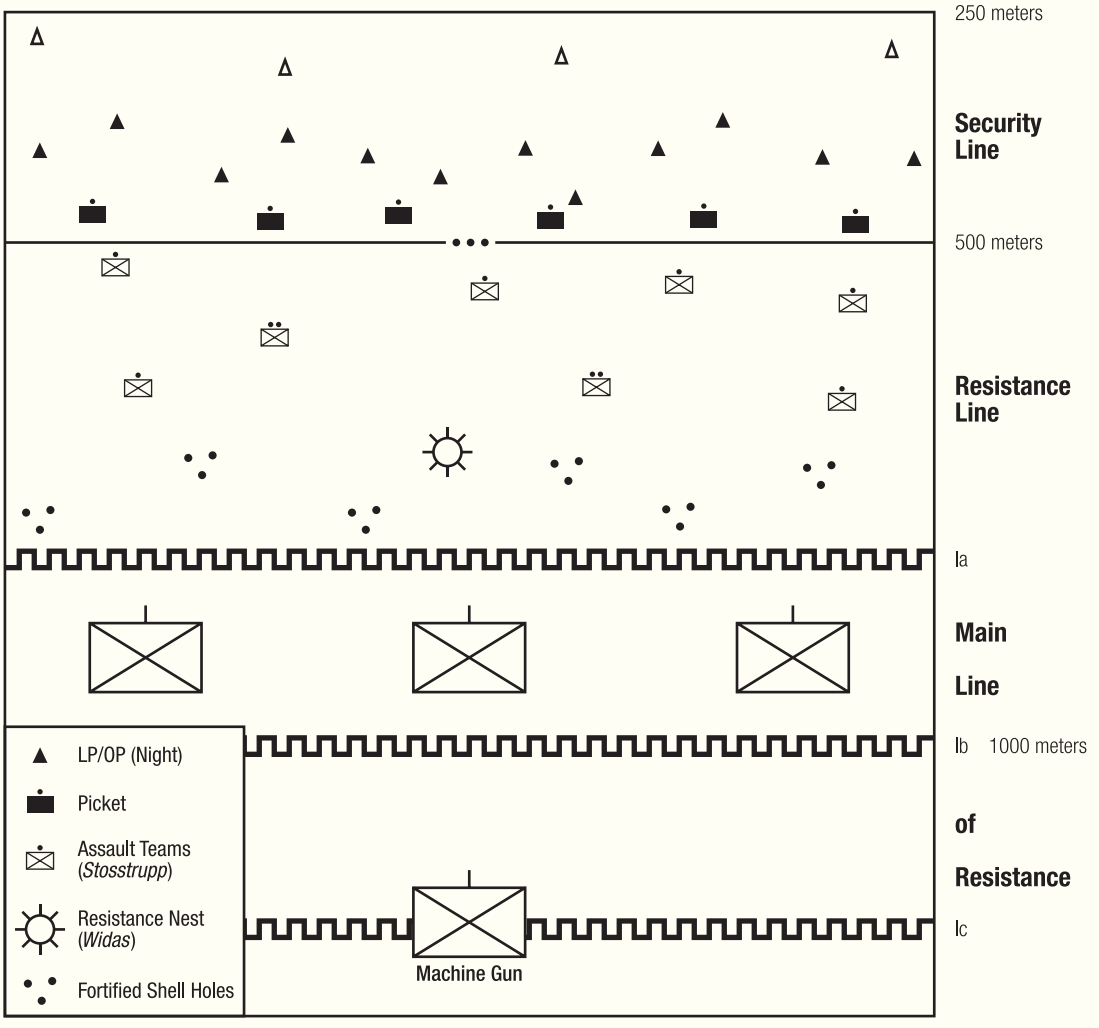


Figure 1

bearers)—*Trupp*—and the assault team of one noncommissioned officer (NCO) and seven riflemen—*Stosstrupp*. The teams could operate as a complete assault squad, form assault sections with other squads or teams, or operate independently (e.g., machine gun team in a resistance nest and assault team conducting counterreconnaissance). The assault squad epitomized at the lowest level the concept of parry (machine gun team) and thrust (assault team), which translates to fire and maneuver. More important, it reflected a great amount of trust and responsibility in junior NCOs; the squad leader used his own initiative and independence to attack the enemy as he saw fit, greatly enhancing the agility of the mobile defense.

Together, the security and resistance lines shielded the main line of resistance from enemy eyes. In the event of a major attack, the security and resistance lines (with the exception of the resistance nests) withdrew to positions in the main line of resistance, presumably occupying predesignated resistance nests or ordinary shell holes as assault squads. The Germans noted that the majority of Allied artillery fires fell about 500 meters from the front lines. Accordingly, with the evacuation to the main line of resistance, German frontline troops were spared horrific artillery bombardment.[13]

For major attacks, the main line of resistance became the initial line of defense—constituting not only the rear of the outpost zone but also the forward edge of the battle zone. It was sited approximately 1,000 meters from the enemy front lines and on a reverse slope (if available). Here, the battalion main body was garrisoned in the old trench lines—labeled *Ia*, *Ib* and *Ic*—each 200 meters apart (figure 1). The battalion used these trenches for accommodations only and moved to positions to the front and rear of the trenches during attacks. Forward of the trenches, the ratio of assault troops to resistance nests was 60:40. To the rear of the trenches (near the battalion rear boundary), the Germans established strong points with the battalion heavy machine gun company (six machine guns) providing the majority of the garrison. Here the manpower ratio of assault platoons to strong points was 40:60. The strong points remained as bulwarks while the assault platoons maintained pressure on the shoulders of the breach. In this manner, the main line of resistance absorbed the initial shock of the attack, limited the breadth of the penetration and attempted to fracture the cohesion of the attack.[14]

The Germans reserved the battle zone as the location of the decisive battle (figure 2). Located 1,000 to 2,000 meters behind the original front lines, the battle zone was divided into a forward area and a rear area. The forward area had a depth of 1,500 to 2,500 meters and was occupied by the alert (or readiness) battalion. Eighty percent of the force was organized into assault companies for immediate counterattacks while the remaining 20 percent occupied powerful strong points. The strong points were located along the rear boundary of the forward area with the crew-served guns of the heavy machine gun company and two companies from the division machine gun brigades. The main purpose of the artillery and machine guns was to support assault companies' immediate counterattacks. From these attacks, the Allies could expect no succor from their own artillery. No evidence exists of any Allied attack successfully penetrating this portion of the defense.[15]

