CSI REPORT

NO. 13

TACTICAL RESPONSES TO CONCENTRATED ARTILLERY



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Combat Studies Institute
U.S. Army Command and General Staff College
Fort Leavenworth, Kansas 66027-6900

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In this publication, when the masculine gender is used, both men and women are included.

CONTENTS

Page

Preface v

Introduction 1

Chapter

1 **Soviet Artillery in Battle: A Historical Perspective** 13
by Lieutenant Colonel James R. Holbrook

2 **World War I: Elastic Defense and the U.S. 3d Division at the Marne River** 33
by Lieutenant Colonel Michael E. Dunn

3 **The Impact of Massive Artillery Fires on Command, Control, and Communications in the European and North African Theaters During World War II** 57
by Lieutenant Colonel Roy R. Stephenson

4 **German Counterartillery Measures on the Eastern Front in 1944–45: Operation Bagration** 73
by Dr. Samuel J. Lewis

5 **Japanese Counterartillery Methods on Okinawa, April–June 1945** 93
by Dr. Thomas M. Huber

6 **The Korean War: The United Nations' Response to Heavy Bombardment** 107
by Dr. William Glenn Robertson

7 **The Korean War: Chinese Forces' Response to Heavy Bombardment** 119
by Dr. Gary J. Bjorge

8 **Israeli Defensive Measures Against Arab Artillery** 131
by Dr. George W. Gawrych

PREFACE

The focus of this study is on how the armies of different nations countered the threat of massive concentrated artillery and/or other types of preparatory fires. Not all were successful, and the reasons for the success or failure of each army provides the contemporary military commander an opportunity to learn from his "predecessors" and benefit from their hard-learned lessons.

INTRODUCTION

The Western Front in World War I provides the classic case of a response by defending armies to concentrated artillery fire. This is the standard to which even conflicts as far removed as the recent Iran-Iraq War are compared. All the methods available to counter heavy artillery concentrations were present in the Great War: fortification, armor, dispersion, constant movement, deception, counterfire, and ground attack on the gun line. Yet the Great War did not start out as an artillery war. Initially, the armies that became locked in combat on the Western Front had seen artillery only as an auxiliary to a battle between bodies of infantry and cavalry. The scale of artillery used in earlier battles was modest compared to that of later struggles where the number of artillerymen engaged could approach the infantry strength as close as 8 to 10.[1] Prewar tactical emphasis was on light quick-firing artillery capable of supporting forces fighting in the open, creating and protecting flanks, and maintaining the advance of maneuver forces. Only the Germans, who had to overcome Belgian frontier forts, invested much in heavy artillery. Tactical doctrine was offensive, suitable it was thought, to the spirit of the contending nations. It was not, of course, suitable to the conditions of war the two sides found on the World War I battlefield.

The contending armies were forced to ground at first, not by the artillery, but by the fire of magazine rifles and the limited number of machine guns available at the start of the war. By the end of 1914, the armies faced each other across a no-man's-land from fairly shallow trench systems that extended in breadth from the Alps to the English Channel. It was then that artillery, particularly indirect artillery of medium and heavy calibers, came into its own. Artillery became the means to open new flanks by blasting penetrations into enemy trench systems. For the defender, it became the means of

protecting or covering flanks. The attacker's artillery was required to suppress the defender's direct-fire systems, to cut the defender's wire entanglements that denied access to his trench lines, to destroy the defender's positions, to block relief by his reserves during an attack, and to neutralize the defender's artillery. Knocking out the defender's guns would prevent him from bombarding the attacker's artillery, his command and control, the assaulting infantry, and those reserves that would concentrate on the attacker's side of no-man's-land to sustain an offensive once launched. On 1 July 1916, British units suffered significant numbers of casualties on the way to their jumping-off point.[2] By 1916, sufficient artillery, guns, and stocks of ammunition were available to give meaning to the aphorism, "Artillery conquers, infantry occupies."[3]

The creation of great concentrations of artillery, capable of breaking a pathway into enemy trench systems, forced a change in defensive tactics. Both sides moved to deeper defensive systems, with German Colonel Fritz von Lossberg developing what has become the classic concept of elastic defense.[4] This called for a thinning out of forward defenses, always subject to destruction by enemy preparation fires. Lossberg recognized that artillery could blast a path for infantry forces for a distance limited by its maximum range. Once this distance was reached, however, the infantry forces would find themselves at a distinct handicap with regard to heavy fire support. Indeed, if maneuver forces could be held back, out of the attacker's beaten zone, the attacker's forces could be struck with a counterattack while they were still suffering from "the disorganizing effects of victory,"[5] the random and disorganizing losses that accompanied any advance. Their withdrawal could be blocked by a standing barrage, and they could be destroyed out of sight of their own supporting fires.

Conceptually, the scheme of defense called for sighting a security zone on the military crest of a piece of high ground. Since the Germans had occupied about one-third of France in their initial advance, they could select a good defensive line and then withdraw to it, which they did on a large scale at least twice during the war. Such a withdrawal was clearly more difficult for the Allies. The defender would set up his forward line of defense on the reverse slope of the terrain feature, out of direct observation and free from direct or observed fires. Even this line was designed only to resist local attacks, not general offensives. Behind this line was a zone of machine-gun posts and/or successive trench lines whose purpose was to support the forward defense line and to break up the coherence of attacking forces strong enough to overcome the forward defense. This zone was deep enough to draw the attacker out from under his own artillery support, and it led to a final line of resistance behind which were fresh counterattack troops whose purpose was to apply that "flashing sword of vengeance,"[6] which Carl von Clausewitz saw as the source of the greater strength of the defensive form, hopefully to restore the entire defensive zone. The counterattack was the most important feature of the elastic defense, and it remained a characteristic of German defensive fighting through World War II. Interestingly enough, reserves designated for the counterattack were committed under the command of the officer responsible for a zone of the defensive system notwithstanding the relative rank of the commander of the counterattack force versus the commander of the defensive zone. This provided for the ability to respond before the attacker could knit his own defense together when the advance was stopped.

To deal with this sort of defensive zone, the armies armed their maneuver forces with far more effective accompanying weapons and decentralized their tactical execution. The combination of infiltration tactics and limited objective attacks could minimize the effect of the elastic defense and increase the cost to the defender,

but it could not lead to the strategic or operational success necessary to bring the war to the end. The war of attrition, always the consequence of an inability to win a decisive victory or find a basis for negotiation, continued. This proved to be the case no less on Okinawa and in Korea than on the Somme.

In World War II, several of the World War I problems were corrected. Operationally, tactical air support provided compensation for the immobility of an attacker's cannon artillery. Mechanized forces, protected from small-arms and machine-gun fire, using infiltration tactics and now controlled by radio, could break through an enemy's defensive zone and exploit into the operational depths, disrupting the coherence of the whole defense until the defender too adapted to the requirements of mechanized warfare, learned to control his own reserves (mechanized and air) by radio, and recognized that defensive zones would have to be deepened to correspond to the geometric increase in mobility inherent in the shift from foot to mechanical traction or even aerial insertion. For all that, the tactical problem remained very much the same: absorb the enemy's preparation fires, break up his attack, counterattack to destroy his forces, and restore the defense. While the decisive defensive battle might now be fought by operational reserves upon whose success or failure the entire theater defense might rest, this was so largely because the defensive fighting in secondary zones remained very much what it had been in World War I. Modern armies, dependent on umbilical cords from their rear, can move as self-sustained forces only for limited periods of time. The "immobile mass," or fixing force, protects the movement of the means of sustainment from interference by enemy ground combat units. By its presence, it requires the concentration of the breakthrough force on limited axes. In World War II, the opposing infantry divisions provided the framework for the mobile battles, and to the extent that forces will continue to be required to hold ground in modern defensive combat, they will continue to do the same.

To understand the tactical counters to artillery available to maneuver forces, one must first place artillery in the combined arms context and recognize its strengths and weaknesses. Artillery is a means of placing destructive effects, normally of greater extent than those possible by direct-fire weapons, at greater distances than can be achieved by direct-fire systems. Artillery systems are flexible because they are able to shift the effects of their fire without moving their weapons, a consequence of their range. They are generally handicapped by the weight of their ammunition which, as a direct result of the need for range and effect, is heavy and bulky.

Artillery fires can be characterized as being area or precision. The function of area fires is normally neutralization. Destruction by such means is generally prohibitively expensive in both time and weight of metal. With the exception of nuclear weapons, which have their own drawbacks, it takes a large number of weapons and a great amount of ammunition to achieve the density of fire necessary to suppress a large area of ground. This normally requires a large number of ammunition carriers or some sort of prestockage that, in turn, provides some evidence of intentions and additional congestion of road nets. Where targets can be located with precision, predicted fire can reduce the weight of ammunition required, but the total is still significant. Today, we count on smart munitions and precise acquisition systems to keep the total weight of ammunition (though not necessarily the cost) in bounds. In World War I, gas was used as a means of suppression that would achieve good effect even from a near miss, although it too required continuous fire to maintain its effect.

Against an enemy who concentrates significant artillery weapons to neutralize an area of a defender's position, there are three basic defenses. The first is to use protection, either by digging in, building field fortifications, or protecting with armor. Protection by engineering reduces mobility and consequently makes forces

vulnerable to precision fires. Therefore, engineering activities must be combined with action by some mobile force to avoid the systematic reduction of the overall force over time. The second method of defense is to thin out one's forces, as Lossberg did, and to protect those left in place. This may make the enemy's task of breaking into a position easier, but forces kept out of the beaten zone are then intact for counterattack and, once intermingled with the attacking enemy, harder to bring indirect fire upon. Lossberg's response implies a force-oriented defense in which terrain is a tool of defense, not an object. An active counter to neutralization fire is a heavy program of counterfire. The drawback here is that it may be difficult to acquire a clever enemy's units before they uncover to fire, thus condemning one's own units to play catch-up, often under fire, a "race" for parity, the most to be expected under these circumstances.

Against precision fires, there are some additional counters. Deception is the most common. If you deny an enemy a target location, precision fire is impossible. A variety of methods have been used successfully: false emitters, dummy positions to draw fire, night occupation, and camouflage discipline. In addition, frequent movement compounds the enemy's problem of targeting in the absence of continuous observation. If you refuse an enemy target identification, he must fall back on area fire and its consequent logistic and temporal burden.

One final caution is in order. High densities of indirect fire are characteristic of breakthrough battles, not meeting engagements. Current artillery cannon range extends about thirty kilometers beyond the forward line of own troops. It is in the zone of cannon artillery that maneuver forces must move and fight in the face of the heaviest concentrations of indirect fire. Soviet forces, in a movement to contact, will have accompanying artillery, but its effect will be much diminished until forward movement slows and a

situation approaching a thirty-kilometer artillery zone is reestablished. To displace artillery still takes time, as does building a coordinated program of fires. On the other hand, multiple rocket launcher systems, used against area targets, and fixed-wing aircraft in close air support, if they are free from interference from low- and mid-altitude air defenses, can carry heavy fire effects beyond the range of cannon. Both have drawbacks in their ability to sustain fire, but the impact of concentrated aerial artillery at General Heinz Guderian's crossing of the Meuse in May 1940 is indicative of the operational effect of tactical concentration at the right place and time. If we can deny the enemy the targets for his rocket batteries and freedom to use his air support, he will be driven inevitably and by his own proclivities back on his cannon. Much of the Soviet artillery's means of sustainment, like ours, is relatively road bound, thin skinned, and hence subject to interdiction. The "Red God of War" may have significant difficulty moving forward on a battlefield marked by intermingled forces and heavy interdiction.

INTRODUCTION

NOTES

1. At 3d Ypres, July 1917. Shelford Bidwell and Dominick Graham, *Fire-Power: British Army Weapons and Theories of War, 1914–1945* (Boston, MA: George Allen & Unwin, 1985), 90.

2. Martin Middlebrook, *The First Day on the Somme* (London: Penguin Press, 1971), 159.

3. Attributed to the French General Staff by J. F. C. Fuller, *The Conduct of War, 1789–1961* (London: Minerva Press, 1968), 166.

4. Graeme C. Wynne, *If Germany Attacks: The Battle in Depth in the West* (Westport, CT: Greenwood Press, 1976), 202 et. seq. Wynne is the classic study of tactical adaptation on the Western Front in World War I.

5. Carl von Clausewitz, *On War*, edited and translated by Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1976), 206.

6. Ibid., 370.

INTRODUCTION

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CHAPTER 1

SOVIET ARTILLERY IN BATTLE: A HISTORICAL PERSPECTIVE

by Lieutenant Colonel James R. Holbrook

In the introduction to his book, *The Red God of War*, British military analyst Chris Bellamy vividly describes some of the effects of massive artillery barrages. Basing his description on eyewitness reports from several wars, he recounts the "sheer horror" and the "sense of hopelessness" artillery barrages create among those on the receiving end. For soldiers subjected to massive artillery barrages, artillery is a "monstrous, apparently unstoppable machine, slicing mechanically through earth, rock, flesh, bone and spirit." The "psychological effect multiplies its cold lethality many times." Bellamy continues:

> Artillery oppresses, jars, stuns and disorientates the enemy and lifts the morale of its own troops. Artillery and rockets provide the greatest firepower and sear a path for infantry, mechanized forces and armour both physically and spiritually. Throughout the centuries, no army has understood this better than the Russian.[1]

This chapter highlights the preeminent role artillery has played in Russian and Soviet military history. The artillery heritage from the Imperial period, including the influence of tsarist officers on the new Red Army in the 1920s and 1930s, is very important for our appreciation of the role of artillery in the modern Soviet Army. Then, after a general discussion of Soviet artillery support of

offensive operations during World War II, this chapter will conclude with some comments on possible current trends.

Imperial Russian Heritage

Since its introduction into Muscovy in the fourteenth century, artillery has arguably been the centerpiece of Russian combat power. According to medieval records, the Russians first used guns to defend Moscow against the Mongols in the late summer of 1382.[2] Based on this chronicled date, in 1982 the Soviet Army celebrated the 600th anniversary of Russian artillery with great fanfare. During those 600 years, Russian artillery has maintained a record of progressive and innovative developments in both doctrine and technology, as well as their applications on the battlefield.

In modern history, during the early eighteenth century, Peter the Great took a personal interest in the development of artillery weapons and doctrine. He had bells taken from churches and monasteries and melted down for their metal. He personally wrote a field manual, *Rules of Combat*, the first three paragraphs of which dealt with the means of neutralizing or carrying off the enemy's artillery.[3]

Two great Russian battle captains of the late eighteenth century—Field Marshal P. A. Rumyantsev and his pupil, the legendary Generalissimo Alexander Suvorov—devoted considerable attention to artillery. The outlines of the combination of Soviet massed fires and mobility can already be seen in their own employment of artillery. During the Seven Years' War (1756–63), for example, Rumyantsev used his field guns in large massed batteries. During the Russo-Turkish War of 1769–74, he showed great skill in the development of mobile firepower, moving his guns from place to place on the battlefield and achieving impressive concentrations of fire.[4] Recognizing the value of concentrated artillery in support of

the main attack, Suvorov successfully concentrated fire at the decisive point during the storming of Ismail in 1790. Altogether, he allocated 67 of the 110 guns available, plus all the firepower of the fleet (500 guns), to support an amphibious assault.[5]

One of the earliest manuals anywhere in the world devoted to artillery tactics was the *General Rules for Artillery in Field Combat*, written on the eve of the Russian War of 1812 by Russian Major General Alexander Kutaysov. Kutaysov's work reflected not only a further sophistication of massed fires and mobility but also the beginnings of doctrine for the employment of artillery reserves and counterbattery fire. Kutaysov paid particular attention to the massing of artillery against a breakthrough sector and the creation of an artillery reserve that, he said, could be comprised of horse artillery whose speed and lightness enabled it to move swiftly to various points. According to his *General Rules*, the artillery's main task in the offense was to destroy the enemy's artillery. This emphasis on counterbattery was several years ahead of its time.[6]

Drawing on the experiences of the Napoleonic Wars, Russian Lieutenant General N. Okunev appears to be one of the first to recognize the totality of the destructive and decisive nature of massed artillery fires. According to his book, *Memoranda on the Change Which Artillery Used Correctly Will Produce on Modern Grand Tactics* (1831), artillery was not merely a "supporting arm" but could achieve results by itself. Okunev believed that the secret of success in the attack was an enormous massed battery of 80 to 100 guns. "In order to survive, the artillery had to be fearless; it was necessary to swamp the enemy with fire before he had the chance to retaliate."[7]

Early Soviet Artillery

Such were some of the main concepts for field artillery employment that came, together with many Imperial Russian artillery officers, to the young, ragtag Red Army after the revolutions of 1917. Bellamy argues convincingly that, due to the need for specialized technical expertise in artillery, the influence of the Imperial artillery on the Red Army was more pronounced than that of other arms. The new army was forced to rely on former officers of the tsar.[8] One example of this carryover from the Imperial artillery tradition was that the Main Artillery Directorate (*GAU*), which had been established in 1862, was taken over completely intact after the Bolshevik Revolution by the leaders of the Red Army. Former Imperial staff officers were simply told that they would now devote their efforts to the defense of the revolution and Soviet power.

In addition to acquiring this important organization, the young Soviet regime had the more or less voluntary services of two tsarist artillery experts: Lieutenant General Y. Sheydeman and Colonel V. Grendal. They wrote many of the most influential artillery manuals in the 1920s. Sheydeman, in particular, presided over the analysis of problems revealed in World War I—using air photos, adjusting fire from aircraft observers, compensating for meteorological conditions, and using sound ranging. A measure of this tsarist artilleryman's influence in the young Red Army is that, by the end of 1922, he had become chief not only of artillery but also of armored forces.

In 1924, the Red Army held the All-Union Artillery Conference at which Mikhail Tukhachevsky, the young Red Army Civil War Front commander, delivered a paper "Maneuver and Artillery." This paper, together with other conference discussions of artillery combat against aviation, tanks, and armored vehicles, strongly influenced the Frunze reforms of 1925. Many of these reforms were

reflected in the 1929 Field Service Regulations. These regulations articulated principles for employing artillery that apply to Soviet artillery even today:

- Close cooperation with all arms throughout the entire battle.
- Massing of fire.
- The suddenness and flexibility of fire.

Another aspect of modern Soviet artillery doctrine that surfaced in clear terms during the 1920s was the issue of artillery and maneuver. Some Red Army leaders tended to view artillery as incompatible with the war of maneuver they wished to fight. Another former tsarist artilleryman, General Golovin, argued in a 1925 article that artillery was even more important in maneuver warfare. According to Golovin, it is necessary in order to preserve one's freedom to maneuver and to deny it to the enemy: "The initial collision between opposed forces in any future war should be pursued with the utmost savagery and therefore, everything had to be thrown into a massive fire blow right at the start."[9]

By the late 1920s, V. Triandafillov, a new young star, appeared on the horizon. Here was an officer who was almost entirely of Soviet military upbringing. Although he had served briefly in the tsarist army, Triandafillov was a truly gifted Red Army officer whose theoretical contributions were based on his experience during the civil war and his innate abilities to perceive the essence of future warfare. In his *Character of the Operations of Modern Armies* (1929), Triandafillov saw clearly the need for artillery to accompany advancing troops through the enemy defense, not "just with fire, but also with wheels." His scheme of artillery operations remains valid even today. According to him, great quantities of artillery were esential for the successful breakthrough of positions held by infantry armed with the heavy weapons of modern war. He believed that

the artillery should outnumber the infantry by 2 to 1. As Bellamy suggests, "this may be the reason for the colossal Soviet artillery build-up in the 1930s and the high proportion of artillery to other arms in the Soviet Army today."[10] Triandafillov is the originator of the famous "norms" that Soviet planners use today. For example, he determined that the amount of artillery needed to support an offensive would be such that a "corps attacking on a 5 km sector would require some 300 guns, which meant reinforcing it with 4–7 artillery regiments. This density of artillery was generally attained by Soviet forces during 1942 and was greatly surpassed by the end of the war."[11]

Soviet Artillery in World War II

The results of the Imperial Russian Army heritage and the creativity of the more gifted Red Army commanders can be seen during the Soviets' war with Germany from 1941–45.