The rear area of the battle zone contained the reserve battalion that came forward upon alert to occupy the artillery protective line. The artillery protective line consisted of a second line of trenches, located on a reverse slope if available. It served as a safeguard to protect the artillery. The reserve battalion would be fresh since it was normally located in a rest area well out of enemy artillery range. To maintain battalion readiness, the Germans rotated their battalions every two weeks between the outpost zone and battle zone. The reserve battalion actually formed part of the division reserve and hence was activated by the division commander. The mission of the reserve battalion was either to prevent the attacker from penetrating farther or to act as the vanguard of the deliberate counterattack. It is noteworthy that whenever the reserve battalion entered the sector of the forward battalion, the forward battalion commander assumed control of it. In this manner, unity of command and objective were maintained.[16]

The snap-back recovery of the defensive sector now came into action. An entire division from the field army reserve occupied the rearward zone, postured to launch the deliberate counterattack within a couple of days of an enemy offensive. The reserve division used this time to plan and coordinate with the forward division for the counterattack. The lead regiment occupied a third line of trenches 2,000 meters behind the artillery protective line. The second-echelon regiments in turn were located 2,000 meters behind the lead regiment. Attacking before the attacker could consolidate his gains, the reserve division swept forward in an irresistible rush, crushing all resistance in its path and reestablishing the cohesion of the defense, though not necessarily the original frontline trace.[17]

The effectiveness of the Elastic Defense is well documented from the defensive battles of 1917. Despite some resistance to this new concept and selective noncompliance by a few

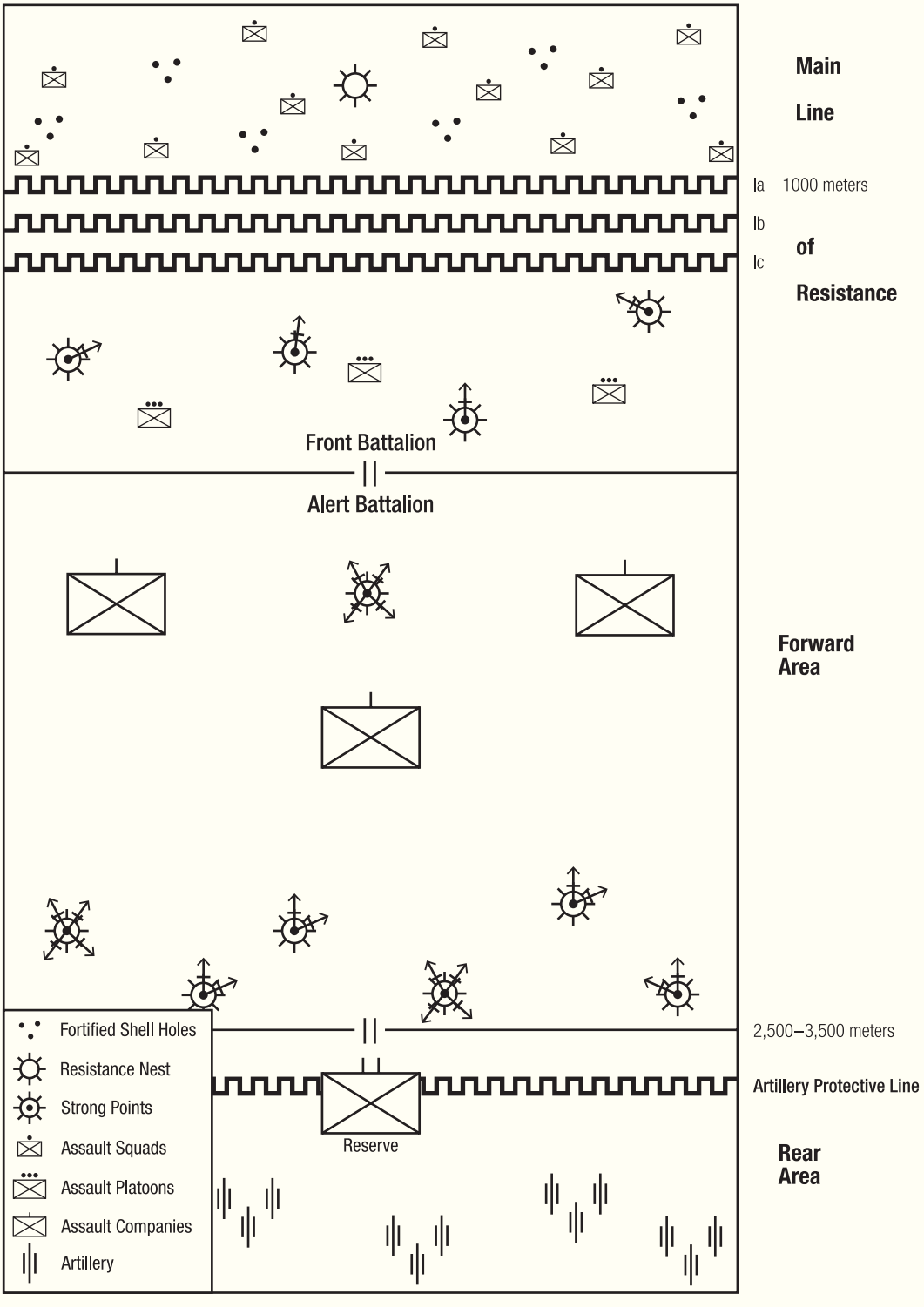

Main
Line
Ia
Ib
Ic
1000 meters
of
Resistance
Front Battalion
Alert Battalion
Forward
Area
Fortified Shell Holes
Resistance Nest
Strong Points
Assault Squads
Assault Platoons
Assault Companies
Artillery
2,500–3,500 meters
Artillery Protective Line
Reserve
Rear
Area

Figure 2

German higher-level commanders, the Germans utterly smashed every French and British great offensive.[18] Unfortunately for the postwar generation of soldiers and scholars, the operational lessons from 1917 were largely overshadowed by the events of 1918. Having suffered tremendous losses during the 1918 Peace Offensive, particularly in the elite assault divisions, the German Army was unable to establish a cohesive front before the Allies—revitalized by the American Expeditionary Force—launched a series of counteroffensives culminating in a crisis for the German Army in September 1918. With a collapsing army and no hope of victory, the German government sought an armistice in November 1918. Curiously, the Allies forgot about the Elastic Defense. The Germans did not.[19]

Interwar Years. The Elastic Defense went through minor modifications in 1921 and 1933, reflecting Germany's strategic position following the Treaty of Versailles and later the influence of mechanized warfare. Reflecting the wartime doctrine, the 1921 version was organized into an advanced position, an outpost zone and a battle zone. The advanced position reflected the modern covering-force area, in which forces provide early warning and prevent the enemy from discerning the location of the defensive lines. Although the rearward zone had disappeared, the forces of the advanced position would withdraw behind the battle zone and serve as a counterattack force. The zones were increased in depth to force the displacement of the enemy artillery as the attack progressed to the battle zone. Both the outpost and battle zones comprised a series of fighting positions with no trench system. Again, the envisioned destruction of the attacker was gained through the use of depth and maneuver combined with integrated fires and the counterattack at all levels.[20]

The 1933 version saw the return of the rearward zone as the Germans addressed the problem of defeating armor threats. The advanced position conducted a mobile defense and withdrew to the rear after providing early warning of a major attack. The outpost zone defeated enemy reconnaissance and provided precise early warning of the location of enemy assaults. The main battle position (replacing the battle zone) contained the infantry and antitank gun positions. The rearward zone held the artillery and armor reserve. Recognizing the need to disrupt the combined-arms attack, the infantry separated the attacking infantry from its tanks with small-arms fire, allowing the tanks to continue, while the combination of mines, antitank (AT) guns, special AT assault teams and artillery destroyed the isolated enemy armor. The armor reserve conducted the deliberate counterattack to complete the destruction of the enemy. Again, the emphasis was on conducting counterattacks at all levels. Two unresolved problems prevented the Germans from exploiting the advantages of the Elastic Defense. First, AT guns were too few in number and of inadequate caliber to defeat existing armor. Second, the tank was viewed as a purely offensive weapon and not as an AT weapon. Until the outbreak of World War II, few German tanks possessed an effective AT gun. No one foresaw the need to integrate tanks directly into the defense, and if tanks were forced to assume the defense, they could not contribute to the AT effort.[21]

World War II, Eastern Front. Although the Elastic Defense remained the official defensive doctrine during World War II, the Germans were never able to implement it fully. Until the winter of 1941–42, the German Army had always been on the operational offensive. The execution of Operation Barbarossa (the invasion of the Soviet Union) prevented its intended implementation. By the end of November 1941, the German juggernaut had practically reached its culminating point. Recognizing this, on 8 December the German High Command ordered the construction of a winter line in accordance with the Elastic Defense. However, an unrelenting series of Soviet counteroffensives from 6 December through the end of February precluded

its construction. The woefully depleted German divisions were still in an offensive posture and were unprepared to assume the defense of overextended sectors and take advantage of the terrain's defensive qualities. Worse, they were in need of rest and refitting after five months of continuous fighting and were at the end of very tenuous supply lines. The initial Soviet penetrations combined with Hitler's "no retreat" directive and the harsh winter created huge salients and reentrants all along the front, threatening the collapse of Army Group Center. Prevented from straightening and shortening the front, the three Army Groups—particularly Army Group Center—were unable to release divisions for recuperation and the construction of a winter line. Consequently, the German High Command's designs were overcome by events as circumstances on the front, rather than doctrine, dictated defensive dispositions.[22]

Since creating a continuous defensive front was impossible due to manpower shortages, the arctic conditions and the pressure from Soviet attacks, an ad hoc system emerged, comprising isolated battalion and company strong points centered on local villages. These strong points cannot be described as contributing to a coherent tactical defense. They were not mutually supporting, lacked tactical depth and required patrols to cover the extensive gaps between villages. Their chief advantage was that they provided shelter to the hapless defenders and allowed the Germans to consolidate heavy weapons and equipment that would have been lost in a retreat during the winter. The survival of the German Army on the Eastern Front was due less to the adoption of the strong-point defense than to the incompetence of the Soviet Army, whose attacks were poorly conceived, piecemeal and uncoordinated. Nevertheless, the mutual attrition that resulted prevented units from recovering their strength. The strong-point defense violated the intent of the defensive doctrine—dispersal and depth, establishment of the "vacant battlefield" and tactical agility. Instead of making the Soviet Army pay a disproportionate price with few returns, the German Army suffered a mutual attrition from which it could not recover.[23]

North African Front. Once his initial offensive culminated with the investment of Tobruch in May 1941, Lieutenant General Erwin Rommel guarded his eastern flank by establishing a defensive line at the Sollum Front. Adapting the Elastic Defense doctrine to the desert environment, he established a series of strong points from Halfaya Pass to Sidi Omar, southeast of Tobruch. Rommel envisioned that a company would occupy an outpost line with widely dispersed posts and that the fortified zone would possess sufficient depth to thwart a mechanized attack.

The lethal 88mm AT gun was the cornerstone of each strong point (figure 3). Established in the center of a triangular configuration, the 88mm AT gun was dug down to reduce its signature and sighted for 360-degree fields of fire. To provide immediate protection of the 88mm AT gun, a machine gun position, a heavy mortar position and a 20mm antiaircraft or 50mm AT gun position were established at the apexes. Communications trenches connected the 88mm AT gun to these positions, giving the strong-point commander the flexibility to shift weapons as the situation dictated. British penetrations into the main line of resistance were intended to founder in the gaps among the strong points.

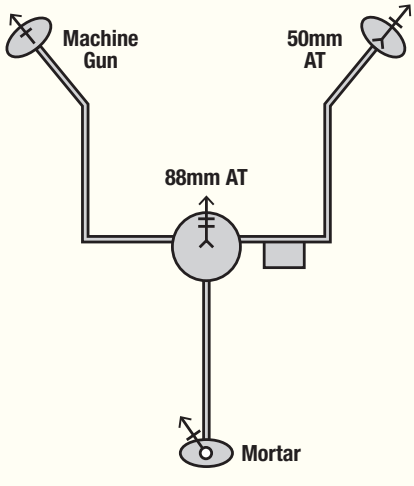


Figure 3

Rommel sought to change the mindset of conventional tactics with his tactical commanders by emphasizing the opportunities of flank and rear shots presented by the strong point defense: "There is no such thing as a 'Direction, Front,' but only a 'Direction, Enemy.'"[24] An unforeseen but welcome advantage for the defender lay in the phenomenon of desert haze. Radiating heat from the desert floor obscured everything below a meter in height. Objects greater than a meter in height (i.e., tanks, armored carriers and trucks) were magnified. Hence, while British soldiers were unable to pinpoint a strong point beyond 150 meters, German AT guns decimated British tank units with impunity.