One of the first developments in Soviet artillery during the early stages of the war was a reduction in the number of artillery pieces in frontline divisions. This artillery was reorganized into the reserve of the Soviet High Command. As the war progressed, control of artillery became more and more centralized. (By 1945, 35 percent of all Soviet artillery was under the control of the Supreme High Command Reserve, where it would be allocated according to need.) Stalin's directive "On the Artillery Offensive" (January 1942) stressed the principles developed in the 1920s and 1930s:

- Concentration on the main breakthrough sector.
- Maintenance of continuous support throughout the entire period of the offensive.
- Artillery and mortar fire moving with the infantry and tanks into the attack, and from one objective to the next.[12]

In 1942, the Soviet Army re-created the artillery division, a formation that had first appeared in 1819. By 1943, divisions were being combined into artillery corps. The composition of corps, as well as several other artillery formations, was often tailored to a particular operation. Figure 1 shows the massive number of artillery pieces concentrated on breakthrough sectors, as well as the tailoring for different Soviet operations.

In addition to providing massive artillery support for breakthroughs, artillery formations devoted considerable attention to counterpreparation. For example, the counterpreparation at Kursk on 5 July 1943—3,000 guns and aircraft—severely disrupted the German deployment at the outset of Operation Citadel. Counterbattery fires also were carefully planned and viciously executed. Figure 2 shows the counterbattery actions during some of the same major operations listed in figure 1.

Artillery Support for Operation Bagration, 22 June–29 August 1944

One good example of artillery support of an offensive is Operation Bagration, the Belorussian operation in 1944. At the start of 1944, the Soviets clearly had the strategic initiative. Soviet war production was at its peak, lend-lease materiel was at its maximum levels, and Soviet military commanders and units had matured under fire. The Battles of Moscow, Stalingrad, and Kursk were behind them.

Between January and 22 June 1944, the Red Army had inflicted serious damage on the *Wehrmacht*: the Leningrad siege had been broken, the Crimea and most of the Ukraine had been liberated, and Finland had been forced out of the war, ending its collaboration with Germany. Five German armies had been smashed. In late spring, all Soviet forces along the front went to the defensive and began to prepare for the summer offensive. On 6 June, the Allies invaded Europe.

Type and Density of Artillery on Breakthrough Sectors in Selected Operations of the Great Patriotic War

Offensive operation	Unit or Formation	Breadth of sector, km	Total guns, mortars, rocket launchers	Break-through sector, km	Total guns, mortars, rocket launchers on break-through sector	Density of artillery of 1 km of breakthrough sector: Operational — General	Operational — Over 76 mm / Over 76 mm without rocket launchers	Tactical — General	Tactical — Over 76 mm / Over 76 mm without rocket launchers
Stalingrad counter-offensive 19–20.11. 42	5TA	35	2166	10	1067	107	103 / 64	—	—
	119RD	5	570	5	554	—	—	111	102 / 64
	421 RR	2	183	2	183	—	—	91	87 / 60
	65A	12	2405	9	1980	220	203 / 122	—	—
Kursk counter-offensive 7–8.43	11GA	36	3703	14	2516	180	170 / 142	—	—
	8GRC	3	930	3	734	—	—	245	235 / 227
	11GRD	1.5	—	1.5	381	—	—	254	233 / 225
	5GA	16	2325	6	1610	268	260 / 190	—	—
	33GRC	6	1680	6	1610	—	—	268	260 / 190
Belorussian operation 6.44	65A	24	2146	8	1572	197	185 / 140	—	—
	18RC	8	1572	8	1572	—	—	197	185 / 140
	37GRD	2	500	2	470	—	—	235	214 / 169

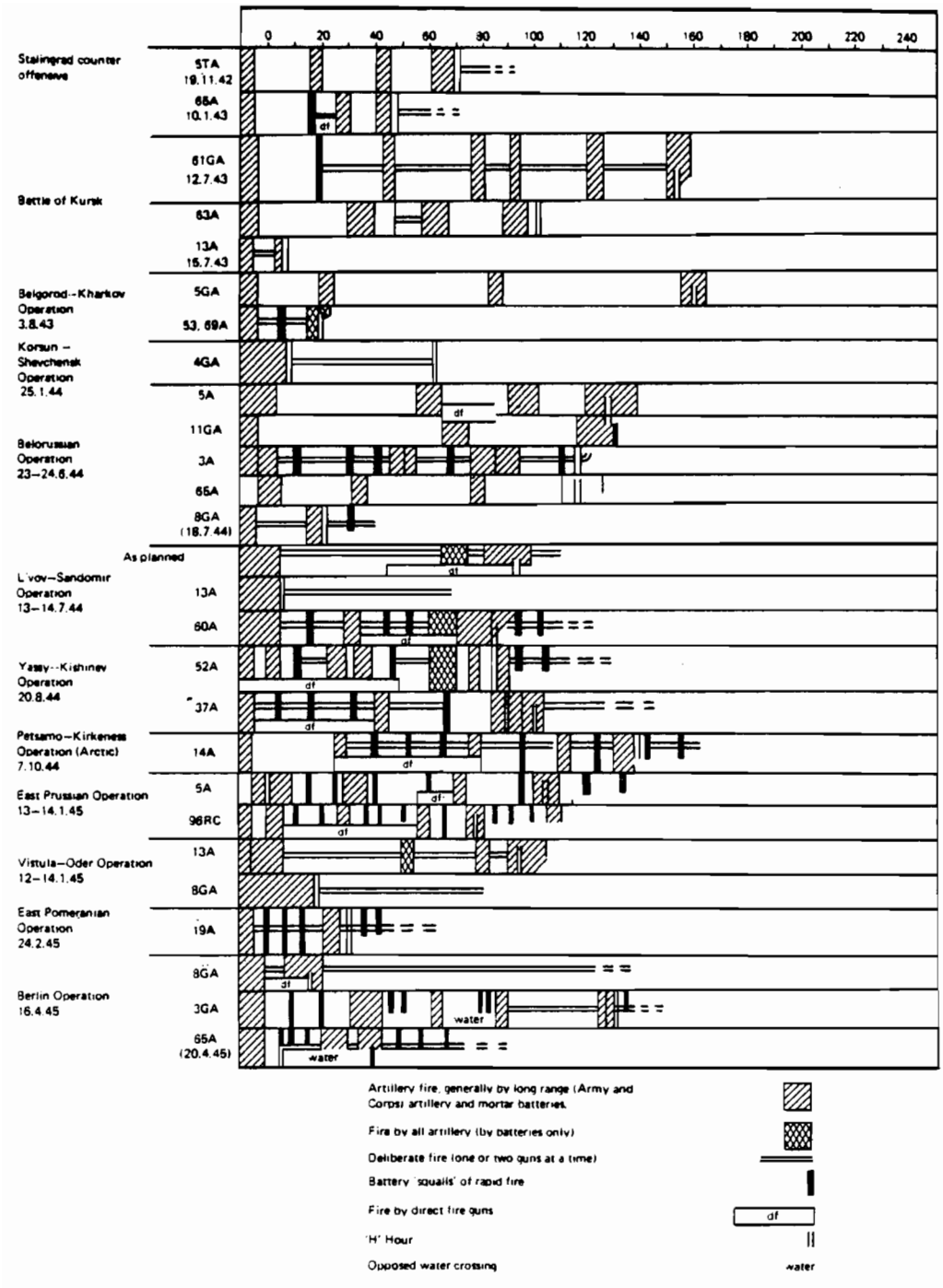
Source: Bellamy, *Red God of War*, 52–53.

Figure 1. Type and density of artillery on breakthrough sectors in selected operations of the Great Patriotic War

L'vov-Sandomir 7.44	60A	30	2641	8.3	2183	264	250/209	—	—
	28RC	4	—	4	1090	—	—	272	256/215
	302RD	1.5	—	1.5	489	—	—	326	320/280
Yassy-Kishinëv 8.44	37A	9	2272	6	1877	313	266/235	—	—
	6GRC	5.5	956	2.5	900	—	—	360	336/305
Petsamo-Kirkeness 10.44	14A	up to 60 (Arctic conditions)	2454	9	1540	171	153/114	—	—
	131RC	7	710	4	684	—	—	171	150/123
	10GRD	2	460	2	440	—	—	220	210/156
Vistula-Oder 1.45	8GA	30	2846	7	2438	348	327/291	—	—
	29GRC	2.5	1090	2.5	1051	—	—	420	396/369
	27 GRC	1.8	540	1.8	517	—	—	287	277/250
	76GRR	0.8	—	0.8	250	—	—	312	300/270
Berlin 4.45	5SA	9	2825	7	2430	347	308/265	—	—
	13A	9	2403	9	2356	252	242/230	—	—
	102RC	5	1373	5	1350	—	—	270	252/240
	147RD	1.5	458	1.5	450	—	—	300	280/260
	64ORR	0.8	—	0.8	—	—	—	300	—

(Source: Peredel'skiy *et al.*, pp. 130–35)

Figure 1 (continued)



Source: Bellamy, *Red God of War*, 56.

Figure 2. Suppression of enemy batteries during selected operations of the Great Patriotic War: type and duration of counterbattery fire (Simplified). Time shown in minutes along the top.

The Soviets' primary strategic objectives for Operation Bagration were to liberate Belorussia from German occupation and to destroy or defeat German Army Group Center. German strategy was essentially to defend in place. Hitler was convinced the Allied invasion was coming, and he believed it necessary to defeat the Allies on his Western Front before he could renew offensive operations in the East.

As the Soviets prepared to launch Bagration, they amassed within the four operational Fronts (a Front is roughly equivalent to a U.S. army group):

> 5 air armies (5,327 aircraft, in addition to 700 bombers from the Long Range Bomber Force)
>
> 15 armies, 8 tank and mechanized corps (a total of 166 rifle divisions)
>
> 2,715 tanks
>
> 1,355 self-propelled artillery guns
>
> 33,000 guns and mortars (including 13 artillery divisions and more than 20 antiaircraft artillery divisions from the Supreme High Command Reserve)[13]

The correlation of forces heavily favored the Soviets: 3 to 1 in manpower, 10 to 1 in tanks and self-propelled artillery, and 8 to 1 in guns and mortars. Figure 3 shows the variety of artillery equipment and task organizations within one of the armies (11th Guards) of the 3d Belorussian Front. Artillery support was carefully tailored to the tasks and conditions of each major formation. Likewise, the artillery preparation by each Front differed according to the mission, nature of the terrain, and enemy defenses.[14]

Some other notable features of Soviet artillery in Operation Bagration were:

- In the 1st Belorussian Front alone, up to forty regiments of artillery arrived by train and sixty-nine artillery regiments were regrouped within the Front.

- In the 43d Army, 1st Baltic Front, more than 150 artillery batteries were concentrated to support a 7-kilometer-wide breakthrough sector.

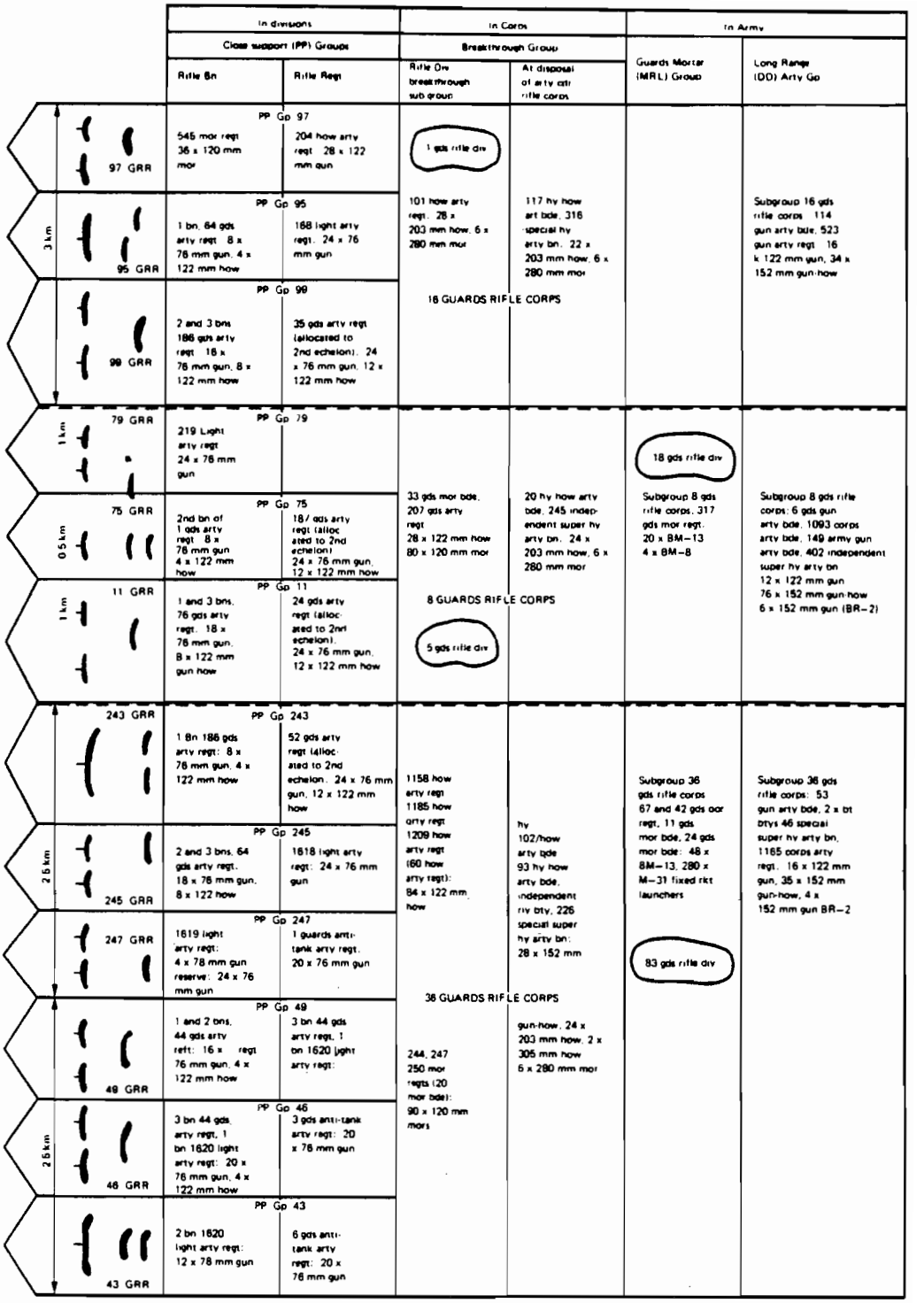
- Tactical density for artillery in 1 rifle division was 235 guns, mortars, and multiple rocket launchers per kilometer.

- Most of the artillery deployments occurred within eight to ten days before the start of the operation. Enough went undetected that the Germans failed to identify the major concentrations and axes of advance accurately.

- Eighty to 90 percent of all artillery within the Fronts was concentrated in the Frontal breakthrough sectors (which represented 11 to 20 percent of the overall width of the Fronts).[15]

Possible New Trends in Soviet Artillery

Many observers have noted that the Soviets place great emphasis on their World War II experiences. This is understandable in light of the great successes they enjoyed during the last two years of that war. Moreover, a future war in Europe would involve many of the same techniques that worked forty-five years ago. But there is ample evidence that Soviet military planners are well aware of the changes that have occurred in doctrine and technology.



Source: Bellamy, *Red God of War*, 59.

Figure 3. The Belorussian strategic offensive operation, artillery grouping of 11th Guards Army, 23 June 1944

Chris Donnelly points out in a 1982 article that several military writers are questioning the applicability of many of the experiences of World War II.[16] The changing battlefield environment—primarily new weapons and high-speed maneuver of all units—suggests problems that they did not have to deal with in World War II.

Some of their specific concerns, as reflected in the contemporary Soviet press, are:

- High proportion of moving armored targets that are difficult to locate, hit, and damage.
- Constant and rapid relocation of artillery units necessary for a high-speed offensive.
- High (and fluctuating) speeds of the assault being supported by the artillery.
- Extreme effectiveness of enemy counterbombardment, especially with advanced projectiles.
- Difficulty of locating enemy batteries in defensive positions.
- Need to locate and destroy individual weapons capable of delivering nuclear warheads.
- Enormously increased frequency of meeting engagements.[17]

Some Soviet officers have even challenged the validity of the Soviet artillery norms. For example, doctrinal norms for suppressing fire are supposed to destroy 25 percent of the men and equipment. But, for some military doctrinal writers, this is not good enough. What is needed is a rolling barrage, combined with directed or concentrated fire at known enemy targets in order to continually neutralize the enemy. This thesis is supported by those who believe the psychological aspects of artillery fire are most important during the preparation and support phases of the attack:

"The attacker's success depends not so much on the degree of destruction as on the fact that the survivors are unable to fight for some time after the shelling has stopped."[18]

Conclusion

Artillery appears to be the most prestigious and influential arm of the Soviet Ground Forces today. For example, only artillery has retained a chief marshal, a rank that has been eliminated in the other arms. The quantity and quality of Soviet artillery weapons, already impressive, continue to grow.[19] Soviet artillerymen are constantly studying ways to adapt their historically successful tactics to meet the needs of the modern battlefield. But the principles of massed fire and mobility, principles that have stood the test of time in Russian military history for hundreds of years, continue to form the framework for Soviet tactical and operational innovation.

CHAPTER 1

NOTES

1. Chris Bellamy, *Red God of War: Soviet Artillery and Rocket Forces* (London: Brassey's Defence Publishers, 1986), 1. This excellent volume forms the basis, along with Duffy (below), of the historical account in this chapter. Bellamy has used the works of the most prominent Soviet artillerymen, who themselves have combined memoirs with data from the Soviet Ministry of Defense Archives. Historical data on artillery in World War II in Soviet publications since 1986 adds little that is new to the survey compiled by Bellamy. His book provides the best comprehensive treatment of Soviet artillery in the English language.

2. Ibid., 9.

3. Christopher Duffy, *Russia's Military Way to the West: Origins and Nature of Russian Military Power, 1700–1800* (London: Routledge & Kegan Paul, 1981), 17–18, 22–23.

4. Ibid., 177.

5. Bellamy, *Red God of War*, 18.

6. Ibid., 20.

7. Ibid., 21.

8. Ibid., 43.

9. Ibid., 44.

10. Ibid., 46.

11. Ibid.

12. Ibid., 49–50.

13. Although there are discrepancies in actual numbers between the sources, the following sources provide background and data on the Belorussian operation: John Erickson, *The Road to Berlin* (Boulder, CO: Westview Press, 1983), 214; V. Mikhalkin, "Boevoe primenenie artillerii v Belorusskoi operatsii [Combat use of artillery in the Belorussian operation]," *Voenno istoricheskii zhurnal [Military history journal]*, June 1984:25–26; and William M. Connor, "Analysis of Deep Attack Operations: Operation Bagration, Belorussia, 22 June–29 August 1944," unpublished report, Combat Studies Institute, U.S. Army Command and General Staff College, March 1987, Annex C, 1–2.

14. Interestingly, artillery preparation in the 1st Baltic Front never fully developed according to plan. On 22 June, the Front commander, General Bagramyan, sent out a reconnaissance in force that was so successful that he decided to advance the timing of his main attack without using fully the planned artillery preparation.

15. Mikhalkin, "Boevoe primenenie artillerii," 25–26.

16. C. N. Donnelly, "The Wind of Change in Soviet Artillery," *International Defense Review* 15 (No. 6–1982):737–44.

17. Ibid.

18. Ibid., 79.

19. See, for example, "Soviets Revive Heavy Artillery Formations," *Jane's Defence Weekly*, 19 March 88:534–535, reprinted in *Field Artillery*, August 1988:44–45.

CHAPTER 1

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CHAPTER 2

WORLD WAR I: ELASTIC DEFENSE AND THE U.S. 3d DIVISION AT THE MARNE RIVER

by Lieutenant Colonel Michael W. Dunn

Facing a defender on either side of the Western Front in World War I were tons of explosives from massed artillery that literally chewed up and destroyed all in its path, including the ground itself. The common defenses of massed forward positions were either totally destroyed and broken through or suffered the tremendous casualties that were bleeding both sides white.