To provide the defensive line with resilience, Rommel placed his mechanized forces in a rear, central position for the counterattack. Each strong point had enough provisions for three weeks and was expected to hold out until the counterattack reestablished the cohesion of the defense. Rommel stressed the importance of continued resistance: "Our panzers and motorized formations will not leave you in the lurch, even if you should not see them for weeks."[25]

The Sollum Line significantly strengthened Rommel's operational position during the siege of Tobruch, allowing him to inflict heavy losses on the British during Operation Battleaxe in June 1941 and Operation Crusader in November 1941. Although Crusader resulted in a defeat, Rommel came within a hair's breadth of success thanks to the tenacity of the Sollum Line. Accordingly, the tenets of the Elastic Defense remained valid in mechanized warfare.[26]

Operation Goodwood, Normandy, 18 July 1944. Unlike the Bocage (a complex of hedgerows) in the American sector of the Normandy bridgehead, the open terrain east and south of Caen in the British sector made it ideal for mechanized operations. To counter this threat, the Germans applied the Elastic Defense, transforming the area south and east of Caen into a checkerboard pattern of village strong points, all slightly dominated by a wooded ridgeline farther in the German rear.

The initial British objective of Operation Goodwood was the Bourgebous Hills, a village strong point approximately six kilometers southeast of Caen (but 15 kilometers from the British line of departure). To rupture the German defensive system, the British carpet-bombed the zone of attack with more than 2,000 bombers followed by a creeping barrage of 1,000 guns. The devastation wrought on the German defenses was pronounced. *Kampfgruppe* Luck, the reinforced 22d Panzer Regiment defending this sector of the front, was initially rendered combat-ineffective. The vast majority of its tanks and assault guns were either destroyed or temporarily out of action.

Fortunately for the defenders, an overcautious British advance and delay of the supporting infantry at the line of departure provided the necessary respite for recovery. Probably no other army could have recovered from such decimation, but the mettle of the small-unit leadership has always been a hallmark of the German Army. Arriving amid a scene of chaos and carnage, Lieutenant Colonel Hans von Luck decided his best course of action was to delay the British advance until reinforcements arrived. In Cagny, which lay on the eastern flank of the British advance, he spotted an air defense artillery battery of four 88mm guns. He quickly moved the battery into an orchard north of Cagny and engaged the British tanks. Although the 88mm had a high profile, cornfields to the front provided excellent concealment. This battery alone helped maintain the shoulder of the breakthrough as well as shredding British tank units.

Other village strong-point leaders placed whatever functional guns they had available into operation and checked the British advance toward Bourgebous. As the day wore on, the Germans repaired their damaged weapons and reinforced the line. By dusk, the Germans had

destroyed more than 200 tanks and repulsed the British offensive. Counterattacks by the 1st and 12th SS Panzer Divisions reconstituted the defense. The German success at Caen demonstrates the resilience of the Elastic Defense despite initial high attrition. Although the British may have made mistakes during the execution of Goodwood, it was the Elastic Defense that allowed the Germans to make the British pay in full.

The question for modern combat is whether the concept of the Elastic Defense is still useful. The following proposal not only underscores its viability in open terrain but also serves to inspire its adaptation for other terrain.

Adaptation of the Elastic Defense for Modern Combat

Repulsing an attack is the minimum standard of any defense. To do so without suffering mutual attrition is the height of military art. The framework of the Elastic Defense—dispersal and depth, establishment of the "vacant battlefield" and tactical agility—is still applicable and effective in the modern fight. Rommel's adaptation demonstrated how devastating a system of AT-weapon strong points combined with an armor counterattack could be to a mechanized attack. Its adaptation today as the Resilient Defense allows commanders to repulse mechanized attacks with dismounted forces and with minimum casualties.

The following description of a battalion task force fight within the context of a brigade combat team (BCT) defense provides sufficient depth for the subject matter. Depending on the width of the defensive sector, the brigade can array its battalions in echelon for greater depth or array two battalions forward with the third occupying the second echelon. The brigade and higher-echelon reconnaissance focus on verifying enemy general intentions, leaving the counterreconnaissance fight to the battalion task forces. It is not the intent of this study to present an authoritative prescription of the defense; rather, it is presented in the spirit of provoking discussion.

The Outpost Sector. Denying the enemy the ability to discern the disposition of the defense is absolutely critical to success. The battalion task force must regard the counterreconnaissance fight to be as important as the main fight. If the task force loses this effort, the attacker has a much greater chance of defeating the entire defense in detail. The task force aggressively challenges any encroachment into its sector in order to establish local moral superiority. There is not much an attacker can do to counter an aggressive counterreconnaissance effort. The lines of communication for enemy reconnaissance are much longer than for the defense, so it cannot afford to devote the resources to secure the intelligence. When faced with such prospects, the enemy must conduct a movement to contact, the worst scenario against a deliberate defense.

The outpost sector is located on the forward slope if available and spans the width of the battalion task force front (figure 4). The task force assigns the counterreconnaissance effort to a company reinforced with the scout platoon and one or more platoons from its other companies, as it deems necessary. To detect enemy reconnaissance, the outpost company establishes LPs/OPs, remote sensors and counterreconnaissance patrols. The counterreconnaissance patrols destroy enemy reconnaissance on contact. Special assault teams—one NCO leading two to four soldiers with a squad automatic weapon (SAW), M203 grenade launcher, light antiarmor weapon (LAW) and plenty of hand grenades—intercept and destroy enemy reconnaissance that infiltrates through the counterreconnaissance patrols.

The company also establishes one or two squad resistance nests behind local prominent terrain for LPs/OPs and patrols to rally on if attacked by an enemy raid or reconnaissance in

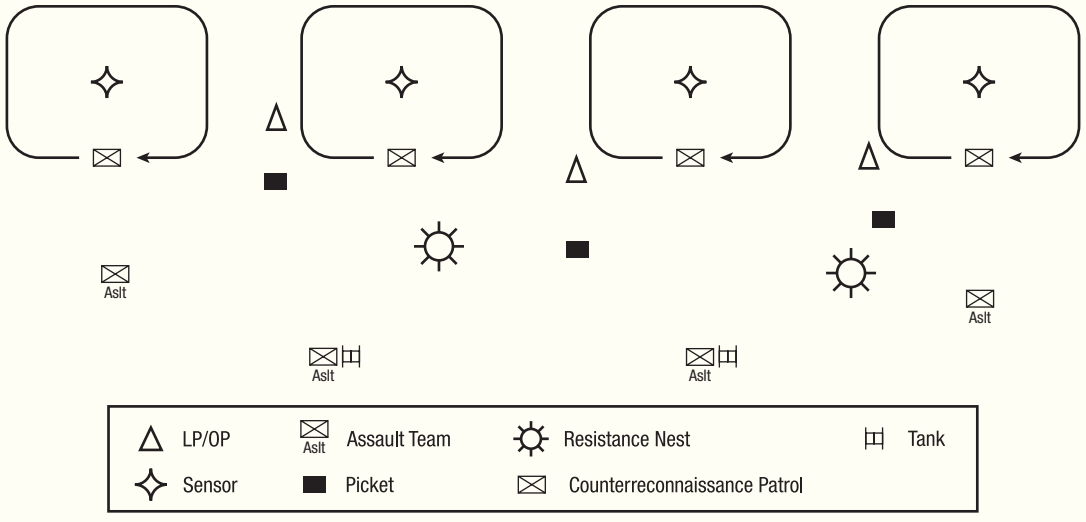


Figure 4

force. The company crew-served weapons (mortars, AT weapons and machine guns) are established in the resistance nests to dominate the major portion of the outpost sector. The outpost company commander keeps the majority of crew-served weapons in designated resistance nests in the main defensive sector during the counterreconnaissance fight. This precaution allows the battalion to defend effectively against a major surprise attack should the enemy decide to conduct a movement to contact without a reconnaissance effort.

The location of resistance nests requires thoughtful consideration. Each nest should exploit the cover afforded by local terrain, such as a reverse slope, an intervening ground swell or a fold in the ground. Locating a nest behind a village or copse of woods is also an effective tactic. If possible, it should be at least 35 meters behind the intervening terrain to provide some standoff. The orientation of the AT weapons and machine guns is generally along the flanks and rear of attacking forces. Leaders must avoid locating resistance nests on prominent terrain, despite the advantages of elevation and observation, since enemy artillery and heavy weapons occupying support-by-fire positions can destroy them in short order. Similarly, villages and copses are likely targets for artillery, so forward-edge positions must be avoided. To exploit their use, resistance nests are located along the rear edge and oriented rearward since the attacker's artillery fire will not be accurate along the rear edge. Moreover, the attacker would need to secure these terrain features in a set-piece fashion, which is a slow process. For an attack plan seeking a quick decision, the attacker will avoid these locales, which is generally a mistake—the task of these nests or strong points is to make the attacker pay for his haste.

To minimize traffic into the resistance nests, squad-sized pickets administer the LPs/OPs from nearby squad bunkers. Counterreconnaissance patrols are assigned sectors and also operate from squad bunkers. Pickets and counterreconnaissance patrols should take advantage of local artillery craters and transform them into bunkers. Their use makes it more difficult for enemy aerial reconnaissance to recognize them as bunkers.

Resistance nests are standardized to Rommel's basic design and expected to withstand enemy attacks until relieved by reinforcements (figure 5). The resistance nest provides 360-degree coverage. The centerpiece of the resistance nest is the AT weapon—tube-launched,

optically-tracked, wire-guided (TOW) missile or Javelin—with machine gun and fighting positions at the apexes. A cache for reserve ammunition, water and food ensures that the nest can continue resistance even when isolated. A protective minefield with two lanes and a standoff distance of 35 meters surrounds the nest.

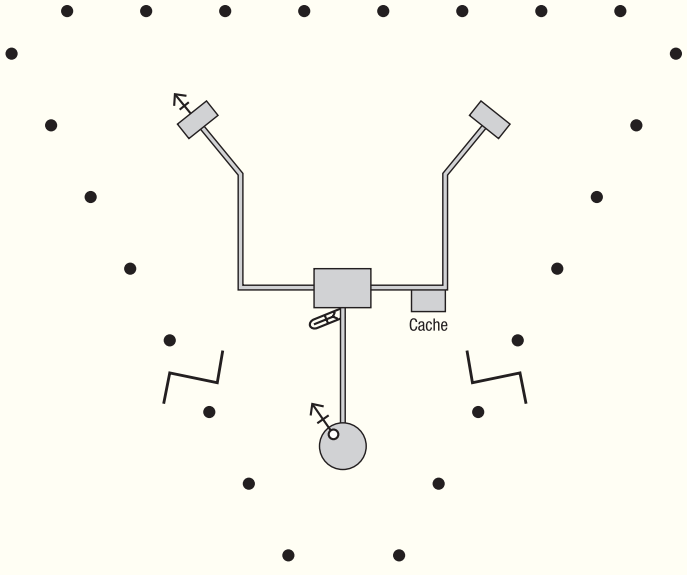


Figure 5

With the communication trenches covered with thin boards, topsoil and camouflaging, the bunker and fighting positions are an essential counter against aerial and local ground reconnaissance. During the battle, the garrison can always lift away the boards at any portion of the nest to engage the enemy as necessary. The AT crew should fire the weapon outside and to the rear of the bunker, using the cover of the bunker to mask its fires from enemy support-by-fire positions to the front. Each nest needs to stock a couple of air defense missiles (e.g., Stinger) to keep enemy helicopters at bay. The firer need not be a trained air defense specialist. Having missiles flying in the general proximity is enough to intimidate most enemy aviators. If air defense missiles are not available, light AT weapons and machine guns are suitable alternatives.

To strengthen the outpost sector, the task force commander may attach a tank section to the outpost company. In such cases, an assault team is assigned to protect the tank, to pinpoint enemy intruders and to guide the tank into a position to destroy enemy armor.

Main Line of Resistance. The Main Line of Resistance is located on a reverse slope (no matter how slight) and comprises two to three companies (figure 6). Prior to the enemy attack, the outpost company and attached units withdraw into their assigned sectors in the main line of resistance with subordinate elements occupying preestablished resistance nests or bunkers. The assault teams transform local craters into bunkers and use them as protection from enemy preliminary artillery fires. The resistance nests in the outpost sector can serve as dummy positions with decoy weapons. Every round the enemy expends against these positions increases the probability of success for the defense.