To hold against this onslaught, the defender needed to minimize the effects of massive artillery fires. The defensive tactics that proved successful used flexibility, decentralized control, thinning of forward lines, deception, and protection provided by entrenchments. The defender relied on counterattack to accomplish the mission of keeping the enemy in check and retaining terrain.

Trench Warfare and Doctrine Development

Trench warfare in World War I evolved as a direct result of the destructive power of modern weapons. Early battles of maneuver became too costly in terms of casualties. French and British troops in exposed areas suffered heavily from well-placed German artillery and machine guns. The Germans, likewise, were shocked by the accuracy and rapid fire of the French and British weapons. Thus, with infantry attacks prohibitively expensive, trench warfare became the norm. Destruction of enemy defenses by massive artillery fire

appeared to be the best way to achieve tactical penetration of enemy lines.[1]

The massive artillery preparations that developed were plagued with problems. Surprise was needed but often lost. Close coordination between artillery and advancing infantry was difficult. Wire communications and messengers were used, as only a few poor radios were available. When the attacker tried to displace forward, his attacking infantry became exhausted, and moving the artillery was difficult, especially over the cratered and torn-up terrain.

As the attacker struggled to exploit early successes, the defender usually had time to bring up reserves and establish new defensive lines. Movement of reserves was easier for the defender, who could use rail, trucks, and good roads. The attacker had to reinforce over the broken ground of the cratered trench lines. The defender also had the advantage of being able to concentrate his artillery fires, especially on a narrow penetration.[2]

Early in the war, both sides emphasized rigid defense of forward lines. As the cost of attacking increased, voluntary surrender of any terrain to an enemy attack was viewed as treasonous. Many believed a defense in depth, with troops allowed to withdraw under pressure, would encourage cowardice, and units expecting to withdraw would only halfheartedly defend their positions.[3]

As the war progressed, the Germans developed a defensive technique known as the elastic defense. Since the German strategy in 1915–17 was to defend in place on the Western Front while attempting to attack and win first in the East, the French and British received fewer attacks. Consequently, later on in the war, the Allies developed their own tactics for elastic defense.[4]

The German elastic defense, and later Allied versions, emphasized three principles: flexibility, decentralized control, and

counterattack. The defense sector contained up to five defensive lines in depth, with the first two or three on the reverse slope, if possible. Only about 25 percent of the infantry was positioned in the first two trenches. A further refinement of this tactic had troops move from the trenches into deep bunkers during heavy bombardment. Troops in forward outposts would leave their trenches and take cover in nearby shell holes. After the barrage targeted on their trenches had passed and before the attacking infantry arrived, troops would return to the shattered trench lines and open fire.[5]

Decentralized control was achieved by giving squad and platoon leaders independence of action, such as defending anywhere forward of the main defensive line, normally the third trench line. A further innovation was to have the forward battalion commander direct the defense for a regiment. With the forward battalion in the first two trenches and the other battalions positioned farther back, this forward battalion commander had the authority to order a regimental counterattack at the most appropriate time. This system contrasted sharply with the French and British decision cycles. Their commanders had to get orders and reserves from the corps or army commander who was miles to the rear. The third principle called for counterattacks at every level to retake lost ground before the attacker could consolidate his gains.[6]

The British and French used massive artillery preparations lasting days in their attempts to totally destroy an area before infantry pushed to penetrate and break through. These attempts often proved unsuccessful and continued to be costly in resources, especially casualties. At the Somme (June–July 1916), the British Fourth Army fired more than 1.6 million rounds on a 14-mile front over 6 days. This inflicted great damage but did not destroy the German defenders. The British suffered 57,470 casualties on the first day of their assault.[7]

Russia's withdrawal from the war in 1917 and the arrival of U.S. forces caused the Germans to plan an offensive in the West for 1918. This offensive was to defeat the Allies before the United States could bring more combat units to bear. As the Germans planned their attack, they studied the lessons of the war to develop new offensive tactics.

An early reformer of offensive tactics was a French Army captain, Andre Laffargue, whose pamphlet "The Attack in Trench Warfare" was based on his 1915 combat experiences. Although the French published it, distribution was for information only, and the British did not even translate it. In contrast, the Germans captured a copy in 1916, immediately translated it, issued it to units, and used the concepts in their tactical development.[8]

> Laffargue advocated a sudden attack to achieve a deep penetration. His attack resembled a gulp, not a nibble. The momentum of the in-depth attack would disrupt the enemy, keep him off balance, and prevent him from organizing an effective response. To capitalize on disruption, the assault had to advance as far as possible. The first wave would identify—not reduce—defensive strongpoints and subsequent attack waves would destroy them. An artillery bombardment applied suddenly in depth throughout the enemy area would precede the infantry assault. Disruption of enemy artillery batteries was particularly important to protect the infantry advance.[9]

The Germans published their new offensive tactics in January 1918 as *The Attack in Position Warfare*, which described "an attack-in-depth, a devouring of the entire enemy position instead of nibbling away at the enemy front line."[10] These tactics, known as Hutier tactics or infiltration tactics, stressed infantry-artillery cooperation, with pyrotechnic control measures, with the infantry

determining the speed of the attack, not the artillery. All artillery missions (preparatory fire, creeping barrage, isolating the objective) were addressed in detail. The intent was that artillery would neutralize, not destroy, enemy positions and would avoid an artillery duel, which would favor the Allies weight of numbers and ammunition. Attack formations were organized for depth and speed, initially to bypass enemy strengths and push deep, with the lead echelon attacking until exhausted rather than losing momentum by the forward passage of lines. Small-unit leadership continued to be necessary for initiative and independent action in this fluid situation. However, higher headquarters (corps or army) controlled the reserve units.[11]

The artillery concept was refined as follows:

> First Stage: Surprise concentration, hitting headquarters, phone links, command posts, enemy batteries, and infantry positions. Fire is sudden, concentrated, and makes extensive use of gas.
>
> Second Stage: Most batteries reinforce those batteries already firing on enemy batteries.
>
> Third Stage: Fire for effect on designated targets according to range. Some batteries continue to shell infantry positions, and heavy pieces engage long range targets.[12]

After detailed and concentrated training, the Germans launched their offensive in March 1918 and were successful until they were halted by stiffening Allied resistance at the Marne River, including U.S. actions at Chateau-Thierry and Belleau Wood, and their own overextension of lines of supply. This early German success was enhanced by the use of a rigid forward defense by some French commanders.[13] The Germans regrouped and began their last

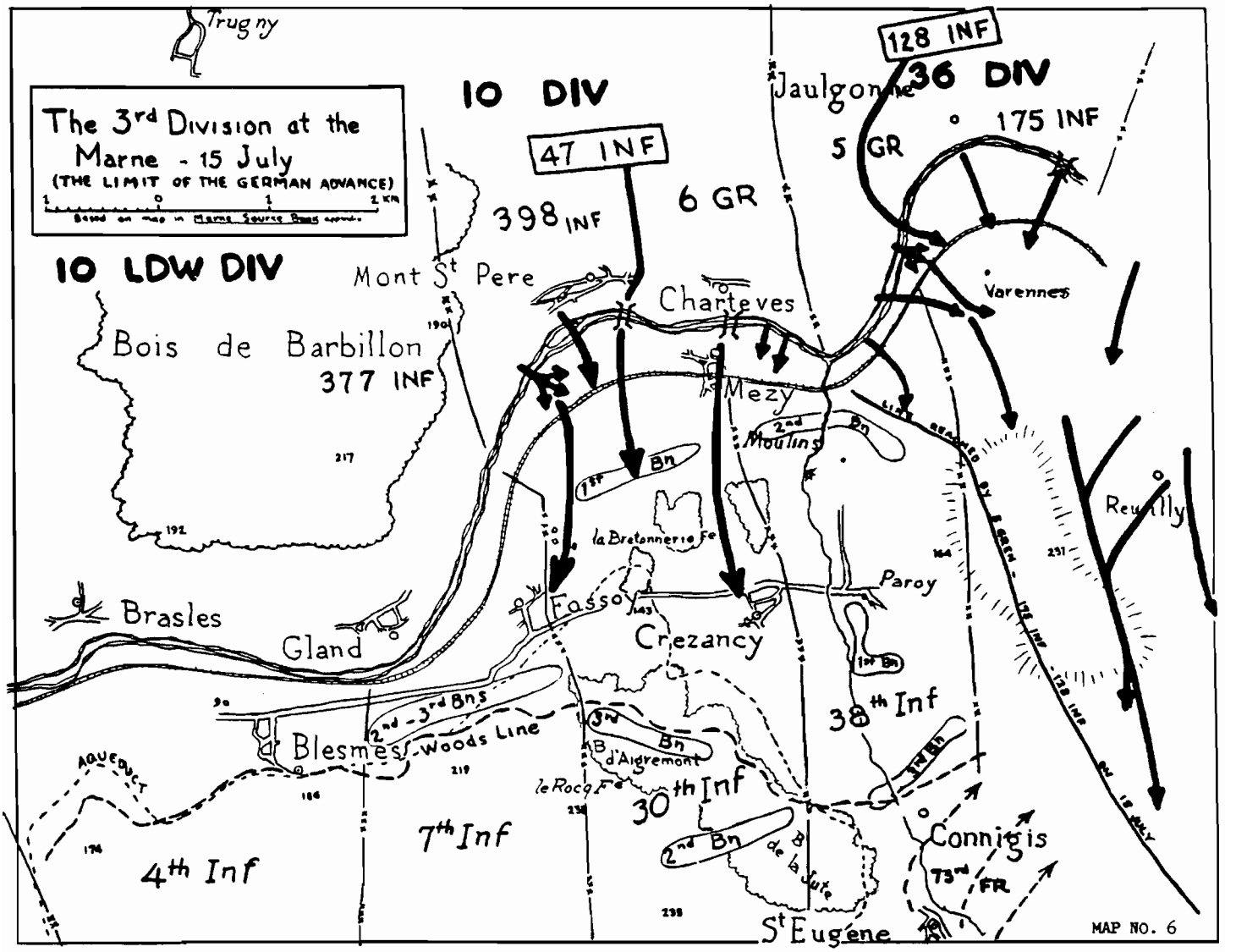
attack of this offensive on 15 July 1918. Their objective was to cross the Marne River and break the Allied line.

Rock of the Marne (Battle of Mezy)

On 30 May 1918, the U.S. 3d Division "stepped into history."[14] Having recently arrived in France, the 3d had not yet completed its scheduled training in the tactics developed by the French and British, but General John J. Pershing ordered it forward to assist in stopping the German advance. Attached to the French 38th Army Corps of the French Sixth Army in the Chateau-Thierry area, initially the 3d Division was committed piecemeal, by battalions and regiments, to strongpoints along the Marne. The division was finally reunited, received its own sector, and began to prepare defenses (see map 1).[15]

Early in 1918, French commanders had been split on whether to use the rigid forward defense or the flexible defense in depth. After the German successes of that spring against the rigid defense, the French commanders changed to an elastic-type defense.[16]

The French 38th Corps (to which the U.S. 3d Division was attached) now organized the defense along the Marne following the principles of flexibility, decentralized control, and counterattack. The forward divisions (left to right—French 39th, U.S. 3d, and French 125th) were to defend in depth using multiple lines of resistance, with the third line as the main line of resistance (MLR). The 38th Corps directed that forward troops were to "fight with their feet in the water, so to speak."[17] If the forward lines were pierced and counterattacks failed, the forward combat groups were to "hold out individually to break the enemy's formations."[18] The corps then placed two reserve divisions in the center behind the U.S. 3d Division. The U.S. 28th Division was put in defensive positions on the reverse slopes of hills, and the French 73d Division, the corps



Source: Rexmond C. Cochrane, *The 3rd Division at Chateau Thierry: July 1918* (Army Chemical Center, MD: Historical Office, U.S. Army Chemical Corps, 1959), 49.

Map 1. The 3d Division at the Marne, 15 July 1918

counterattack force, was positioned so it could move either left or right.[19] Both reserve divisions were three to five miles south of the river and just out of range of the bulk of German artillery. The corps was thus defending with three divisions up and two back.

To defend along the south (near the bank) of the Marne River, the U.S. 3d Division deployed all four infantry regiments on line (left to right, the 4th, 7th, 30th, and 38th) with only three companies (one battalion) of the 4th Infantry in division reserve, positioned on the far left in the rear of the 4th's sector. The three artillery regiments of the division were deployed: the 76th Field Artillery (75-mm) on the western half of the sector, the 10th Field Artillery (75-mm) on the eastern half, and the 18th Field Artillery (155-mm), together with five French artillery batteries (75-mm, 105-mm, and 155-mm), in general support.[20]

U.S. 30th Infantry

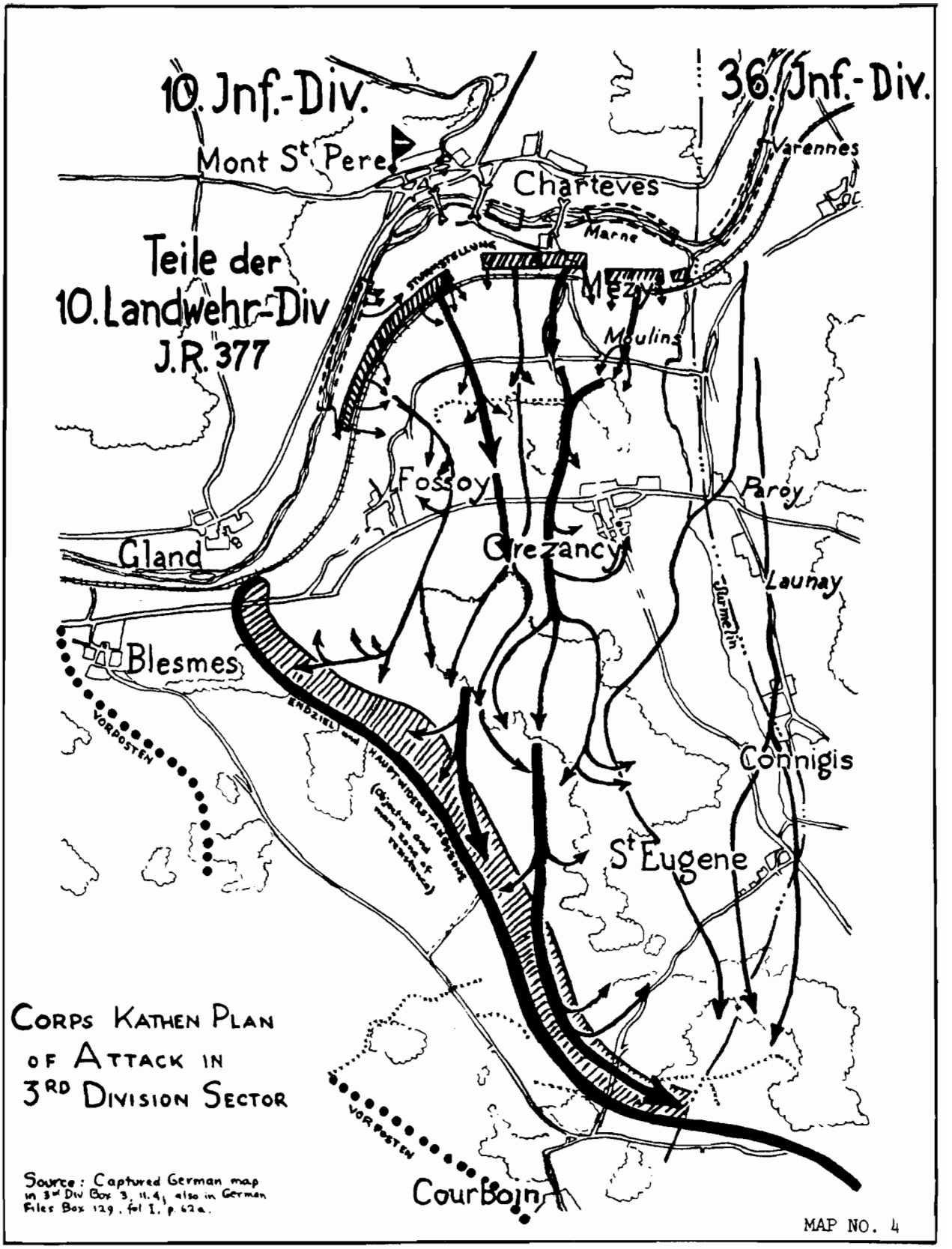
The U.S. 30th Infantry assumed its sector on the night of 10–11 June 1918 in the center of the 3d Division's area. The Marne River was seventy yards wide and too deep to ford. On the German side, the ground rose steeply to a 425-foot plateau, and on the U.S. side, the riverbank was low and led to an open plain three-fifths of a mile (one kilometer) deep. Behind this plain, the ground rose to a 500-foot forested ridge that provided observation to the river and throughout the entire regimental sector. The town of Mezy was in the right front of the sector on the river. A railroad generally followed the river on the U.S. side, with an embankment high enough to provide some cover for an attacker crossing the river.[21]

The forested ridge, judged the key terrain, was made the MLR. The regiment deployed its three battalions in a stacked one-one-one configuration. Outposts (the first forward defense line [FDL]) were

placed along the river, except for the town of Mezy on the right and a farm on the left front, which were made strongpoints. A second FDL was placed on the plain in front of the ridge. The 1st Battalion manned both forward lines. The 3d Battalion, reinforced with two companies of the 38th Infantry, was placed in the MLR, generally along the ridge. Dummy trenches were dug on the ridge during daylight, but during darkness, actual camouflaged fighting positions were dug 100 yards down the slope. As expected, the German observers mistook the higher fake trenches as the U.S. MLR.[22] The 2d Battalion was orginally positioned far in the rear near Courboin and thus out of range of most German artillery.[23]

The FDL positions were also constructed at night and camouflaged. The forward battalion was directed to prepare small-unit perimeter defenses that could be defended from any direction. For communications, two separate telephone lines linked the battalions to the regiment. The 10th Field Artillery was located behind the forested ridge of the MLR and was in range of most German artillery.[24]

Unknown to the defenders, the Germans' final offensive of the war was to begin at midnight, 14 July, with the German 10th Division of three regiments attacking the sector held by the 30th Infantry (see map 2). The attack plan called for two regiments to cross the river at midnight in boats (one on each side of the 30th's front), eliminate the outposts on the river line, and use the railroad embankment for cover and concealment to move laterally and link up. With the crossing sites secure, a pontoon bridge would be put in to cross the third regiment and the heavy equipment in the center. Then, just before dawn (0400), all three regiments would assault the ridge. The German plan called for a massive artillery preparation, first barrages on the outpost line and the ridge to assist the crossing, then shifting fires to the ridge (MLR) and suspected U.S. artillery positions. Finally, a creeping barrage would precede



Source: Cochrane, *3rd Division*, 24.

Map 2. Corps Kathen plan of attack in 3d Division sector

the infantry assault on the ridge. Because of the river, telephone communication between the German infantry and artillery was impossible, and observed adjustments from the German side of the river were unreliable due to darkness. Therefore, the Germans scheduled firings based on a timetable.[25]

The Germans had massed eighty-four batteries against the thirty-one Allied batteries in the 3d Division area.[26] Most of the German artillery had ranges of just over 9,000 yards (8,000 meters). Attacking German divisional batteries were equipped with 77-mm field guns and 105-mm light field howitzers with ranges of 9,405 and 9,733 yards respectively. German corps batteries had 150-mm field howitzers (50 percent), with a range of 9,296 yards; 210-mm mortars (25 percent), with a range of 11,155 yards; and others (25 percent), including heavier weapons, with ranges of 12,000 to possibly 29,000 yards.[27]

The thirty-one defending Allied batteries were equipped primarily with French 75-mm guns, which had a range of 9,350 yards. Some 105-mm howitzers (range 13,400 yards) and 155-mm howitzers (range 12,250 yards) added longer reach to Allied firepower.[28] Organic to the 3d Division were twelve batteries of 75-mm guns and four batteries of 155-mm howitzers (one of which was moved into position at the start of the battle and immediately was put out of action).[29]

Exact German firing positions are not known, but assuming guns were placed with two-thirds of their range into enemy territory, the bulk of the 3d Division, including all its 75-mm artillery, was in enemy range. The French 38th Corps had positioned its reserve divisions just out of range of all German divisional artillery and most corps artillery.