First Echelon. Time permitting, the task force also establishes dummy nests in sector. To assist in the deception, soldiers use them for living accommodations and shift to the real nests prior to the battle. To enhance deception, the depth of dummy position trenches is limited to one meter, but placing foliage (or burned oil) on the trench floor gives the illusion of greater depth to aerial reconnaissance. Camouflage must be good but imperfect for effective deception. Dummy weapon systems almost guarantee that the enemy will expend ordinance against the dummy nests, so the deception effort is always worthwhile.

Resistance nests form an irregular checkerboard pattern in depth. The distance between them is dependent on the ability to provide mutual supporting fires but is generally not more than 600

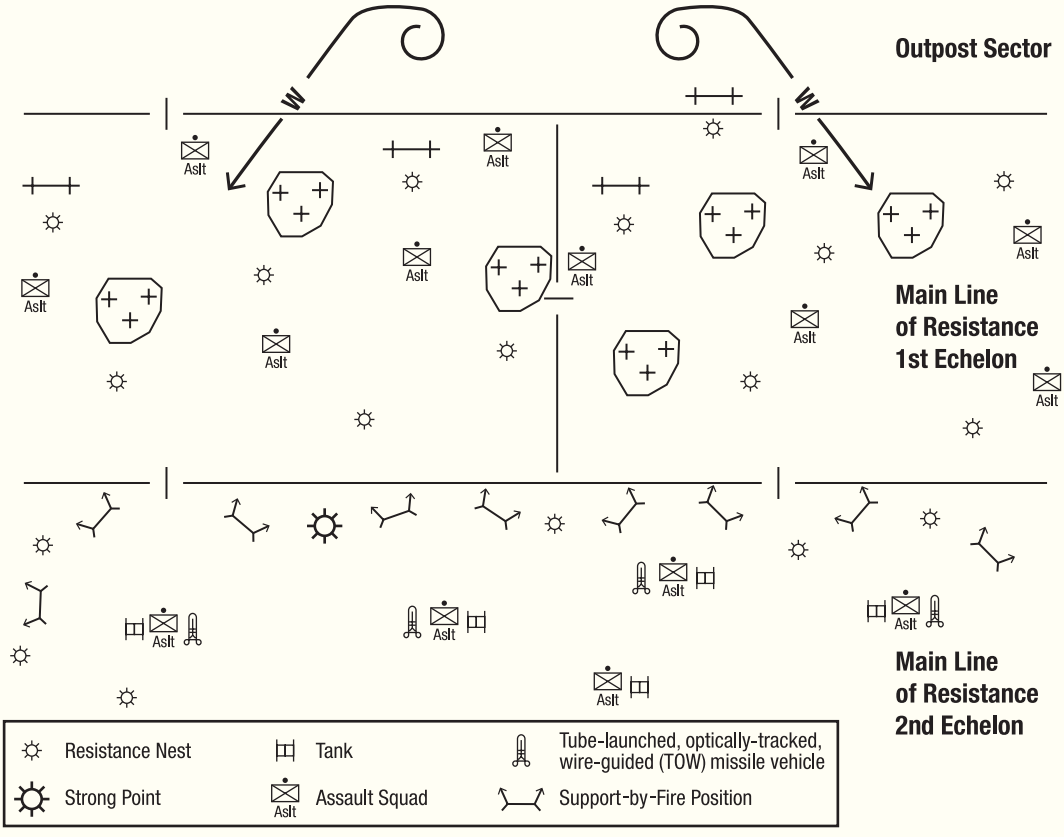


Figure 6

meters. The depth is also dependent on the amount of compartmentalized terrain since the main line of resistance should not be quartered up into isolated pockets. Otherwise this type of defense is not suitable. When available, nests on counterslopes provide even greater mutual support.

Assault teams are not tied down to any piece of terrain but take advantage of existing terrain to engage any enemy that enters their sector. They are free to avoid artillery fires and free from becoming decisively engaged with superior enemy forces. Rather, their job is to ambush, hit and run and erode the strength of any force that enters their sector. By maintaining constant pressure on the flanks of enemy penetrations, they limit the scope of the breach, allowing the task force weapons in depth to destroy enemy penetrations in detail. Assault teams may also use resistance nests from which to sally.

Because the open nature of the terrain prohibits the effective use of obstacles and indirect fires, the fire and obstacle plan focuses on denying distinct areas in each sector. In this manner, the task force can mass its fires and obstacles against hapless enemy forces that enter these areas. Targeted areas are those that offer refuge for the enemy, support-by-fire positions that dominate the main line of resistance, and covered avenues of approach directly into the main line of resistance. Assault teams also use these areas to maneuver against and suppress the enemy for artillery fires to take effect.

An initial task for the defense is to separate the armor from its infantry. Assault teams may allow the armor to pass through and engage the infantry for the purpose of suppressing it. Even

if the infantry advance is disrupted by as little as ten minutes, it is more than enough time for the AT systems in depth to destroy the unsupported armor.

Second Echelon. The task force may place its heavier weapons into a second echelon for even greater depth. As with the first echelon, the sector consists of resistance nests, one to two strong points, mobile defense areas occupied by an infantry company, the AT company (or platoon) and any attached armor. Assault squads organized from the infantry company and the engineer platoon provide protection of the tanks and TOW vehicles, as well as seeking out and destroying enemy penetrations that enter their mobile defense area. The tanks, TOW vehicles and assault squads can form mobile hunter–killer teams to use volley fire against enemy armor concentrations. Using the nests and strong points as anchor points, these teams maneuver among support-by-fire positions within their assigned area.

Deliberate Counterattack. Ensuring a successful deliberate counterattack requires some detailed coordination and reconnaissance. Regardless of rank, the task force commander of the defensive sector has operational command of the counterattack force. The counterattack force commander reconnoiters support-by-fire positions in each sector and presents these to the task force commander for approval and guidance. The counterattack force commander also keeps a liaison officer at the task force tactical operations center (TOC) in order to keep apprised of the tactical situation. The task force and counterattack force select linkup points for guides to lead counterattack forces into designated support-by-fire positions and also provide a quick tactical update. To counter enemy battlefield interdiction and chemical strikes aimed at neutralizing the reserve, the counterattack is echeloned. This means that an armored company is positioned behind each task force sector for immediate response (either partially or as a whole) into the threatened sector. The counterattack force advances into the sector by platoons to prevent the attacker from massing interdiction fires. If the threat is not contained, additional company teams from the reserve counterattack into sector. Although such a counterattack technique appears antithetical to the concept of crushing the attacker in one fell swoop, it is actually tactically prudent and effective when used in conjunction with the Resilient Defense. Professionals should not be tied to romantic notions of combat; they should focus on results. Massed deliberate counterattacks from the operational reserve are best used against deep penetrations.