The 3d Division had positioned its 75-mm batteries forward with two-thirds of their range into enemy territory also. This placed them

under severe counterbattery fire, but they could also return it. This position just behind the MLR could provide deeper fires and very accurate fires to the FDLs; however, they were vulnerable if the main line was heavily engaged or broken. The 155-mm batteries and supporting French batteries were positioned farther to the rear and out of range of most German fire, but they were still capable of placing counterbattery fire on most German firing positions. The forward slope of the forested ridge in the 30th Infantry's sector and other hilltops provided excellent observation posts for adjustment of fire throughout the sectors and across the river.

The German 10th Division successfully assembled next to the river and was ready to cross with two regiments at midnight (6 battalions totaling 4,200 against the forward defense battalion of 800), with artillery fires to start at 0010.[30]

Eleventh-hour Allied intelligence learned of the enemy attack, and a preemptive Allied barrage was fired at 2345, disrupting the German crossing and attack plan. The counterpreparation included the 3d Division artillery firing 3,300 rounds of gas, including mustard gas.[31]

The U.S. barrage caught the Germans in their boats and inflicted considerable physical and psychological damage to the lead elements. The confusion and delays caused by this initial preemptive fire also disrupted the time schedules for German artillery, although it opened fire as planned at 0010.[32]

In the 3d Division sector, the German barrages totaled approximately 100,000 rounds during the day. Half the total was gas, with about 75 percent gas during the first three hours.[33] U.S. soldiers were forced to wear gas masks for up to seven hours.[34] The German artillery ranged up to seven miles into the Allied sector, with the heaviest density during the first three hours. Some

reported nearly 2,000 gas shells around each battery of the 10th Artillery.[35]

The 30th Infantry's outposts on the river met the attacking Germans with heavy small-arms fire. After fierce fighting, the Germans took some of the positions, but unknowingly bypassed some, including one platoon at Mezy. The platoon leader chose to wait until dawn and try to fight his way back to friendly lines.[36]

With the two lead regiments having taken heavy casualties, but across the river, the German artillery started its creeping barrage at 0400 for the attack on the ridge. However, the two regiments had not succeeded in linking up. The 6th Grenadier Regiment, attacking on the U.S. right, started forward behind the artillery barrage and ran into the undetected second FDL. Heavy losses stopped this attack. Then, while the confused Germans hesitated, the bypassed platoon from Mezy moved into the Germans' rear and opened fire. The psychological shock of this small attack in their rear broke the German regiment, and it fled back toward the river. The remnants of another bypassed platoon also moving back to friendly lines captured 146 of the confused Germans. By the time the survivors of the 6th Grenadier Regiment reached the river, it had taken 40 percent casualties in six hours of combat.[37]

The German 398th Infantry Regiment, attacking on the U.S. left, had also taken heavy casualties in the crossing, including the lead battalion commander. The regiment was then held up by heavy resistance from the U.S. outposts, not destroying them until 0400. As the German artillery creeping barrage started moving on schedule, the 398th Regiment also moved forward, still trying to link up with the 6th Grenadier Regiment. A left-flank U.S. strongpoint stopped them at 0500. Heavy small-arms fire from the strongpoints, mortar fire from the second FDL, and accurate U.S. artillery fire slowly forced the regiment back to the river bank by 1000.[38]

The third German regiment, the 47th Infantry, crossing later on the U.S. right front behind the 6th Grenadier Regiment, also took heavy losses from U.S. artillery and camouflaged infantry outposts. The 47th withdrew back across the river and moved one mile laterally, with the intention of crossing again to support the 398th. By the time the 47th reached its destination, the 398th had been forced back to the river.[39]

The Germans finally got the 47th and 398th Regiments securely placed behind the railroad embankment on the U.S. side of the river by late morning, but they were contained by accurately adjusted U.S. fires.[40]

The U.S. 30th Infantry command post had little knowledge of the early stages of the battle. The German artillery barrages had missed most of the U.S. forces by hitting the false trenches near the ridge crest, but both telephone lines to the forward battalion had been cut. Few runners survived with messages, and the few that did survive indicated the forward battalion had been overrun (which was not the case). The regimental commander decided to withhold reinforcements, figuring it was too late to save the forward battalion by counterattack. He did not want to commit another battalion in the dark.[41] Additionally, the 2d Battalion, in reserve, had been scheduled to replace the 1st Battalion on the forward lines that night. It was moving up the back side of the ridge about midnight, was caught in the open by the German preparation, and took heavy casualties, both physically and psychologically. The regimental counterattack force was not in condition or in position to deal a counterblow.

First light came at 0500, and a patrol of four officers from the regimental command post went forward to determine the status of the forward battalion. Seeing Germans approaching the MLR, the patrol returned. This information caused the regimental command post to move 500 yards to the rear, behind the ridge. One

company saw the command post moving and began its own retrograde before it could be stopped.[42] It was 0600 before regimental headquarters determined that the forward battalion was still in place, the attack on the right and center had been driven back, and the remaining threat was now on the left. The 3d Division headquarters telephoned that the French 73d Division was to counterattack to restore the 30th Infantry's position. The regimental commander convinced the 3d Division that French reinforcements were not needed; however, the division reserve of three companies (one battalion) from the U.S. 4th Infantry was sent to the 30th Infantry.[43]

The remainder of the day consisted of sporadic sniping and shelling. The Germans, determining their losses, finally withdrew across the river at 2130, and the battle closed.[44]

Analysis

The battle had lasted twenty-one and one-half hours, with the decisive phases occurring within the first ten hours. The U.S. 30th Infantry suffered almost 39 percent casualties (1,425) of its strength of 3,800. It could be counted as 100 percent casualties, as it was withdrawn from the line the next day for gas decontamination.[45] The forward battalion lost about 50 percent of its approximate 800. Significantly, most American casualties were from artillery fire, especially in the 2d Battalion, which was moving in the open at midnight. German casualties amounted to 40 percent, 30 percent, and 17 percent of the attacking regiments, a total of 1,872.[46]

The fire from the eighty-four German batteries was so intense that a French observer with the 30th stated he had seen nothing like it since Verdun. For various reasons, this massive fire was not fully effective. U.S. infantry forces had held their ground and repulsed the German attack because they were prepared for the gas, and

many barrages fell on the fake trench line, missing the camouflaged positions. Later, 1,800 shell craters were counted in and around the fake trenches of the 30th Infantry. Lack of communications between the assaulting infantry and the artillery and reliance on a preplanned timetable hampered coordination and failed to allow the German infantrymen to shift fire to the actual U.S. positions.[47]

U.S. artillery was greatly outnumbered but was far more accurate and effective. The preemptive counterpreparation and the adjusted accurate fire after daylight offset the weight of numbers.

The 30th Infantry suffered losses from the gas shells that forced the soldiers to wear uncomfortable masks for hours, and many were killed and wounded in the hail of high explosives. There were, however, other forms of casualties due to the massive bombardment.

> A medical officer in the 30th Infantry, Major William E. Boyd, described the shell shock cases: "some of them cursed and raved and had to be tied to their litters; some shook violently . . . some trembled and slunk away in apparent abject fear of every incoming shell, while others simply stood speechless, oblivious of all surroundings."[48]

A division report of 5 August 1918 included the lessons learned of (1) the importance of trenches as protection against artillery fire and (2) that reserves cannot be maneuvered in the open during a bombardment. Two battalions had been in motion to the front when the enemy preparation started (one each in the 30th and 7th regiments). Caught in the open by enemy artillery, they were combat ineffective for the duration of the battle.[49]

This example of successful defense demonstrates the effectiveness of the principles of an elastic-type defense: flexibility,

decentralized control, and counterattack. The flexibility of defense in depth with several lines was able to absorb the attack, forcing the attackers to expend their energy before breaking through. The concealment and deception of all defensive positions allowed them to withstand the massive artillery preparation, as false positions took the brunt of the fires. These camouflaged positions were then very effective in surprising the attacking infantry.

Decentralized control was critical as communications were immediately shattered. The first five hours of the fight was "in the dark," both literally and figuratively. The rough control that was achieved through visual observation after daylight was definitely enhanced by the initiative of lower-level leaders fighting hard without specific orders but in accordance with the planned concept. The surprise action of a small platoon hitting the rear of an attacking enemy regiment and routing it demonstrates what is possible when leaders and men continue to fight in a fluid situation.

Counterattack was not employed above battalion level in this example, but again, the effectiveness of counterattack can be seen in the example of a small platoon routing an enemy regiment. The planned defense had the capabilities to counterattack at all levels, including the not-executed, but available, French division. Corps placement of reserve and counterattack divisions out of most of the artillery range kept them fully operational for contingencies.

This battle demonstrates that the effects of massive fires from an attacking enemy can be reduced and fought through by a combination of sound infantry actions and the accurate timely fires of smaller amounts of friendly artillery.

Summary

The 3d Division minimized the effects of massive artillery fires at the Marne with an elastic defense (flexibility, decentralized control, counterattack), plus deception, entrenchments, preemptive actions, and timely intelligence. The "Rock of the Marne" was hit hard but didn't shatter; it absorbed the attack and "snapped" back.

CHAPTER 2

NOTES

1. Jonathan M. House, *Toward Combined Arms Warfare: A Survey of 20th-Century Tactics, Doctrine, and Organization*, Research Survey no. 2 (Fort Leavenworth, KS: Combat Studies Institute, U.S. Army Command and General Staff College, August 1984), 19–24.

2. Ibid., 24.

3. Ibid., 25; and Graeme C. Wynne, *If Germany Attacks: The Battle in Depth in the West* (1876; reprint, Westport, CT: Greenwood Press, 1940), 15–17.

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6. Ibid., 26–27.

7. Wynne, *If Germany Attacks*, 105–17.

8. Timothy T. Lupfer, *The Dynamics of Doctrine: The Changes in German Tactical Doctrine During the First World War*, Leavenworth Papers no. 4 (Fort Leavenworth, KS: Combat Studies Institute, U.S. Army Command and General Staff College, July 1981), 38–39.

9. Ibid., 39.

10. Ibid., 41.

11. Ibid., 41–43.

12. Ibid., 44-45.

13. Ibid., 53.

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15. Ibid., 3–7.

16. Lupfer, *Dynamics of Doctrine*, 53.

17. Rexmond C. Cochrane, *The 3rd Division at Chateau Thierry: July 1918* (Army Chemical Center, MD: Historical Office, U.S. Army Chemical Corps, 1959), 15.

18. Ibid., 16.

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22. Ibid., I-6-3.

23. Hemenway, *Third Division*, 137.

24. USACDC, *Fire and Maneuver*, I-6-3 to I-6-4.

25. Ibid., I-6-4.

26. Ibid., I-6-9.

27. Great Britain, Army, *German Army Handbook, April 1918* (1918; reprint, New York: Hippocrene Books, 1977), 67–68.

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29. Hemenway, *Third Division*, 192–267.

30. USACDC, *Fire and Maneuver*, I-6-5.

31. Cochrane, *3rd Division*, 29; and USACDC, *Fire and Maneuver*, I-6-5.

32. USACDC, *Fire and Maneuver*, I-6-5.

33. Cochrane, *3rd Division*, 37.

34. Hemenway, *Third Division*, 137, 157.

35. Cochrane, *3rd Division*, 33.

36. USACDC, *Fire and Maneuver*, I-6-5.

37. Ibid., I-6-6.

38. Ibid., I-6-6.

39. Ibid., I-6-6.

40. Ibid., I-6-7.

41. Ibid., I-6-7.

42. Ibid., I-6-7.

43. Ibid., I-6-8.

44. Ibid., I-6-8.

45. Ibid., I-6-8; and Cochrane, *3rd Division*, 53.

46. USACDC, *Fire and Maneuver*, I-6-8.

47. Ibid., I-6-9.

48. Cochrane, *3rd Division*, 35.

49. Ibid., 98–99.

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CHAPTER 3

THE IMPACT OF MASSIVE ARTILLERY FIRES ON COMMAND, CONTROL, AND COMMUNICATIONS IN THE EUROPEAN AND NORTH AFRICAN THEATERS DURING WORLD WAR II

by Lieutenant Colonel Roy R. Stephenson

The U.S. Army had limited experience in countering or minimizing the effects of massive artillery preparatory fires in the European Theater of Operations (ETO). Except for two isolated occasions, Kasserine in 1942 and the Ardennes counteroffensive in 1944, U.S. units were not subjected to massive enemy preparatory fires and did not develop tactical- or operational-level dispositions to counter the effects of such a bombardment.

The absence of formidable German artillery beginning with the Normandy campaign served to focus the attention of both the infantry and artillery commanders on the German mortars, which were considered more lethal. Even after U.S. Army units were subjected to massive preparatory fires during the German counteroffensive in the Ardennes (December 1944), afteraction reports indicated that the "experts" did not believe there was a need to develop a means to counter the effects of a preparatory fire by anything more than to ensure that field fortifications were promptly emplaced.[1]

The Germans, on the other hand, were forced early in the war to counter the effects of intense artillery preparatory fires. In almost all cases, the German commanders turned to a modification of the

elastic defense, which the German Army had developed in World War I. German General Hermann Balck used a variation of this defense in Lorraine against the U.S. Third Army late in in 1944.[2] The battles in the Huertgen Forest, in which the U.S. First Army attempted to break through the German defenses, also demonstrated how effective this type of defense can be. Four U.S. divisions were severely mauled attempting to penetrate the German lines. Even though the Germans were aided by the poor weather conditions during the fall season, which prevented effective use of American air power, the German elastic defense proved quite effective for the situation at the time.[3]

Although massive preparatory fires were not extensively used in the African and European theaters, significant lessons can still be learned from the experiences. The three case studies addressed in this chapter—one involving an American defense and two dealing with the Germans—illustrate how devastating massive preparatory fires can be to the defending command's C^3 (command, control, and communications) networks. Thus, disrupting the defenders' C^3, as these three studies show, may be just as effective as destroying their combat units.

Ardennes

The Ardennes counteroffensive provides the most illuminating information for American commanders concerning the effects of preparatory fires. Prior to 16 December 1944, the Ardennes sector of the ETO was regarded as a "quiet" sector where untried units could get experience and tired units could rest and refit. Three U.S. infantry divisions in this sector met this criteria. The 106th Infantry Division had just arrived from the United States, while the other two, the 28th and 4th Infantry Divisions, were recuperating from the Heurtgen Forest battle and refitting and training their 9,000 replacements. Because of the low probability of an enemy

attacking in the Ardennes, the high command took a calculated risk in defending with less troops than elsewhere on the front. This meant that VIII Corps frontages were abnormally long; the three divisions defended an 85-mile frontage, three times the accepted frontage for a 1944 division. Thus, VIII Corps was forced into manning strongpoints on the likely avenues of approach. By this curious quirk of chance, the U.S. VIII Corps was required to organize itself into a defense that, in outward appearance, was remarkably similar to the German elastic defense. However, here the similarity ends. The American concept, if it could be called that, differed from the German doctrine because German doctrine called for a counterattack force, which U.S. VIII Corps lacked.

At 0530 on 16 December, three German field armies opened the preparatory fire by employing over 1,000 guns and rocket launchers on a 75-mile front in the Ardennes.[4] Although the German preparatory fires were massive and the American defenses collapsed, some interesting facts arise. First, and most striking, is that the preparation by over 1,000 German artillery pieces and rocket launchers ranging from 76-mm to 14-inch railroad guns did not result initially in large numbers of casualties or losses of equipment. These preparatory fires did, however, disrupt the American communications. Hugh Cole, in his official study of the battle for the U.S. Army Center of Military History titled, *The Ardennes: Battle of the Bulge*, indicates that the initial German barrage severely damaged the U.S. communications nets, particularly the artillery net. Additionally, the Germans jammed the U.S. radio frequencies by playing phonograph records on the U.S. radio nets. Due to the communications failures, many units were unaware of approaching German troop units until the Germans literally were on their doorsteps. For example, the 559th Field Artillery Battalion, an VIII Corps artillery unit, did not learn of the German force to its front until 1215, seven hours after the attack began.[5] Cole states that numerous artillery units, especially towed

units, proved vulnerable to the attacking enemy infantry and armor because they either did not know the location of enemy forces or could not displace fast enough to keep out of harm's way. A Historical Evaluation and Research Organization (HERO) study, which focuses on artillery units, indicates that U.S. forces lost a large number of artillery pieces during the Ardennes counteroffensive. Yet during the entire length of the battle, only fifteen tube losses were directly attributable to enemy artillery fire.[6]

The initial success of the German preparatory fires was due not only to limiting U.S. artillery response but also to disrupting the U.S. communications network—the normal command and control channels of the American division and corps commanders. The Americans simply could not get intelligence upon which to act. The catastrophic losses suffered by VIII Corps units occurred because the frontline units lost communications with their higher headquarters and supporting units. American afteraction reports are replete with commanders lamenting that they could not get information due to severed or disrupted communications. The confusion in the minds of the operational-level American commanders caused by the preparatory fires disrupting their communications with their subordinates caused those commanders to not respond (or to respond incorrectly) to the situation.

The example of Major General Norman D. Cota, commanding the 28th Infantry Division, is a classic case. He could not commit the armored forces under his command because he did not know where the main threat in his division's sector was and because he could not communicate with his other headquarters. He felt he needed to keep the armor in reserve until he could determine where the main threat was. By the time he determined that the main threat was, in fact, in the 110th Infantry's sector and he committed tanks to aid the regiment, it was too late to prevent the German breakthrough. Had the U.S. armor in the 110th Infantry's sector on

16 December been committed twenty-four hours earlier, it might have dramatically affected the outcome of the battle. As it turned out, the Fifth Panzer Army was unable to get its armor across the Our River until the second day of the battle.[7]

Operation Cobra

The concept that the disruption caused by massive preparatory fires may be the most damaging effect can be supported by one other short example: Operation Cobra. During Operation Cobra (25–31 July 1944), German forces of the 2d *SS* Panzer and the Panzer *Lehr* Divisions were subjected to an intense bombardment along a narrow front seven miles west of Saint-Lo. There was a total of 1,500 B-17s and B-24s, each dropping forty 100-pound bombs, followed by 396 B-25s and 1,000 artillery pieces hitting the same area.[8] Yet according to German Seventh Army afteraction reports, casualties due to the bombardment were less than 10 percent of the personnel. The German artillery two miles back was virtually unscathed. The major damage was in combat vehicles, crew-served weapons, and communications equipment. The bombardments put communications into a state of chaos. The German Seventh Army could not communicate with the troops in the bombardment box and, like the defenders at the Ardennes, could not react immediately. No one could tell what was happening. By the time a reasonable idea of what was occurring emerged, the American forces had achieved a breakthrough.

North Africa

An example of the disruption of C^3 can also be found in North Africa. At El Alamein, Field Marshal Erwin Rommel based his defense on his study of British attack methods and the terrain. Rommel believed the British (Sir Bernard L. Montgomery) would be

forced to revert to a World War I style of attack to assault German positions. Accordingly, Rommel's concept of defeating this form of attack was a modification of General Erich Ludendorff's elastic defense of World War I.

Rommel fortified the German infantry into hard-point defensive positions and laid minefields that contained 445,000 mines along the entire length of his 31-kilometer front. He positioned the reserves behind the minefields, scheduled to attack around them to block any penetrations. Farther back were two additional mechanized infantry divisions that would provide greater depth to the defense.

On the night of 23 October 1942, at 2200, 802 artillery pieces, supported by Wellington bombers dropping an additional 125 tons of explosives, completely saturated the German positions within the first 15 minutes. Some known German artillery positions received 100 rounds during this 15-minute period.[9] Surprisingly, this bombardment produced relatively few casualties, but it completely destroyed or disrupted the German communications nets and caused severe damage to towed artillery positions. A combination of cutting the landlines and jamming the VHF radios by Wellington bombers resulted in the disruption of German communications. The normal German command system was rendered inoperable. The only initial communications received at Rommel's Africa Group headquarters were from runners, and their information was sketchy.

The inability to get a comprehensive idea of what was occurring caused General Georg Strumme (who, when the battle began, was in command while Rommel was in Germany) not to deploy his reserves. Lack of communications caused Strumme to withhold permission for the artillery to counterfire (the Germans were also short on artillery rounds), as he could not ascertain the location of the main attack. In an effort to get information, he decided to go forward to the 90th Light Division's command post. Because the British had seized territory in between Strumme's headquarters and

the division command post, Strumme and his small staff were forced to evade capture on their return to the command post. In the ensuing excitement, Strumme suffered a heart attack and died. By the time General Ritter von Thoma (who replaced Strumme as acting commander of the German Africa Group) assumed command and ascertained what was happening, the battle was lost.

Conclusions

A cursory look at the effects of massive preparatory fires based on these three cases from World War II might give the impression that defenses cannot withstand massive integrated preparatory fires (air, artillery, direct-fire weapons) without collapsing. However, careful examination of the circumstances does not support the contention that the preparatory fires were totally responsible for the collapse of the defense. The bombardments themselves did not cause damage as serious as was expected. In all cases, determined defenders inside the areas hit with the preparatory fires were able to respond to the follow-on attacks. In none of these examples did the bombardments themselves result in immediate breakthroughs by the attackers. In Operation Cobra, after the preparatory fires, the farthest advance by any U.S. unit was only 2,300 yards, hardly a spectacular gain.[10] The German Ardennes counteroffensive was behind schedule because of the stiff resistance the Germans encountered from the American troops isolated in the villages, which had been turned into impromptu strongpoints. Until the Americans were forced out, they blocked roads critical for the German advance.[11] Likewise, at El Alamein, the German defenders did not crack under the initial bombardment. They offered stiff resistance and were not forced to retreat for ten days.

In the World War II examples cited in this chapter, the inabilty of the commanders to get intelligence or command orders explains

why the attacks following the massive bombardments initially succeeded. This was a direct result of the bombardment's interdiction or disruption of the communications systems. In World War II, wire was the primary means of communication in defensive operations, and the wire was laid on top of the ground or strung from trees or poles. It was extremely vulnerable to the preparatory fires, thereby reducing the defender's ability to coordinate the defense after it was destroyed. The lesson to the modern commander is that, if wire communications are to remain a viable communications means, either the wire must be buried to ensure its survival as was done in World War I or, as suggested in the World War II General Board at Fort Sill, Oklahoma, multiple redundancy must be incorporated into the system to enhance its survival.

Additionally, based on the lessons from El Alamein and the Ardennes, some communications means to supplement radios should be employed to reduce the effects of jamming. In both cases, jamming, coupled with the interruption of the wire nets, severely reduced the commanders' ability to take decisive action.

Other World War II lessons concerning large preparatory fires also have validity today. For example, battle casualties for both German and U.S. forces among artillery personnel were significantly greater in towed batteries than in self-propelled batteries during the preparatory fires. Both the Americans and Germans agreed that, once a battle position was identified, it was subjected to repeated artillery attacks to prevent its use. The inherent lack of mobility and protection of personnel by armor are the major contributing factors to the vulnerability of towed artillery and their personnel. For U.S. forces, self-propelled artillery personnel losses were less than half than those suffered by towed artillery.[12]

Another lesson derived from the World War II experience is the effectiveness of field fortifications that enable units to endure preparatory fires. Battlefield personnel casualties and gun losses by

artillery were in inverse proportion to the extent units were dug into field fortifications.[13]

In summary, a study of the ETO during World War II does not offer any new, startling concepts to overcome the effects of massive preparatory fires. The World War II examples from the ETO do, however, provide two very significant lessons for the modern commanders facing an enemy capable of massive preparatory fires. First, the communications networks must be able to survive preparatory fires. This can be done either through redundancy or some type of protective means. Second, current defensive doctrine should be reevaluated. Present doctrine, similar to that of World War II, requires centralized command and control. As the World War II examples indicate, this may be the weakest link in a defense subjected to massive preparatory fires. There may be a need to revamp existing defensive doctrine to allow for a greater decentralization of the command and control functions of the defense.

CHAPTER 3

NOTES

1. Afteraction reports, observer reports, and the General Boards convened after the conclusion of the war to record lessons learned; all indicate interest, almost exclusively, in "passive" means of surviving artillery attacks. Survival recommendations included actions such as ensuring redundancy in wire communications, improving armor protection on self-propelled artillery, and protecting positions with field fortifications. The only active defensive means discussed was counterbattery fire and the procedures necessary to improve it.

2. In his book, *Panzer Battles: A Study of the Employment of Armor in the Second World War* (Norman: University of Oklahoma Press, c1956), Major General Friedrich Wilhelm von Mellenthin describes the defensive operations of German Army Group B in defending the Lorraine in 1944.

3. All the German afteraction reports show that the German artillery would not fire if a U.S. artillery spotter plane or fighter-bomber was observed. U.S. Army Ground Forces, Report no. 935, "Germany Artillery Commander's Views on U.S. Artillery" (APO 887: European Theater of Operations, United States Army, 10 May 1945).

4. The bombardment varied to some extent in each German field army area. In the Fifth Panzer Army, the bombardment was twenty minutes long and concentrated on the destruction of wire communications; isolation of observation post and command post positions; interdiction of crossroads and assembly areas; and finally, neutralization of U.S. artillery. In the Sixth Panzer Army and

Seventh Army areas, the bombardment was thirty minutes long and concentrated more on frontline and artillery positions. In all instances, at the point of penetration, the Germans mustered approximately twenty tubes per kilometer. Historical Evaluation and Research Organization, *Modern Artillery Experience in Combat: Ardennes* (Dunn Loring, VA, 1977), hereafter cited as HERO, *Ardennes*.

5. Hugh Cole, *The Ardennes: Battle of the Bulge*. U.S. Army in World War II (Washington, DC: Office of the Chief of Military History, U.S. Army, 1965), 658.

6. The U.S. First Army lost forty-one artillery pieces during 16–26 December 1944. Of the tubes lost, fifteen were losses to artillery fire, and twenty-two were losses for other unspecified reasons. HERO, *Ardennes*.

7. In addition to being unable to get their armor across, the Germans blocked their bridge sites with armor and infantry units to such an extent that their artillery units could not displace forward to aid in the reduction of U.S. positions. This left the task to armor and infantry units, which took much longer. The Fifth Panzer Army did not get artillery units across the Our River until 19 December. Cole, *Ardennes*, 657.

8. David Eisenhower, *Eisenhower at War, 1943–1945* (New York: Random House, 1986), 350.

9. Barrie Pitt, *The Crucible of War*, vol. 3 *Montgomery and Alamein* (London: Papermac/Macmillan, 1986), 95.

10. Eisenhower, *Eisenhower at War*, 381.

11. General Hasso-Eccard von Manteufel's artillery preparation plan may have actually worked against him. As commander of Fifth Panzer Army, General Manteufel had planned to use the artillery to

pin the Americans to the villages so they could be bypassed by his attacking infantry. The problem this created was that these villages were astride the very same routes his vehicles needed to continue the attack. The result was that the Germans had to root the Americans out of each village in order to clear the roads. Consequently, the battles for these villages delayed the German advance forty-eight critical hours. B. H. Liddell Hart, *The German Generals Talk* (New York: William Morrow & Co., 1948), 76–78, 272–93.

12. U.S. Army, Field Artillery Advisory Panel, "Report of Army Field Artillery Advisory Panel on Field Artillery" (N.p., 18 February 1949), appendix A, annex B, 36.

13. HERO, *Ardennes*, 11.

CHAPTER 3

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CHAPTER 4

GERMAN COUNTERARTILLERY MEASURES ON THE EASTERN FRONT IN 1944–45: OPERATION BAGRATION

by Dr. Samuel J. Lewis

Insufficient data is available to answer with certainty the question of what the German Army did in 1944–45 to negate or avoid the effects of massive Russian artillery barrages (excluding the use of an operational withdrawal). For this late period, relatively little has been written on Eastern Front operations below corps level, and most German records were destroyed or remain in Warsaw Pact nation archives. Even if those records were available, the size of the theater, variations in terrain, missions, and force composition would suggest a tactical diversity as great as that experienced during World War I. In all probability, however, the German infantry divisions attempted to rely on the elastic defense to the limited extent that was possible. The lack of forces to defend ground drastically altered that tactic, replacing the outpost zone and most of the battle zone with a thin line of weapons pits, a line of strongpoints, or a combination of the two—all depending on the local circumstances.

The Conceptual Framework

The German Army developed the elastic defense during World War I and incorporated it into its 1933 regulations that remained in effect through the end of World War II.[1] Major Timothy A. Wray ably summarized the elastic defense in the Combat Studies

Institute's Research Survey No. 5, *Standing Fast: German Defensive Doctrine on the Russian Front During World War II, Prewar to March 1943:*

> This doctrine [elastic defense] focused on defeating enemy attacks at a minimum loss to defending forces rather than on retaining terrain for the sake of prestige. The Elastic Defense was meant to exhaust Allied offensive energies in a system of fortified trenches arrayed in depth. By fighting the defensive battle within, as well as forward of, the German defensive zone, the Germans could exploit the inherent limitations and vulnerabilities of the attacker while conserving their own forces. Only minimal security forces would occupy exposed forward trenches, and thus, most of the defending troops would be safe from the worst effects of the fulsome Allied artillery preparation. Furthermore, German firepower would continuously weaken the enemy's attacking infantry forces. If faced with overwhelming combat power at any point, German units would be free to maneuver within the defensive network to develop more favorable conditions. When the Allied attack faltered, German units (including carefully husbanded reserves) would counterattack fiercely. Together, these tactics would create a condition of tactical "elasticity": advancing Allied forces would steadily lose strength in inverse proportion to growing German resistance. Finally, German counterattacks would overrun the prostrate Allied infantry and "snap" the defense back into its original positions [see figure 1].[2]

For the German Army on the Eastern Front in 1944–45, the dilemma of defending too great a frontage with insufficient forces

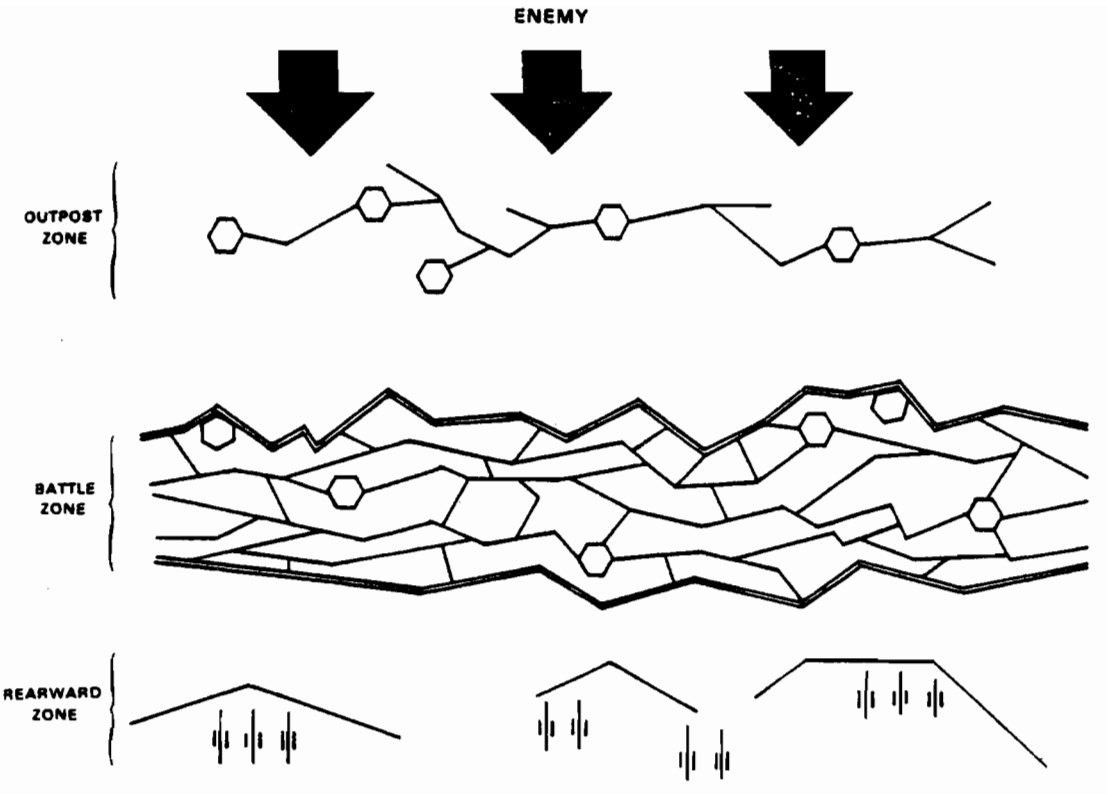
dictated drastic changes to the tactic of elastic defense, as can be observed in Operation Bagration.

Operation Bagration

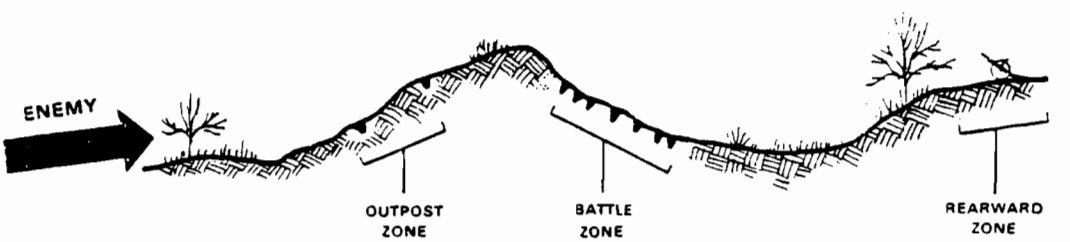
One of the particularly heavy barrages of World War II supported the Red Army offensive against German Army Group Center, beginning on 22 June 1944. The Soviet fire plan incorporated the following:

- Fifteen minutes of fire on German defensive positions up to a depth of three kilometers.
- Ninety minutes of fire on observed targets, artillery positions, and heavy weapons positions.
- Twenty minutes of fire on the German main defensive line and positions to the rear.
- On-call fire from observers throughout the remainder of the day.

Along the 690-kilometer line, the four Soviet Fronts deployed some 24,000 gun and mortar tubes. Some 17,000 tubes were deployed in support of the specific breakthrough sectors. Along the line, the Soviets deployed 35 artillery pieces per kilometer, but 178 per kilometer in the breakthrough sectors. Naturally, the Soviet barrages did vary from sector to sector. The war diary of the German Fourth Army stated that the three-hour barrage Fourth Army received was the heaviest it had yet encountered.[3]



Cross Section of German Defense Zones (Ideal)



Source: Wray, *Standing Fast*, 4.

Figure 1. The elastic defense, 1917–18

How the twenty-nine German divisions deployed and reacted to such barrages remains open to question due to the nonavailability of the German records, particularly at the regimental and divisional levels. Surviving records of the Fourth and Ninth Armies, however, shed some light on how the Germans deployed. Each division defended a front of twenty-four to thirty-two kilometers, sectors far too large for the divisional artillery to cover. The divisions fielded about fifty infantrymen per kilometer of front, eighty per kilometer of front if one includes the crews of the infantry heavy weapons. The divisions defended sectors five to six kilometers in depth with from three to five trench systems covered by minefields and wire entanglements where applicable. The Germans possessed sufficient mines, but artillery ammunition remained in short supply.[4]

That shortage of ammunition limited the defender's ability to use counterbattery fire against the Red Army. On 20 June 1944, when it became clear that the Soviet buildup indicated the threat of a large offensive and there occurred a noticeable increase in artillery fire, the German Third Panzer and Ninth Armies possessed only 2,000 to 3,000 105-mm howitzer shells for counterbattery fire. Another solution to the problem, withdrawing to another defensive line, was not possible due to Hitler's stand-fast, fight-to-the-last-bullet policy. Even after the huge Soviet breakthroughs during the first two days of battle, the commander of Army Group Center prohibited withdrawals.[5]

The German General Staff Training and Foreign Armies East Branches continued to compile lessons learned through 1945 on combat against the Red Army. The following lessons learned from the 1944–45 period indicate several tendencies of the Red Army when it undertook large-scale offensives using massive artillery barrages:

- Even average intelligence work on the Germans' part would indicate the Russian buildup, materiel being brought forward,

construction of artillery dummy positions, improvement of roads and paths, detailed rehearsals in the Russian rear area by the assault troops, and aggressive patrolling (probes up to company strength). Historically, the large tank formations were last to arrive in the assembly area. The best solution in dealing with such a buildup would have been for the Germans to use air power and artillery to heavily pound the builtup area, particularly the artillery positions and the forward assembly area.[6]

- Until late 1944, the large Russian artillery preparation (30 to 100 minutes) served as an "alarm clock" to warn the Germans of the impending attack. At that time, the Soviets began to vary the timing and pattern of their traditional rolling barrage. They did this because German infantry had learned to withdraw from the first to the second trench during the barrage and, immediately following the barrage, move back to the first trench. Consequently, the Soviets began using "feint barrages," which usually took place two to three hours before the actual attack, to determine the Germans' intentions. The Germans' best solution to this problem was to move back to another trench line (already prepared) and have their artillery fire concentrate on the forward Soviet positions. Once the attack began, Soviet infantry tended to cling to the initial assault objectives. German artillery concentrations on these positions proved effective until the Soviets learned to avoid occupying enemy positions.[7]

- Following the end of the rolling artillery barrage, there was usually a lull in Soviet artillery activity. Although some guns concentrated on reducing German strongpoints, Soviet guns had little to shoot at. There were so many guns that, when they attempted to move forward, they created ever worsening traffic jams.[8] Such traffic jams provided lucrative targets.

- Soviet infantry in the attack, when fired on or in the presence of enemy tanks, had a tendency to hit the dirt and not move.

When a Soviet attack was stopped, the infantry began digging in systematically. The Germans found that their best chance rested in an immediate counterattack. The best location for such a counterthrust was at the base of the breakthrough corridor.[9]

- Ten minutes before the rolling barrage passed the German front line, Soviet infantry units opened fire with heavy weapons to keep the Germans pinned down. The assaulting Soviet infantry hoped in this way to arrive at the German positions while the German defenders were still in full cover. To nullify this tactic, the Germans constructed concrete shields with observation and firing ports.[10]

- Before an offensive, the Russians removed the obstacles they had erected previously. It was important to observe such changes.[11]

1st Battalion, 27th Fusilier Regiment, 12th Infantry Division

There are relatively few German Army battalion-level accounts concerning Operation Bagration. The following recollection by a battalion commander cannot be substantiated by documentation, but it does reflect how the Germans attempted to maneuver within the battle zone, which was consistent with the elastic defense.