Terrain Anchor Points. If the task force has one of its flanks anchored on a significant terrain feature (mountains or swamp), it must focus its counterreconnaissance effort there since enemy reconnaissance will likely exploit this feature. The task force assigns this task to a company. The company and some battalion AT weapons are oriented inward along the edge of the terrain feature, providing overlapping fires on the task force flank. Although the task force commander accepts risk by occupying the outpost sector with a reinforced scout platoon, the attacker will not likely focus the reconnaissance effort there when mountains or swamps are available. To strengthen the outpost zone, the task force commander attaches a tank section and establishes a squad resistance nest with assault squad from the main line of resistance in support of the scouts. Prior to the attack, the company withdraws into positions that cover the avenue of approach along the edge of the terrain feature, ensuring that the task force flank is well anchored. Up to one platoon continues counterreconnaissance activities during the battle.

Conclusion

The Resilient Defense neutralizes two great advantages of a mechanized enemy—mobility and firepower. Dispersal and depth make it more difficult for the enemy to pinpoint the main

line of resistance and mass against a point of weakness for a breakthrough. Fortified points allow the defender to control significant portions of terrain with minimum manpower. In this manner, the commander can devote manpower to counterreconnaissance and mobile assault squads without seriously weakening the overall defense. A significant counterreconnaissance effort prevents enemy reconnaissance from collecting detailed intelligence and prevents it from breaching obstacles or selecting support-by-fire positions dominating key friendly positions. The attacker cannot unhinge a defense based on fortified points in depth by maneuver or penetration since the resilience of the defense rests on the collection of individual points.

The "vacant battlefield" requires the attacker to become decisively engaged before he can pinpoint positions. In the course of the encounter, the attacker is forced to move against resistance nests in a piecemeal manner, thereby slowing the momentum and exposing each attacking force to the fires of other resistance nests and assault teams. Protective minefields are more difficult to pinpoint (as opposed to wire obstacles) and also force the attacker to expose engineer vehicles or breaching teams to various fires during the course of the attack. The judicious emplacement of obstacles and artillery targets behind terrain and within the depths of the sector allow the assault teams to erode the attacker by using hammer-and-anvil tactics. The net effect is to slow the attack to such an extent that counterattacking forces can occupy attack-by-fire positions without the need to move as a massed body. The location of attack-by-fire positions in the second echelon and selection for their hull/turret defilade characteristics preclude the need for engineer preparation. This advantage provides greater flexibility during the course of the engagement and precludes enemy reconnaissance from locating these positions, recording them as artillery targets or emplacing aerial deployed mines in these positions prior to friendly occupation.

The key element of the Resilient Defense is the exploitation of tactical agility at the lowest levels. Empowering junior leaders of assault teams with the authority to choose the time and place of engagement significantly increases their contribution to the fight. Entrusted with this tactical responsibility, subordinates achieve great success through their initiative and ingenuity. In this dynamic environment, the attacker not only must contend with the fires from the resistance nests but also must constantly check over his shoulder for fear of close assault.

The Resilient Defense has a firm historical foundation, tested by the high-intensity battles of the two world wars. That this tactical doctrine has failed to take hold in the U.S. Army is a reflection of the American offensive perspective in both wars rather than of the efficacy of the system per se. Rather than relying solely on technology to solve all battlefield problems, it should be viewed as a way to enhance tactical doctrine. The Resilient Defense cannot be blindly applied to different types of terrain without considerable adaptation. It was designed for open terrain and hence cannot be viewed as a panacea for all circumstances. Eventually, potential adversaries will close the technological gap that the United States currently enjoys. Since U.S. crisis response entails inserting light and medium forces into a crisis region rapidly, a potential adversary with mechanized forces will have the initial edge. To paraphrase the Duke of Wellington: If the U.S. Army attempts to defend in the same old way, it will eventually get defeated in the same old way. The American Soldier deserves more than that.

Endnotes

[1] Timothy Lupfer, *The Dynamics of Doctrine: The Changes in German Tactical Doctrine During the First World War* (Fort Leavenworth, KS: Command and General Staff College, July 1981), pp. 11–12.

[2] Martin Samuels, *Doctrine and Dogma: German and British Infantry Tactics in the First World War* (New York: Greenwood Press, 1992), pp. 64–72, 78; Samuels translates the three pillars as follows: *Flächen und Lücken* is a defense over a large area (*Flächen*) defended by a series of mutually supporting, dispersed squad-sized posts covering the gaps (*Lücken*). *Die Leere des Gefechtsfeld* literally means the empty or vacant battlefield. *Schlagfertigkeit* literally means a riposte, but tactical agility comes closest to describing its meaning in this context, denoting an active defense at all levels; Graeme Wynne, *If Germany Attacks*, repr. 1976 (Westport, CT: Greenwood Press Publishers, 1940), pp. 157, 293, 312; Wynne interprets *Die Leere des Gefechtsfeld* as the "invisible garrison," meaning that cover and concealment are so refined that the attacker cannot locate the fires; Lupfer, *The Dynamics of Doctrine*, p. 30.

[3] Wynne, *If Germany Attacks*, p. 156.

[4] *German and Austrian Tactical Studies: Translations of Captured German and Austrian Documents and Information Obtained from German and Austrian Prisoners—From British, French and Italian Staffs, Compiled and Edited at the Army War College* (Washington: Government Printing Office, 1918), pp. 122–125, 128; hereafter cited as *Tactical Studies*. The German term for the concrete resistance nests is *Widerstandnester*, shortened to *Widas*. Wynne, *If Germany Attacks*, pp. 113, 147, 151, 153, 173; Samuels, *Doctrine and Dogma*, p. 65; Lupfer, *The Dynamics of Doctrine*, p. 15.

[5] Samuels, *Doctrine and Dogma*, pp. 68–69; Lupfer, *The Dynamics of Doctrine*, pp. 13, 15; *Tactical Studies*, pp. 122–123, 127–132; Wynne, *If Germany Attacks*, pp. 150, 312.

[6] Wynne, *If Germany Attacks*, p. 158; quotation from Erich Ludendorff's *My War Memories, 1914–1918*, vol. I (London: Hutchinson & Co., 1919), p. 387.