The 12th Infantry Division served under the XXXIX Panzer Corps of the German Fourth Army. Since March 1944, the division fought east of Mogilev defending a 32-kilometer front along the Pronja Bend with no reserves, excluding the field replacement battalion. The 1st Battalion defended a front of more than four kilometers behind the Pronja River, which was fifteen to twenty-five meters wide and served as an antitank obstacle. Throughout May, the arrival of replacements and the return of convalescents increased the battalion's strength to about 430 men. By June, the 4 companies

each fielded 70 to 100 men. The battalion held the northern flank of the division, with its neighbor to the north being the 337th Infantry Division. The battalion aggressively patrolled the 1 1/2-kilometer gap between it and its neighbor to the north and the front down to the river, most of which could not be observed from the main line of resistance.[12]

The battalion did not defend the river line but, rather, established its first line on a series of hilltops and rises (30 meters above the river) 300 to 500 meters from the river. That trench linked a series of weapons pits, each sited to provide flanking fire for another. Where appropriate, the infantry had placed mines and wire in front of the line. The troops lived in squad bunkers sited on reverse slopes. The battalion commander set up a second line 400 to 600 meters behind the first, mostly on reverse slopes. Covered communications trenches linked the first and second lines. It took the battalion eight weeks to complete five such lines.[13]

The Red Army's 2d Belorussian Front faced the German Fourth and Ninth Armies. It occupied a 160-kilometer front and achieved an artillery density of 181 guns and mortars per kilometer. The Front's main effort rested with the 49th Army, which concentrated ten rifle divisions to strike the German 337th Infantry Division, the northern neighbor of the aforementioned 1st Battalion.[14]

The usual harbingers of a Soviet offensive alerted the German defenders, accentuated on 22 June by Red Army loudspeaker psychological operations broadcasts, artillery fire, and aggressive patrolling. By the evening of the 22d, the battalion had driven the Soviet advance parties back across the Pronja River. The battalion commander expected the major attack on the following day, so during the night, he evacuated the first line and occupied the second line. However, he left several forward observers in the first line. After illuminating the battlefield during the night, the Soviets began their barrage of all calibers at about 0400. The rolling

barrage lasted about three hours, moving back and forth several times across the first line and destroying just about all the positions and communications links in the first line. The German battalion in the second line suffered forty casualties from the barrage.[15]

Following the three-hour barrage, the German battalion commander took the unorthodox measure of moving forward to the first line. He found that a sufficient number of positions had survived for his troops to occupy. The first Soviet attack broke down about 200 meters in front of the first line. Subsequent attacks in regimental strength met the same fate. During the night, the German battalion once again withdrew to the second line where it once again averted the brunt of the morning Soviet artillery barrage and subsequently moved back to the first line. To avoid being surrounded, the battalion finally retreated on the night of 24 June.[16]

A Critical Summary

In all probability, the tactical measure of withdrawing to a second line was a viable alternative in 1944 and 1945, certainly one of the few available to the German infantry. It also remained consistent with the World War I tactic of elastic defense, in which the defender maneuvers within the defensive zone.[17] An earlier exchange of ideas within the German Fourth Army indicated that most commanders viewed any form of linear defense superior to a system of strongpoints. One commander observed that the only thing strongpoints accomplished was to draw heavy artillery fire.[18] At least within the German Fourth Army, therefore, the use of a modified elastic defense remained an accepted practice. In addition, one Red Army lessons learned report for Operation Bagration concluded that its artillery preparation failed to strike the German positions in depth sufficiently, particularly German reverse slope positions.[19]

Another variation of German defensive tactics consisted of a line of strongpoints as the main line of resistance, with reserves behind used to counterattack. As late as October 1944, the German 2d Mountain Division used such a tactic in northern Finland, undoubtedly as a result of the extended frontage and the peculiar nature of arctic terrain. When attacked by an overwhelming Soviet force that same month, those strongpoints simply drew heavy Soviet artillery fire and were surrounded by the attackers.[20] German coastal defenses in France were also based on the strongpoint system. During the Normandy invasion in June 1944, several of the sturdier, reinforced concrete strongpoints (like several of the 2d Mountain Division's strongpoints) survived heavy artillery bombardments, only to be reduced by the attacker within seven days. Maintaining such strongpoints managed to inflict losses on the enemy and to tie down the attacker's forces, but in the absence of large reserves for a counterattack, strongpoints served as little more than traps for the defending garrisons.[21]

Major Timothy A. Wray observed that the German tactic of defense in depth remained a viable solution for the defender but that there were not enough German divisions for the actual tactic to be used. He remarked that the German divisions, usually having to defend great frontages, used the principles of the elastic defense but were forced to use a linear defense with small reserves. Consequently, Wray noted that it remains difficult to find an actual example of the elastic defense in depth as described in German doctrinal literature.[22]

There is some probability that the actions of the 1st Battalion cited above did occur in spite of the lack of documentary evidence. It would appear, therefore, that one possible solution to the problem of facing massive artillery barrages in positional warfare is withdrawal to a second prepared position. Most important, however, is the realization that, no matter how sound a tactical

defensive doctrine is, there comes a point when the attacker's strength is so preponderant that the defender can be overwhelmed and destroyed regardless of tactics. It should be remembered that the 1st Battalion did not bare the brunt of the major offensive, and that could be one of the reasons why it survived.

CHAPTER 4

NOTES

1. See Germany, Generalstab, *Truppenführung* [Troop leading], Heeresdruckvorschriften 300/1 (Berlin: E. S. Mittler und Sohn, 1936); Germany, Heer, Oberkommando des Heeres, *Ausbildungsvorschrift für die Infanterie* [Training manual for infantry], pt. 11, *Feldbefestigung der Infanterie* [Field fortifications for infantry], H.Dr. 130/11 (Berlin: E. S. Mittler und Sohn, 1940) (the author listed here is hereafter cited as Germany, OKH); and Germany, OKH, *Der Stellungskrieg* [Positional warfare], H.Dr. 91 (Berlin: E. S. Mittler und Sohn, 1940).

2. Timothy A. Wray, *Standing Fast: German Defensive Doctrine on the Russian Front During World War II, Prewar to March 1943*, Research Survey no. 5, (Fort Leavenworth, KS: Combat Studies Institute, U.S. Army Command and General Staff College, 1986), 3.

3. Gerd Niepold, *Battle for White Russia*, translated by Richard Simpkin (London: Brassey's, 1987), 60–62.

4. Ibid., 28–35.

5. Rolf Hinze, *Der Zusammenbruch der Heeresgruppe Mitte im Osten 1944* [The destruction of Army Group Center in the East 1944] (Stuttgart: Motorbuch Verlag, 1980), 18–41.

6. Germany, Generalstab des Heeres, Abteilung Fremde Heer Ost (IIa), "31.Januar 1945, Vortragsnotiz: Hinweise fur die einige Abwehr nach Erkenntnissen über die sowjetrussische Kampfweise" [Notification for defense in accordance with recent Soviet tactics], signed Gehlen, microfilm series T-78, roll 304, National Archives and Records Administration, Washington, DC, hereafter cited as NARA.

7. See note 6.

8. See note 6.

9. See note 6.

10. See note 6.

11. See note 6.

12. General Lemm, "Defense of Mogilev by the 12th Infantry Division," in *1985 Art of War Symposium—From the Dnepr to the Vistula: Soviet Offensive Operations, November 1943–August 1944, a Transcript of Proceedings*, edited by Colonel David M. Glantz (Carlisle Barracks, PA: Center for Land Warfare, U.S. Army War College, 1985), 359–84. General Lemm subsequently rose to the rank of lieutenant general in the *Bundeswehr*.

13. Ibid.

14. Niepold, *Battle for White Russia*, 55.

15. Lemm, "Defense of Mogilev." The usual indicators of an impending Soviet offensive began with knowledge of increased rail traffic, road improvements, and construction of additional artillery positions—gleaned through aerial reconnaissance photos. On the ground, the indicators consisted of more aggressive patrolling and the ranging in of Soviet guns.

16. Ibid.

17. See Graeme C. Wynne, *If Germany Attacks: The Battle in Depth in the West* (Westport, CT: Greenwood Press, 1976); and Timothy T. Lupfer, *The Dynamics of Doctrine: The Changes in German Tactical Doctrine During the First World War*, Leavenworth

Papers no. 4 (Fort Leavenworth, KS: Combat Studies Institute, U.S. Army Command and General Staff College, 1981).

18. See "Kdr. I./Inf.Rgt. 20 (mot.) Erfahrungsbericht" of 17 August 1942, "Stuetspunktsystem oder H.K.L." [Experience report of 17 August 1942, strongpoint system or main line of resistance], signed Hauptmann Haderecker, and letter from the Operations Officer, 267th Infanterie Division, 24 August 1942, microfilm series T-312, roll 184, NARA.

19. Cited in Niepold, *Battle for White Russia*, 62.

20. James F. Gebhardt, "Petsamo-Kirkenes Operation, 7–30 October 1944: A Soviet Joint and Combined Arms Operation on Arctic Terrain," July 1988, manuscript being prepared for future publication by Combat Studies Institute, U.S. Army Command and General Staff College, Fort Leavenworth, KS.

21. Germany, Heer, Oberbefehlshaber West (Oberkommando Heeresgruppe D), Ia Nr. 5050/44 geheim of 20 June 1944, Erfahrungen aus den Invasionskaempfen Normandie [OB West lessons learned report for the invasion of Normandy], microfilm series T-312, roll 1059, NARA.

22. Wray, *Standing Fast*, 57–177.

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CHAPTER 5

JAPANESE COUNTERARTILLERY METHODS ON OKINAWA, APRIL–JUNE 1945

by Dr. Thomas M. Huber

In the spring of 1945, the Imperial Japanese Army (IJA) on Okinawa was ordered to hold the island at all costs. IJA commanders faced potential massive bombardment from three sources: U.S. Army field artillery, Army Air Force aerial bombing, and U.S. Navy offshore bombardment. The IJA had little field artillery of its own to rely on and no friendly air or naval presence. This meant U.S. ships and planes could bombard IJA's positions to any degree and at will. How did the commanders on Okinawa cope with this problem of unlimited enemy bombardment?

The Bombardment

Okinawa is sixty miles long and two to eighteen miles wide. The task of the IJA 32d Army was to hold the island as long as possible to prevent U.S. forces from using it as a staging area for attacks on Japan itself. To do this, the 32d Army chose to go underground in the island's southernmost tip, an area about sixteen miles long and three to twelve miles wide. Into this limited area, it carved sixty miles of caves and tunnels. Onto this same zone of approximately eighty square miles, U.S. forces, between 24 March and 22 June, fired 2.4 million artillery rounds, 1.8 million by ground forces and .6 million by naval forces (see tables 1 and 2). These numbers do not include aerial bombardment or direct fire from guns of 75-mm or less. (For example, the U.S. Army XXIV Corps fired 100,000 rounds of 75-mm ammunition.)

TABLE 1

AMMUNITION EXPENDED BY U.S. TENTH ARMY FIELD ARTILLERY, 1 APRIL–30 JUNE 1945

Type	Rounds Fired
Howitzer, 75-mm	166,068
Howitzer, 105-mm	1,104,630
Howitzer, 155-mm	346,914
Gun, 155-mm	129,624
Howitzer, 8-inch	19,116
Total	1,766,352

Source: Roy E. Appleman, et al., *Okinawa: The Last Battle*, U.S. Army in World War II: The War in the Pacific (Washington, DC: Historical Division, Department of the Army, 1948), 498.

TABLE 2

AMMUNITION EXPENDED BY THE U.S. NAVY IN THE RYUKYUS CAMPAIGN, MARCH–JUNE 1945

Type	Rounds Fired
Star illumination, 5-inch	66,653
High-capacity fragmentation, 5-inch	432,008
High-capacity fragmentation, 6-inch	46,020
High-capacity fragmentation, 8-inch	32,180
High-capacity fragmentation, 12-inch	2,700
High-capacity fragmentation, 14-inch	16,046
High-capacity fragmentation, 16-inch	4,411
Total	600,018

Source: Appleman et al., *Okinawa*, 500.

U.S. artillerymen relied mainly on radio-bearing forward observers for spotting. Since the IJA had no air presence, U.S. forces also used "cub" reconnaissance planes to locate targets. In addition to these methods, U.S. forces used new GR-6 sound locator sets to aim artillery.

In preparation for assault landings on 1 April 1945, U.S. carrier planes bombed Okinawa on 23 March, and on 24 March, U.S. Naval vessels implemented a preparatory bombardment of 13,000 6-inch and 12-inch shells. From this point on, U.S. forces were able to lay saturation bombardments on any target they could discover.

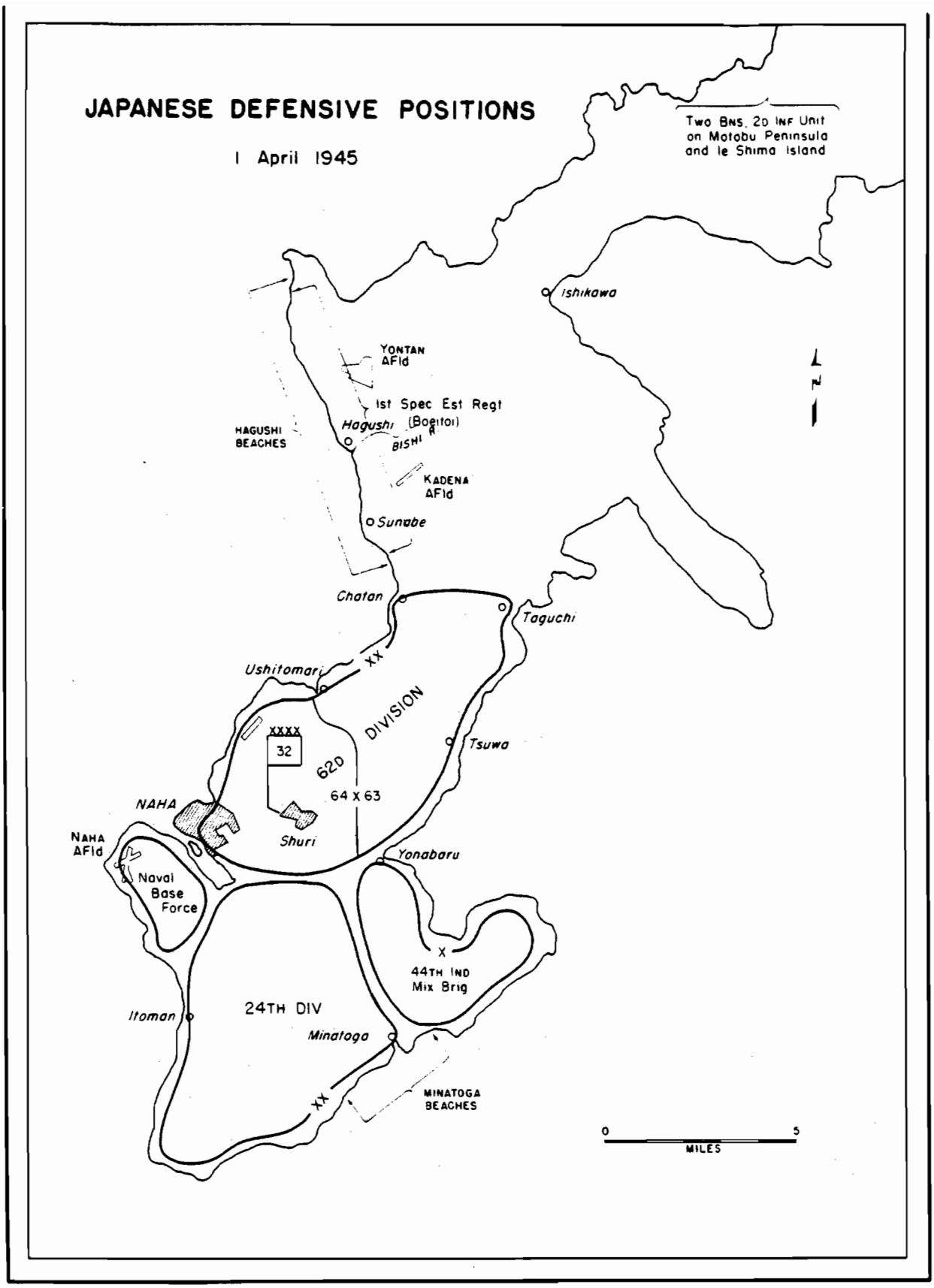
Japanese Countermeasures

Despite continuous savage bombardment, the IJA 32d Army held out on Okinawa for ten weeks (1 April to 22 June). Its 100,000-troop force (76,000 regulars and 24,000 Okinawan Home Guards) was outnumbered by U.S. Tenth Army (180,000 troops including replacements). The IJA 32d Army was further disadvantaged by having few tanks and none that could face the Sherman M-4, of which U.S. Tenth Army had many.

To counter the U.S. forces' terrific firepower, the Japanese resorted to a variety of methods, including the underground construction of caves, carefully sited pillbox caves, reverse-slope combat, pre-positioning of supplies, concealment, dummy positions, and night operations. The keystone of the Japanese counterartillery defense was the 32d Army's construction of an elaborate system of underground caves, sixty miles of them in all. The 32d Army's operational task was defined a year before the battle began, and in this year, its 100,000 troops labored on the cave systems as if their lives depended on it, which they did. They built two kinds of caves, headquarters and frontline firing positions (pillboxes). The 32d Army headquarters cave was 1,300 feet long and was situated 100

feet below the surface. Its walls were planked, and it was furnished sparsely with desks and chairs. It also boasted electricity and a lavishly stocked kitchen. It housed 1,000 troops, including staff, clerks, messengers, and the headquarters company. Though safe from fire and well provisioned, it was hot, humid, and cramped. Subordinate to the 32d Army were the IJA 24th and 62d Divisions and the 44th Independent Mixed Brigade, each of which had a similar headquarters cave on a reduced scale.

Several miles north of the headquarters tunnels, the Japanese stretched a web of fireport caves across the Okinawan isthmus, interdicting the U.S. forces' anticipated axis of advance southward from the Hagushi beaches (see map 1). Each cave was constructed as a pillbox, with the fireport opening out just beneath the dome of a hill or the crest of a ridge. The fire openings were sited against the reverse slope of hills or ridges in their front so that they were not visible to the enemy until he reached the reverse slope and so that nothing was visible to artillerists farther away. Machine guns were the usual weapon placed in the fireport, although direct-fire guns of up to 47-mm were also used. Behind the fireport, into the earth of the hilltop or ridge, the Japanese cut a narrow shaft for fifteen feet or more. They widened the end into a room to provide living quarters for the troops who manned the weapon and to allow for storage space for ammunition and food. They also cut further shafts to the rear of the hill or ridge to provide one or more rear entrances to the cave so that troops could come and go without being under fire from enemy troops advancing on the fireport. Each battalion built and inhabited its own fireport caves so that fields of fire were well integrated between them, but only up to battalion level. The genius of the pillbox caves was that they allowed the IJA to interdict the advance of U.S. infantry with machine gun and artillery fire while completely protecting the caves' inmates from even the heaviest bombardment.



Source: Appleman, et al., *Okinawa*, map no. VI.

Map 1. Japanese defensive positions on Okinawa, 1 April 1945

One of the methods that made the IJA's antiartillery cave operations feasible was the pre-positioning of weapons, ammunition, food, and other necessary items in the caves. Each battalion stocked underground all the material it would need for a six-month period. Imperial General Headquarters in Tokyo made furnishing these supplies a priority during the year prior to the battle so that the whole campaign was conducted with little need to move supplies during the fighting.

Even though the IJA caves were almost impervious to fire, the Japanese devoted much effort to concealing their location and entrances and also to concealing trucks, tanks, antiaircraft guns, midget submarines, motorboats, and other items that could not be taken into the caves. The numerous entrances to the caves were kept small and were covered with a wooden lid that was topped with sod and foliage, making the entryway nearly invisible. Cooking smoke from headquarters caves was routed by a special shaft away from each cave so as not to reveal its location, and cooking was done only at night. Trucks, motorboat pens, and such were concealed using netting and foliage. Antiaircraft guns, unusable in the caves, also had to be left in the open. They, too, were covered with netting and foliage and protected further by the construction of numerous dummy antiaircraft guns that were then positioned and camouflaged like the real ones. From the air, it was impossible to tell the difference. In practice, U.S. artillery spotters could not identify IJA positions unless they were active.

When forces had to move on the surface, the IJA 32d Army strove for concealment by conducting all operations at night. At several junctures in the battle, the 32d Army ordered a large-scale offensive or a large-scale retreat. In these cases, the involved units and their supplies moved and assembled at night. All IJA attacks were carried out at night, and U.S. artillery could not be brought to bear on these movements.

The IJA 32d Army on Okinawa faced firepower on the ground alone that was ten times its own. Nonetheless, it was able to hold out against U.S. forces for ten weeks by using methods that were elaborate and unorthodox: extensive underground construction, lavish supply stockage, reverse slope tactics, meticulous concealment, and night operations.

Effectiveness: Vulnerability to Artillery-Infantry Combined Arms

The Japanese caves largely neutralized the Americans' massive advantage in firepower. This alone did not assure the Japanese of victory, however, because U.S. commanders found they could use infantry to partially restore their firepower advantage. To destroy the cave positions, U.S. forces sent tank-infantry teams against them to locate and blow up each fireport and rear entrance one by one. The Japanese were forced to deploy infantry on the surface to prevent this. The result was searing small-arms battles between U.S. tank-infantry teams duelling with, in effect, Japanese pillbox-infantry teams to see who would control the cave entrances on the surface.

One result of this aggressive U.S. use of infantry was that remote bombardment was able to eliminate some Japanese infantry. Before attacking, the U.S. forces mounted a saturation bombardment on the IJA cave positions they faced, then immediately rushed U.S. infantry teams forward to capture and seal the cave openings. The Japanese could prevent this only by having surviving infantry already deployed at the moment the bombardment ceased. They were to delay the American forces' onrush long enough for additional IJA troops to deploy out of the caves and defend the openings. This meant that ten IJA troops per company had to remain on the surface during the bombardment, where many became artillery casualties. Once U.S. infantry crossed onto the

reverse slope and engaged IJA infantry at close quarters in the vicinity of the cave openings, the U.S. troops did not call in further friendly artillery for fear of friendly casualties. Even when bombardment stopped, however, only one-third of the IJA troops in the crowded fireport caves could safely deploy outside when U.S. infantry was in the area. So when U.S. troops did finally overrun the cave openings, two-thirds of the defenders and their main fire weapon were helplessly trapped inside. Thus, although the caves reduced IJA's vulnerability to artillery, Japanese vulnerability to ground maneuver elements increased greatly.

The American attack was successful, in part, because it used massive bombardment and aggressive infantry in rapid succession. In this way, U.S. bombardment sometimes caught the Japanese outside their ingenious caves, while U.S. infantry sometimes caught them inside. The caves prevented the IJA 32d Army from being easily annihilated by massive U.S. artillery, but use of superior infantry forces in combination with artillery eventually allowed U.S. forces to destroy the cave positions by attrition warfare.

Results: C^3 Aspects

The IJA's innovative cave positions were extremely effective at frustrating U.S. battlefield intelligence but created major problems of command, control, and communications (C^3). For example, although Japanese night movement confounded both U.S. artillery spotters and field intelligence, such night operations produced serious problems of command and control for the Japanese. Officers found it was exceptionally difficult to coordinate the assembly and deployment of forces on a large scale, especially for an attack, where organization had to be achieved before dawn and in close proximity to the enemy. Night marshaling for attack or retreat had to be done on the surface because there was not enough room for force concentration or staging in the caves. U.S.

artillerymen contributed to the night control problem by maintaining a steady interval bombardment all night on major road intersections and bridges. Japanese units could only pass these points piecemeal, causing IJA units to be delayed—or worse, dispersed. Since the IJA conducted both assembly for attack and the attack itself at night, IJA's attacks tended to be poorly coordinated, fragmented, and ineffective.

The caves did nothing to solve the problem of operational movement by day, which was when U.S. Tenth Army forces chose to fight. During the day, IJA troops could neither concentrate for counterattack nor retreat without being vulnerable to lethal direct fire or bombardment. This was especially a problem for the Japanese holding caves that were being overrun. They could not flee their caves at the last moment before American troops reached the openings because they could not tell from inside their caves where the Americans were. Additionally, once the Americans bypassed the cave openings, IJA troops could not exit the caves without being shot or forced to surrender. In practice, the cave troops could go neither forward nor backward and usually died in place.

The caves greatly complicated the problem of communication between the headquarters and line units of the IJA 32d Army. The 32d Army staff failed to make adequate preparations in this area. The 32d Army had few radios and, for communication, used field telephone wire (often cut by artillery) or messengers, who were slow. Artillery requests by IJA frontline units took many hours to fill, because it took the messenger that long to make his way to rear-area artillery positions. Striking targets of opportunity was impossible.

The IJA 32d Army and division headquarters often received information from line units by messenger, which meant such reports were hours old. Orders went back to the line units the same way, making for further delays. The headquarters could not give

elaborate instructions in response to events of the battle because the headquarters did not know them until some while afterward. At any given moment, the 32d Army headquarters did not know exactly where the battle line was. This obliged the 32d Army to rely mainly on standing orders to the line units to resist U.S. forces as long as possible if they were attacked.

All in all, the IJA cave positions lent themselves to successful cover and concealment, as did IJA night operations. However, these same methods impaired IJA C^3 efforts. The cave positions were well suited for a fixed defense, but dependence on them did not allow agility or accommodate attack.

Conclusion

The IJA 32d Army staff developed ingenious methods to carry out its mission in spite of being extremely handicapped by inferior artillery. Because it had inferior infantry assets as well, the arduous underground construction and courageous reverse slope tactics bought the 32d Army only time, not victory.

CHAPTER 5

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CHAPTER 6

THE KOREAN WAR: THE UNITED NATIONS' RESPONSE TO HEAVY BOMBARDMENT

Dr. William Glenn Robertson

For analytical purposes, the Korean War can be divided into two phases. The first phase, which lasted from June 1950 to November 1951, can be characterized as a war of movement in which the opposing forces maneuvered up and down the Korean peninsula in successive offensives and counteroffensives. In November 1951, with the resumption of serious truce negotiations, United Nations (UN) forces ceased offensive operations and assumed a posture of active defense. From that date until the signing of the armistice in late July 1953, the conflict can be characterized as having entered a static phase. Only in the static phase was Communist heavy bombardment a significant factor in operations. Prevented by political considerations from adopting a policy of dispersal/defense in depth, UN forces responded to this heavy bombardment primarily through programs of enhanced field fortification and massive counterfires.

The Mobile Phase

Throughout the mobile phase of the conflict, North Korean and Chinese Communist artillery, while often present, played no significant role in combat activity. The Communist forces lacked both artillery materiel and trained artillerymen. The principle of mass for the Communists therefore tended to be expressed almost

completely in terms of infantry manpower rather than in terms of artillery concentrations. During this period, Communist forces generally did not use artillery for close support of attacks, nor did they concentrate artillery for preattack bombardment. As of 1 October 1951, Eighth Army estimated that only 530 tubes were available to Communist forces in the Korean peninsula. In contrast, UN forces on the same date had 1,050 tubes available for use. The inequity did not end there because UN artillery had by far the heavier weight of metal. Virtually all Communist artillery was of 76.2-mm caliber (13,300-meter range), while UN artillery ranged from 105-mm through 8-inch caliber.[1]

Communist Artillery During the Static Phase

As the war entered its static phase, Communist artillery began to show marked improvement in both quantity and quality. Eighth Army's estimate of tubes available to Communist forces stood at 852 at the beginning of 1952, but by 1 July of the same year, the number had grown to 1,246 tubes. Nevertheless, prior to September 1952, there was no recorded instance of deliberate artillery preparatory fires or programmed bombardments by Communist artillery.

In September 1952, Communist artillery came into its own through the institution of preparatory massed fires preceding attacks, as well as an intensified program of bombarding UN forces' rear areas. From the fall of 1952 until the armistice in July 1953, Communist artillery was an omnipresent and potent force that had to be considered by UN planners. Communist artillery ammunition expenditures, which had been as low as 11,900 rounds in February 1952, jumped to 220,600 rounds in October 1952. While receding from that high point for most of the remainder of the war, Communist artillery ammunition expenditures never again declined below 36,000 rounds per month. During the last two months of the

war, Communist artillery ammunition expenditures climbed to their highest totals ever. For example, Communist gunners fired an estimated 375,400 rounds in July 1953.[2]

Although the increased amount of artillery materiel available and improved efficiency in gunnery gave Communist forces more options after mid-1952, Communist artillery tactics and techniques remained very conservative in nature. Even in offensive operations, the guns were emplaced farther to the rear than was the UN practice. Communist artillery remained relatively immobile and was hampered by inadequate ammunition transportation assets. The guns were heavily camouflaged in holes, caves, and tunnels, with a great excess of gun positions over tubes. Hampered by inadequate communications gear, lack of maps, and no aerial observation, Communist artillery fire control seemed relatively inflexible. Massing of fires seems to have been done only by prearrangement, there being no documented instance of massing fires on a target of opportunity. Most Communist artillery (and mortar) fire was thus concentrated in intense bombardments of very small areas in support of local actions.

Such use soon assumed a familiar pattern that continued throughout the remainder of the war: a methodical increase in registration fire accompanied by growth in the number of emplacements and increased rear-area traffic; a violent flat trajectory barrage, which fell on both the objective and nearby positions of the main line of resistance, with special emphasis on outposts; and an equally violent infantry attack, often mounted through the barrage. While covering a geographically small area, these barrages could result in the dumping of large numbers of shells on a position in a relatively short time. For example, 6,000 rounds fell on Hill 281 (Arrowhead) in one day in the fall of 1952. Similarly, Pork Chop Hill and its vicinity were drenched with 20,000 rounds of artillery and mortar fire during an action in the summer of 1953.[3]

UN Forces' Responses

The response of UN forces to bombardments of such magnitude took several forms, most notably an increase in the strength of fortifications and increased use of counterbattery techniques. One response not generally available was the possibility of extending the depth of the defensive belt and holding the forwardmost positions very lightly, thereby adding an elasticity to the defense that accepted the loss of ground, even if only temporarily.

As a result of the relatively sudden resumption of truce negotiations in the fall of 1951, UN forces found themselves holding a line across the peninsula that was far less than optimal for protracted defense. In an effort to give the defensive line some depth, a number of outposts were sited on hills and ridges forward of the heavily fortified main line of resistance. In many cases, this outpost line of resistance was badly located for defense, but it was deemed politically inexpedient to relinquish ground already gained. With a more rational defensive trace impossible to achieve for political reasons, weak outposts had to be defended at all costs. These outposts became the scene of virtually all the battles that occurred during the static phase of the war.[4]

With defense in depth possible only in a very limited sense, other responses to Communist heavy bombardment had to be devised. An obvious answer was to burrow more deeply into the Korean soil. Sandbags, railroad iron, and heavy timbers appeared in large quantities as the Communist guns became more assertive. Bunker building became a fine art in an effort to shield the infantry from the rain of shells. Observation posts and command posts also occupied bunkers, many of them very elaborate structures. Because most of the Communist artillery fire was 76.2-mm, bunkers were mostly built to a standard that would withstand a direct hit from a 105-mm projectile. UN artillerymen also went to ground,

heavily revetting their gun positions and placing fire direction centers under the cover of timbers, rails, and several feet of earth.

Recognition that Communist barrages almost invariably broke unprotected communications wire led to various techniques of protecting those vital lines. These techniques included burying the wire at least eighteen inches deep, suspending the wire from the sides of trenches, running large numbers of redundant wire links over different routes, and practicing the conduct of operations by using radio links alone. Not practiced to any great extent (and realized as a failing by the end of the war) was the ancient art of camouflage, especially as it related to protecting observation posts from early obliteration.[5]

Along with increased attention to field fortifications, UN forces made effective counterbattery activities a cornerstone of their response to Communist heavy bombardment. This counterbattery program relied on a thorough and systematic intelligence-gathering effort to identify sectors threatened with large concentrations of Communist artillery, as well as all potential firing positions within that sector. This task was made somewhat easier by the nature of the Communist artillery system: relative inflexibility of procedure, inadequate transportation assets, and the propensity to expend great effort fortifying gun positions. The task of the intelligence teams was also simplified to a degree through access to aerial observation and photoreconnaissance missions (a service unavailable to Communist gunners).

Due to the extensive nature of the Communist fortification program, UN artillerymen emphasized precision destruction rather than neutralization in their counterbattery programs. These programs became increasingly sophisticated as the war progressed. One division mounted Operation Scrap Iron on a regular basis. In this program, certain known Communist gun positions (active or inactive) were selected, ground and aerial surveillance was focused

on these positions, and precision fires were begun that would continue until each position was destroyed in turn. Similar programs were instituted at higher echelons. Often, nondivisional medium and heavy artillery assets in a corps were concentrated, then moved through successive division zones destroying Communist gun positions systematically. Occasionally, all nondivisional artillery assets in Eighth Army would be massed in one corps zone for a similar purpose. During the last six months of the war, counterbattery missions of UN artillery represented 9 percent of total artillery missions. An average of 5,400 rounds per day was expended in the counterbattery effort along the 150-mile front in 1953.[6]

Hill 395

An excellent case study of UN counterbattery efforts can be found in the battle for Hill 395 (White Horse Mountain), 6–15 October 1952. The position, a hill mass that anchored the left flank of the IX Corps sector, was defended by Republic of Korea (ROK) infantrymen supported by both ROK and American artillery units. Communist preparations for a massive attack were detected early, permitting IX Corps artillerymen to move into position just prior to the opening of the action. By the time of the initial assault, the defenders had completed their prior fire planning, including a complete counterbattery plan. When the action opened on 6 October, this counterbattery plan was instantly implemented, and it was constantly revised during the course of the engagement. Available assets for UN forces were four battalions of 105-mm howitzers, two battalions of 155-mm howitzers, one battalion of 155-mm guns, two batteries of 8-inch howitzers, one 4.5-inch rocket battery, and one 4.2-inch mortar company.

Communist artillery assets are unknown, but ammunition expenditures exceeded 50,000 rounds during the operation. For

thirty days prior to the opening of the battle, Communist gunners averaged 244 rounds per day in the sector. Four days into the operation, Communist artillerymen fired over 12,000 rounds in a single day. During the same period, UN artillerymen responded with over 31,000 rounds, many of which were expended in counterbattery missions. Thereafter, a marked decrease in the effectiveness of Communist artillery was noted. Although the action continued for nearly another week, Communist artillery was never so prominent again. Effective friendly counterbattery fire was thus a contributing factor in the ability of UN forces to maintain their original positions.[7]

Conclusion

Only two of the three general categories of response to heavy bombardment (dispersal/defense in depth, field fortification, and counterbattery) were employed to any great extent by UN forces in Korea. With dispersal/defense in depth not an option, field fortification and extensive counterbattery programs became the options of choice. Contemporary analyses indicate that, although field fortifications generally provided adequate protection against Communist artillery, counterbattery efforts appear to have been the key defensive measure.

CHAPTER 6

NOTES

1. U.S. Army, IX Corps, G2 Section, "Enemy Tactics, Techniques and Doctrine" (Korea, September 1951), 38, 51; and U.S. Army, Eighth Army, Artillery Officer, *A Study of the Employment and Effectiveness of the Artillery With the Eighth Army During the Period October 1951–July 1953* (Seoul, Korea?, 1954), 9, 42, hereafter cited as Eighth Army, *Artillery*.

2. Eighth Army, *Artillery*, 39, 42, 43; and Matthew B. Ridgway, *The Korean War* (Garden City, NY: Doubleday & Co., 1967), 217–18.

3. Eighth Army, *Artillery*, 21, 40; and "Requested Comments to General Maxwell D. Taylor by Major General Lionel C. McGarr, May 1954," pt. 1, sect. II, p. 9, and pt. 1, sect. III, pt. B, p. 2, hereafter cited as "McGarr Comments."

4. "McGarr Comments," pt. 2, sec. II, pt. B, and pt. V, p. 1–2; and Ridgway, *Korean War*, 217–25.

5. "McGarr Comments," pt. 1, sect. III, pt. B, p. 2, 8; Eighth Army, *Artillery*, 9; Mark M. Boatner III, "Countering Communist Artillery," *Combat Forces Journal* 4 (September 1953):24–25; and Jerry F. Dunn, "Self-Propelled Artillery in Positional Warfare," *Combat Forces Journal* 4 (November 1953):14–17.

6. "McGarr Comments," pt. 1, sect. II, p. 9; Boatner, "Countering Communist Artillery," 25; U.S. Army Artillery School, "Report of the Artillery School Observer Team, 12 January–18 February 1953" (Fort Sill, OK, 1953), tab B, p. 2; and Eighth Army, *Artillery*, 21.

7. U.S. Army, IX Corps, G3 Section, "Special After Action Report Hill 395 (White Horse Mountain), 6–15 October 1952" (Korea, 23 October 1952), 24, 29–31, 49, 51–52.

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CHAPTER 7

THE KOREAN WAR: CHINESE FORCES' RESPONSE TO HEAVY BOMBARDMENT

by Dr. Gary J. Bjorge

The Chinese armies sent to Korea during the Korean War consisted basically of light infantry divisions with no air, no armor, and little artillery support. The United Nations (UN) forces they faced enjoyed air supremacy over the front lines and an enormous superiority in artillery firepower. During the first half of 1951, the UN Command used its air assets and artillery to inflict heavy casualties on the Chinese Communist Forces (CCF) and forced the CCF to develop special defensive measures. First, offensive operations were reduced in scale. Second, the CCF attempted to reduce the number of lucrative targets and placed as much of the army underground as possible. These efforts were successful enough to allow the CCF to maintain the combat power needed to achieve an operational and strategic stalemate on the Korean peninsula.

April and May 1951

The devastating effect of artillery fire and aerial bombing on CCF maneuver units is illustrated by what happened during the CCF's April and May offensives in 1951. The April offensive against the U.S. I Corps north of Seoul pushed UN lines back to the northern outskirts of the city but then ground to a halt in the face of heavy casualties and disorganizaton caused by UN air and artillery attacks. Interdiction of CCF rear areas by UN bombers and long-range artillery caused the Chinese supply system to collapse and disrupted communications between units. As confusion

increased, CCF commanders were forced to issue such generalized orders as "go as far south as possible." Reserve units passed through forward units without knowing the number of casualties already sustained or the state of confusion that existed.[1] When the offensive ended after nine days, an estimated 71,712 Chinese and North Korean soldiers had been killed.[2]

Early in May, the CCF shifted its units to central Korea and, on 16 May, launched an offensive against X Corps. During the resulting battle, which UN forces called the Battle of the Soyang River, restrictions on the use of ammunition by UN artillery were lifted for the first time in Korean operations, and artillery units achieved record rates of fire. For example, during one 12-hour period on 17 May, the 38th Field Artillery Battalion of the 2d Infantry Division fired 11,600 rounds from its 105-mm howitzers. When the battle opened on 16 May, the artillery available in X Corps consisted of the following:

4 medium battalions	(U.S.)
7 light battalions	(U.S.)(1 armored SP)
1 battery, 155-mm (SP)	(U.S.)
1 provisional battery, 8-inch howitzer	(U.S.)
2 light battalions	(ROK) [3]

While the battle was in progress, X Corps received additional artillery, including another battery of 8-inch howitzers, bringing the total number of battalions to almost twenty. The X Corps deployed this artillery to a depth of thirty miles along a forty-mile front, and

during the six crucial days when the CCF offensive was blunted and finally broken, it fired the following amount of ammunition:

Date	Rounds	Tons
16 May	17,113	504.71
17 May	38,885	1,088.46
18 May	41,357	1,187.45
19 May	47,184	1,357.42
20 May	50,102	1,377.53
21 May	47,188	1,287.55
Total	241,829	6,803.12[4]

During these six days, B-26 and B-29 bombers on night-bombing missions also supported X Corps. Operating under radar control, they dropped as many as 200 tons of bombs a night on CCF reserves and suspected assembly areas.[5] CCF casualties from this artillery fire and bombing were extremely heavy, and their units often fell into a state of great confusion. This was especially true at night when, despite the CCF's tradition of night fighting, they found it hard to collect troops and reorganize.

The following incident illustrates what was happening to the CCF at this time. On 19 May, the Chinese captured two U.S. soldiers and took them to the headquarters of a CCF battalion preparing to join the attack. On the night of 20 May, this battalion came under heavy bombing just as it was forming to attack south. Terrible explosions inflicted so many casualties that the surviving troops fled northward in disorder. Amid this confusion, one of the U.S. soldiers escaped and made his way back to the U.S. lines. A patrol from the 9th Infantry was sent out to try to locate the other American.

The patrol found him dead, but in the same area, there were also approximately 300 dead fully armed CCF soldiers.[6] Since the CCF always placed great stress on salvaging weapons from the battlefield, the presence of all these weapons was another indication of how CCF unit organization was breaking down under the impact of UN firepower.

When the CCF headquarters realized the destructive effect of UN firepower, it promptly took action to counter what the Chinese called the "inflict-casualties-war" being carried out by the UN Command. One major step was to reduce the number of troops deployed within the effective range of UN artillery. By means of shell fragment analysis and the study of sound and flash, the CCF quickly determined the type of UN artillery deployed across the front line from its units and then positioned them accordingly. Following what they called the principle of "with troops light to the front and heavy to the rear, with firepower heavy to the front and light to the rear,"[7] the CCF placed a relatively small number of soldiers along the front line while the main body was positioned along a second line and on the flanks in preparation for counterattacks. The headquarters then directed that large numbers of troops should not concentrate in one place and that there should be no more defending of positions to the death. The CCF objective was "to limit casualties while still fighting to kill and wound more of the enemy and gain the time that was needed."[8]

During the first half of 1951, when the CCF was applying the principle of deploying troops "light to the front and heavy to the rear," the U.S. Eighth Army described it as a "one up, two back" defensive formation.[9] In this disposition of forces, a forward corps had one division on the front line with two divisions in reserve. An army had one corps forward with two corps in reserve. Frontline regiments still had the mission of digging in and offering stiff resistance to advancing UN troops, but the holding of terrain was

now of minor importance. The CCF objective was to create weaknesses in a UN offensive and then exploit them using counterattacks by its deep reserves.