[7] Samuels, *Doctrine and Dogma*, pp. 65–66, 68–69, 72–73; Lupfer, *The Dynamics of Doctrine*, pp. 13, 15; *Tactical Studies*, pp. 122, 127, 129, 131; Wynne, *If Germany Attacks*, pp. 123, 129, 138, 209.

[8] Lupfer, *The Dynamics of Doctrine*, p. 13.

[9] *Tactical Studies*, p. 224; Wynne, *If Germany Attacks*, pp. 150, 153, 155–157, 207, 209, 333–335, 339; Lupfer, *The Dynamics of Doctrine*, pp. 13–14, 30, 34; Samuels, *Doctrine and Dogma*, pp. 66, 69–71, 80.

[10] Samuels writes the width was 1,500 meters; Samuels, *Doctrine and Dogma*, p. 79. Lupfer says the width was one kilometer; Lupfer, *The Dynamics of Doctrine*, pp. 13, 18. Although front commanders operated under the framework of the Elastic Defense, the organizational details of the defensive sectors (zones) differed depending on the prerogatives of the local command. Since all the variations presented in Wynne's exhaustive study of the Elastic Defense go beyond the scope of this paper, my description of the zones represents a synthesis of methods in order to provide a comprehensive picture. Wynne, *If Germany Attacks*, pp. 150, 297.

[11] Samuels, *Doctrine and Dogma*, pp. 73,75; Wynne, *If Germany Attacks*, pp. 146, 151–154.

[12] Wynne, *If Germany Attacks*, pp. 151–153; Samuels, *Doctrine and Dogma*, p. 75; Lupfer, *The Dynamics of Doctrine*, p. 20.

[13] John English, *On Infantry* (New York: Praeger Publishers, 1984), pp. 12–14, 16, 20–21; Samuels, *Doctrine and Dogma*, pp. 75–76; Lupfer, *The Dynamics of Doctrine*, pp. 20, 27–29; the 1917 reorganization is as follows: the assault squad (*Gruppe*) consisted of two teams (*Trupp*). The machine gun team was comprised of one light machine gun, two gunners and two ammunition bearers. The other team comprised the squad leader and seven riflemen (12 men). Three squads comprised a platoon and three platoons comprised a company. Wynne, *If Germany Attacks*, pp. 153–154, 295, 327.

[14] Samuels, *Doctrine and Dogma*, pp. 75–76; the number of squads includes the forces of the security and resistance lines. Battalion organization was four infantry companies and one machine gun company. Lupfer, *The Dynamics of Doctrine*, pp. 13–15, 17; again, the internal dispositions differed from command to command. In some Army sectors, the machine gun strong points constituted a powerful fortified line. At Passchendaele, this line was strengthened with all the regimental heavy machine guns while the immediate reserve division occupied the artillery protective line. Wynne, *If Germany Attacks*, pp. 151–152, 295–297, 307, 311.

[15] Samuels, *Doctrine and Dogma*, pp. 76–78; Lupfer, pp. 13, 16; the German term is *Bereitschaftsbataillon*, which means readiness or alert battalion. Wynne, *If Germany Attacks*, pp. 292, 297, 311, 333.

[16] Samuels, *Doctrine and Dogma*, pp. 78–80; Lupfer, *The Dynamics of Doctrine*, pp. 16, 18–19; Wynne, *If Germany Attacks*, p. 312.

[17] Samuels, *Doctrine and Dogma*, pp. 79–80; Lupfer, *The Dynamics of Doctrine*, pp. 19–20; Wynne, *If Germany Attacks*, p. 337.

[18] Samuels, *Doctrine and Dogma*, pp. 80–82; Lupfer, *The Dynamics of Doctrine*, pp. 29–35.

[19] Samuels, *Doctrine and Dogma*, pp. 80–82; Lupfer, *The Dynamics of Doctrine*, pp. 29–35.

[20] Published in the 1921 operations manual, *Führung und Gefecht der vebundenen Waffen* (Combat Leadership and Combined Arms) attempted to reconcile Chief of Staff Hans von Seeckt's insistence on fighting a mobile defense without abandoning the advantages of the proven defense. In reality, serious efforts at modifying the defensive doctrine were suspended until von Seeckt resigned in 1926. Timothy Wray, *Stand Fast: German Defensive Doctrine on the Russian Front During World War II: Prewar to March 1943*. Research Survey Number 5 (Fort Leavenworth: Command and General Staff College, 1986), pp. 9–14.

[21] The 1933 manual, *Truppenführung*, remained the official defensive doctrine up to World War II. Wray, *Stand Fast*, pp. 14–18.

[22] Two exceptions were the British counterattack at Arras, 21 May 1940, and the Soviet attacks against Army Group Center from July through September 1944. The Germans were able to divert disaster at Arras with the expedient use of the 88mm antiaircraft gun in an antitank role. Army Group Center was not so fortunate and suffered egregious losses with a net shortage of 80,000 men (mostly infantry) by 1 October. This fight reflected exactly what would confront the German Army on the Eastern Front for the remainder of the war: overextended frontages, undermanned divisions, unfavorable defensive terrain and inadequate supplies. By the end of November, the average strength of a division on the Eastern Front was as follows: infantry division at 65 percent, mechanized infantry division at 60 percent and armor division at 35 percent. Wray, *Stand Fast*, pp. 18–56.

[23] The average division strength in Army Groups North and Center (the "defensive front") remained at 50 percent for the remainder of the war. Since Army Group South received the majority of replacements and reinforcements, the majority of the divisions on the defensive front reduced their complement from nine to six battalions. Worse, Hitler forbade the diversion of resources to building an east wall along the defensive front since he viewed such measures as a waste of resources and defeatist in attitude. Wray, *Stand Fast*, pp. 57–107, 111–113.

[24] Quoted by H. W. Schmidt, *With Rommel in the Desert* (New York: Ballantine Books, 1951), p. 81.

[25] Quoted by Schmidt, *With Rommel*, p. 82.

[26] Schmidt, *With Rommel*, pp. 69, 81–82; Paul Carell, *The Foxes of the Desert* (New York: Bantam Books, 1962), p. 30.

[27] John Keegan, *Six Armies at Normandy* (New York: Penguin Books, 1984), pp. 192–193, 200–219; Hans von Luck, *Panzer Commander* (New York: Dell Publishing, 1989), pp. 189, 192–200.