After June 1951

After June 1951, with the front line roughly along the 38th Parallel, the CCF began to employ a position-type defense along a main line of resistance. In order to withstand intense UN air and artillery bombardment, the CCF deployed units in great depth along narrow fronts and erected an elaborate system of field fortifications with extended outposts and key terrain features organized for an all-around defense. Primary defensive positions were commonly placed on the forward slope, with personnel shelters on the reverse slope. The forward defensive trenches had shelter holes for individual soldiers dug into the bottom at intervals of several feet. Recesses for storing hand grenades were dug into the sides. Tunnels and alternate trenches connected the forward slope defensive positions and the personnel shelters. Ammunition storage spaces were also connected with the defensive positions by trenches. All positions were constructed to provide cover from high-angle fire while still maintaining good fields of fire. The fortifications on hilltops were covered with alternate layers of logs and dirt to a depth of up to fifteen feet. From three to twelve layers of logs were used, depending on their availability.[10]

In addition to digging in to provide cover, the CCF also used the terrain, natural vegetation, darkness, unfavorable weather conditions, and smoke to cover its movements. In forward areas, marches took place at night, with the men walking in single file three to five paces apart. Secondary roads and trails were used, and march discipline was very strict. The Chinese launched attacks only at night or during poor weather, unless the opportunity for a major success clearly outweighed the extra casualties to be taken in a daytime operation. If an objective was to be held, the attack began

early enough in the evening so that the battle would be over by midnight. The rest of the night could then be spent digging in and organizing a defensive position. Attacks designed to delay or halt UN advances began early enough to allow an end to the engagement by daybreak. Planned withdrawals took place under cover of darkness and only rarely were supported by mortar or artillery fire. According to Chinese prisoners of war, this was done because, if CCF soldiers opened fire, they immediately became primary targets for UN artillery.[11]

Camouflage was another CCF defense against UN artillery. Unit commanders paid great attention to the initial camouflaging of their positions and instructed their troops to always take maximum advantage of natural cover and concealment. Troops dug foxholes very carefully and not only concealed the hole with natural vegetation but also scattered the dirt around to avoid attracting attention. When resting outside of foxholes, the troops would scatter about under trees or other natural cover, always keeping a distance of at least ten feet between them. If an aircraft approached, the men would freeze in place in order not to disclose their position by movement. This kind of camouflage discipline often saved CCF units from detection while they were on the march or crossing open terrain. The uniform caps worn by CCF soldiers had loops on them for attaching natural vegetation, and this helped them blend in with their surroundings. The CCF also was careful to camouflage mortars, artillery pieces, and all vehicles near the front. Although mortar firing positions were almost always in cleared areas, after firing five to ten rounds, crews would place the mortar in a camouflaged hole some ten yards from the firing position and then take shelter in individual foxholes. To heighten the effect of camouflage, the Chinese made decoys using materials found at hand. They stuffed straw into discarded clothing to create realistic dummy riflemen and also constructed dummy artillery positions using logs for barrels, steel plates for shields, boards for trails, and

straw for wheels.[12] Although made with simple material, these decoys were realistic enough to attract a significant amount of UN fire. So effective were CCF camouflage efforts that, according to a report written by the U.S. IX Corps G2 in September 1951, they were a major reason for the CCF's ability to survive in the face of constant aerial surveillance and fierce bombardment by UN forces.[13]

Conclusion

The Communist Chinese Forces reduced casualties from UN firepower in three ways:

- The CCF reduced the scale of offensive operations. Initially, the CCF had planned and initiated operations intended to destroy UN division-sized units. The need to defend against massive UN artillery, however, forced the CCF to change its focus to planning operations designed to destroy company- and battalion-sized units. It became obvious to the CCF very soon that the concentrations of men and materiel required for large-scale operations created too many good targets for UN air and artillery forces.

- The CCF dispersed troops and supplies and protected them underground as much as possible.

- The CCF exerted every effort to counter UN target acquisition efforts through the effective use of cover and concealment.

By using these defensive measures, the CCF, a force whose firepower was decidedly inferior to that of the UN Command, maintained enough combat power in the field to allow the Chinese government to achieve certain strategic objectives in Korea. If success is defined by achieving political-military objectives, Communist Chinese defensive measures against UN artillery were successful.

CHAPTER 7

NOTES

1. U.S. Army, I Corps, "The Communist First Phase Spring Offensive, April 1951" (Korea, 1953), 35.

2. Ibid., 38.

3. Edward M. Almond, *Conference on Battle Employment of Artillery in Korea* (Fort Sill, OK: Artillery Center, 11 February 1952), 5.

4. U.S. Army, X Corps, Artillery, *Battle of the Soyang River: An Analysis of Artillery Support X Corps Sector* (Korea, 29 May 1951) [Inclosure 5].

5. Almond, *Artillery Conference*, chart 16.

6. Ibid., 7.

7. Jiang Zhongan, "Tan Kangmei Yuanchao Zhanzhenzhong Yundong Fangyu Zuozhan ti Jingyan" [A discussion of the experiences of mobile defense operations during the war to resist America and aid Korea], *Junshi Lishi* [Military history], No. 4–1987:17.

8. Ibid.

9. U.S. Army, Eighth Army, "Enemy Tactics" (Korea, December 1951), 76, hereafter cited as Eighth Army, "Enemy Tactics."

10. Ibid., 91–92.

11. U.S. Army, IX Corps, G2 Section, "Enemy Tactics, Techniques and Doctrine" (Korea, September 1951), 28, hereafter cited as IX Corps, "Enemy Tactics."

12. Eighth Army, "Enemy Tactics," 95–96.

13. IX Corps, "Enemy Tactics," 6.

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CHAPTER 8

ISRAELI DEFENSIVE MEASURES AGAINST ARAB ARTILLERY

by Dr. George W. Gawrych

The Egyptians and Syrians began the 1973 war on 6 October at 1405 with air strikes and massive artillery barrages on Israeli positions both in the Sinai and on the Golan Heights. Caught by surprise and deprived of critical air support, the Israeli Defense Forces (IDF) went to war without a strong combined arms doctrine. Consequently, Israeli troops initially found themselves very vulnerable to Arab artillery fire. But the Israelis doggedly maintained their defenses and eventually went on the attack to seize back territory lost in the initial Arab offensives. What methods the Israelis used against massive Arab artillery fire forms the main thrust of this chapter.

Arab Artillery on the Offensive

The Egyptians employed over 2,000 field artillery pieces along a 170-kilometer front for 53 minutes, firing some 3,000 tons of explosives, while the Syrians fired 600 pieces along a 65-kilometer frontage for 55 minutes. During the first minute of the war, some 10,500 shells, or 175 shells per second, fell in the canal area of the Sinai alone.[1] Syrian saturation of the Golan was of a similar scale and intensity. The Arabs used the wide-front artillery barrage to confuse the Israelis in locating their main efforts.

The Arab arsenal was based almost exclusively on Soviet weaponry with the following main types and corresponding ranges:

Weapon	Range (kilometers)
122-mm howitzer, M-30	11.8
122-mm howitzer, D-30	15.3
130-mm gun, M-46	27.1
152-mm gun/howitzer, ML-20	17.3
152-mm howitzer, M1943 (D-1)	12.4
152-mm gun/howitzer, D-20	17.4
180-mm gun, S-23	30.4

Multiple rocket launchers included the 240-mm BM-24 (10.3 kilometers); 140-mm BM-14-16 (9.8 kilometers); 122-mm BM-21 (20.4 kilometers); and 132-mm BM-13-16 (9 kilometers). The mortars were of the 120-mm, 160-mm, and 240-mm caliber. The Egyptians and Syrians also had FROG rockets and SCUD missiles, but when these were employed remains a point of controversy. In addition to this equipment, the Arabs deployed an untold number of tanks to fire directly on Israeli concrete pillboxes and other targets visible from the West Bank, while Egypt committed 220 and Syria over 100 planes in air strikes on key Israeli positions. All told, both Arab countries had no difficulty in saturating Israeli positions along Artillery Road in the Sinai (10–12 kilometers) and in most of the Golan.

Arab priorities on the two fronts appeared similar, though more detailed information is now available for the Egyptian side. In the crossing operation, the Egyptian High Command initially concentrated its artillery fire on the Israeli strongpoints of the Bar Lev Line to a depth of one to three kilometers. The Egyptians wanted to pin down the Israeli defenders inside their bunkers, as well as to create gaps in the minefields and barbed wire for the passage of Egyptian troops into the Israeli rear.

After fifteen minutes of heavy artillery fire (that is, at the point when Egyptian infantry began to cross the Suez Canal), Egyptian artillery shifted its fire to Israeli targets rearward in order to disrupt expected Israeli counterattacks. In this phase, the Egyptian planners assigned greater resources to silencing Israeli artillery and to hitting command posts, roads, supply depots, and assembly areas with long-range artillery. In addition to this preplanned list of targets, Egyptian observers moved forward, while others infiltrated behind enemy lines and provided information on Israeli troop movements. Some thirty minutes into the war, artillery and infantry equipped with antitank weapons began to coordinate their fires to foil counterattacks by Israeli armor. Artillery fires helped force Israeli tanks into kill zones for antitank weapons. Meanwhile, the Egyptian Air Force flew missions against the strongpoints, artillery positions, command posts, electronic warfare facilities, and airfields.[2]

Through the fourth day of the war, the Egyptians relied on heavy artillery fire to support the expansion of bridgeheads and to stop Israeli counterattacks. On 14 October, the Egyptians launched their last and ill-fated offensive with a thirty-minute fire preparation. On the northern front, Syrian offensive operations had ground to a halt on the 8th. Thereafter, the Syrians fought on the defensive to the end of the war and hence employed heavy artillery fire for the sole purpose of stopping Israeli attempts to advance into Syrian territory.

Initial Effects

According to some authors, artillery was the greatest killer on the battlefield in the 1973 Middle East War.[3] The Egyptians possessed excellent intelligence concerning Israeli deployments and war plans so that virtually every artillery and tank bivuoac along Artillery Road suffered hits on the first day of the war.[4] The Israeli Artillery Corps, forced on the defensive on both fronts, suffered its heaviest casualties in any war: 191 killed in action.[5] A majority of these no doubt occurred during the first few days of the war.

Heavy artillery fire caused much confusion and dispersion of effort for the defenders. Egyptian military writers attribute part of the Egyptian success in establishing bridgeheads and in defeating Israeli counterattacks throughout the war to the role played by the artillery in disrupting Israeli counterattacks.[6] Direct hits on communications vehicles and wire caused communications interruptions, while heavy artillery fire sometimes forced forward command posts to move farther back, losing direct observation of the battlefield. Moreover, smoke from artillery shells created difficulties of identification for both sides. Further, many Israeli commanders, shaken by the artillery saturation, frequently overloaded communications nets, making it more difficult for senior commanders to assess properly the tactical situation.

Overall, Egyptian artillery, including rockets and the air force, hurt Israeli attempts to conduct combined arms counterattacks and thereby facilitated Egyptian offensive operations designed to establish and then expand the bridgeheads. As the Israelis became "accustomed" to the fire, unit commanders adhered more to doctrinal communications procedures, which resulted in more accurate reporting and better control of the battlefield.[7]

But many soldiers found dealing with massive artillery preparation of a battlefield extremely difficult. During the 1973 war, the IDF

reported an unusually large number of incidents of battle shock, and these proved highest during the extremely intense first hours of constant shelling. They accelerated again two weeks later when Egyptian fire concentrated on those Israeli forces attempting a countercrossing to the West Bank. In studies conducted by the IDF after the war of all the combat arms, battle shock proved most frequent among armor units, followed by artillery and then infantry. Support units, perhaps less prepared for battle, apparently faced an even greater risk of psychological breakdowns than the combat units.[8]

Israelis on the Defensive

Israeli doctrine called for the ground forces to conduct operations with the air force, which provided support in the role of a flying artillery. But the Egyptians, and the Syrians to a lesser extent, neutralized the Israeli Air Force on the first day of the war with their air defense systems. Weaknesses in combined arms doctrine resulted in Israeli ground forces suffering heavily from Arab artillery.

Israel could ill afford, or just did not want, to give up any territory on the Golan or in the Sinai. Hence, the IDF built an elaborate system of fortifications on both fronts designed to sustain heavy artillery barrages. Troops at the front line were expected to hold their ground while reinforcements arrived to stop any breakthroughs.

Although massive in scale, Arab artillery proved incapable of destroying all fortified Israeli strongpoints in the Sinai and on the Golan. In the Sinai, for example, the Budapest strongpoint, just east of Port Said, never surrendered, and Israeli forces finally relieved the beleaguered garrison on the 11th. Port Tawfik, on the other hand, held out until the 13th when the defense collapsed because of ammunition shortages. On the Golan, most strongpoints held out, but here, unlike in the Sinai, the Arab

offensive came to a halt on the second day of the war. By the third day, Israeli forces were pushing back the Syrians.

Weak in combined arms doctrine, the IDF neglected artillery in favor of armor. The Israelis had planned to fight with air support and to be on the defensive for only brief periods. Ground forces deprived of air support consequently had to fight without effective counterbattery fire. Artillery Road in the Sinai, for example, had slightly more than twelve batteries or forty-eight guns and howitzers (mainly 105-mm, 155-mm, and 175-mm) on the eve of hostilities, a token force in comparison to the Egyptian side. By the end of the first day of the war, only one gun of the forty-eight could fire; the others either suffered hits or became inoperative due to wear and tear from sustained heavy firing.[9]

This force ratio disparity in artillery pieces changed little during the course of the war as the Israeli High Command still emphasized armor. Artillery received a very low priority for transporters moving to the Sinai front, a grave error according to some Israeli analysts.[10] Thus, Israeli counterbattery fire, when it did exist, usually had to be sporadic, highly selective, concentrated, and brief. In some instances, a short burst of counterbattery fire sufficed to silence Arab artillery fire.[11] But such a result was infrequent, and Israeli field commanders frequently complained of no or insufficient air and artillery support in response to Egyptian offensive operations.

Mobility, in particular lateral dispersion rather than in depth, formed the essense of Israeli defensive practices on the ground against heavy artillery fire. Many Israeli artillery units, for example, changed positions five to fifteen times daily, or even at twenty- to thirty-minute intervals, to prepared positions.[12] The self-propelled U.S. 155-mm howitzer performed well in this regard. The Israelis had little choice against Arab fire, since it was imperative not to give up territory to the Arabs. Avigdor Kahalani, the Israeli commander of the 77th Tank Battalion of the famous 7th Armored Brigade,

tersely described the difficulty facing his men: "We stood helpless under accurate Syrian artillery fire. I ordered the tanks to spread out."[13] Tankers closed their hatches, and maneuver forces "thrashed or shuffled about" rather than give ground to the enemy.

One Israeli writer succinctly described the centrality of mobility of the defensive system for the Golan, a description whose general outlines conformed with defenses in the Sinai as well:

> With the exception of the bunkers and village defensive positions, the entire Israeli defensive force was capable of movement. Tanks, self-propelled artillery, infantry, and armored infantry were all in motion, or could be on short notice. Artillery batteries moved, set-up, fired, rested, moved, and fired again within minutes of receiving an order . . . the entire firepower of the Israeli battle force could move from one fulcrum to another in an infinite variety of combinations. An attacker could never be certain just what combination he might encounter. It was a strategy based on mobility and the paramount Israeli requirement that the expense in men and equipment be minimal.[14]

Effective lateral dispersion in the heat of battle as described above depended on a commander possessing intimate knowledge of the terrain so that he could relocate to positions that offered suitable protection but yet were not likely targets for the adversary. Here, variations occurred in the Israeli experience. Units that had trained to fight in the Sinai unexpectedly found themselves on the Golan and vice versa. In relocating to another theater of operations, Israelis soldiers lost the combat multiplier possessed by the defender who knows his terrain intimately.[15]

Camouflage and Deception

In addition to employing elaborate strongpoints, counterbattery fire, and mobility, the Israelis resorted to using camouflage to conceal positions, setting up dummy artillery positions to deflect fire from true targets, and sending false messages over radio transmitters to misdirect artillery fire.[16]

Conclusions

During the 1973 Middle East War, the IDF understood the value of mobility in the defense but learned that effective countermeasures against artillery needed to be of a combined arms nature. In this regard, the most important lesson learned was the need for massive artillery in a counterbattery role. In 1973, the IDF had only three artillery brigades, but by 1982 when Israel invaded Lebanon, the army had fifteen. During this brief period, the number of self-propelled guns grew from roughly 300 to over 950 (over a 200 percent increase). With this significant increase in self-propelled artillery, the IDF was able to acquire both more firepower and mobility.[17]

The IDF experience in 1973 clearly pointed out the feasibility of a defense based on strongpoints on the front line, with limited dispersion in the rear. Israeli commanders had to employ such tactics because the nation's leadership was determined not to surrender any critical ground unless absolutely necessary. But the cost for the IDF was high in both men and materiel.

CHAPTER 8

NOTES

1. Muhammad 'Abd al-Halim Abu Ghazala, *Wa-Intalaqat al-Madafi' 'inda al-Zuhr: al-Midfa'iya al-Misriya min Hilal Harb Ramadan* [And the guns opened fire in the afternoon: Egyptian artillery during the Ramadan War] (Cairo: Mu'assasa Dar al-Sha'ab, 1974), 116; Hassan al-Badri, Taha al-Magdoub, and Mohammad Zia al-Din Zohdi, *The Ramadan War, 1973* (New York: Hippocrene Books, 1978), 72; and Chaim Herzog, *The War of Atonement, October 1973* (Boston, MA: Little, Brown, 1975), 159. Abu Ghazala, a brigadier general in the 1973 October War, commanded the divisional artillery for the Second Army and is currently the minister of defense and commander in chief of the Egyptian armed forces.

2. On Egyptian artillery, see Abu Ghazala, *Wa-Intalaqat al-Madafi' 'inda al-Zuhr*, 97–101, 115–16; al-Badri, al-Magdoub, and Zohdi, *Ramadan War*, 62, 72–74; Sa'ad al-Din Shazli, *The Crossing of the Suez* (Novato, CA: Presidio Press, 1980), 222, 225–26; Hasan Mustafa, *Ma'arik al-Jabhah al-Misriyah fi Harb Ramadan 1973* [The battlefield of the Egyptian front in the Ramadan War of 1973] (Baghdad: Mudiriya al-Mutabi' al-Askariya, 1982), 242–43, 257–58; D. K. Palit, *Return to Sinai: The Arab Offensive, October 1973* (New Delhi: Palit & Palit, 1974), 64–65; and Robert D. Lewis, "The Ramadan War: Fire Support Egyptian Style," *Field Artillery*, August 1988:33–34.

3. Trevor Dupuy, *Elusive Victory: The Arab-Israeli Wars, 1947–1973* (Fairfax, VA: Hero Books, 1984), 594; and Lewis, "The Ramadan War," 36.

4. Jac Weller, "The Fight at Suez," *National Defense* 63 (July–August 1974):131.

5. Yoram Movshovitz and Dan Petreanu, "The Artillery Corps–1948 to the Present," *IDF Journal* 4 (Fall 1987):19.

6. Abu Ghazala, *Wa-Intalaqat al-Madafi' 'inda al-Zuhr*, 114–26; and al-Badri, al-Magdoub, and Zohdi, *Ramadan War*, 73–75.

7. Avraham Adan, *On the Banks of the Suez* (Novato, CA: Presidio Press, 1980), 141–42, 198, 202–3, 221, 224, 225; discussions with Israeli and Egyptian officers attending the U.S. Army Command and General Staff College; Martin Van Crevald, *Command in War* (Cambridge, MA: Harvard University Press, 1985), 218–19, 224; and Lewis, "The Ramadan War," 35. Adan served as the commander of the 162d Armored Division in the Sinai during the 1973 Middle East War.

8. Reuven Gal, *A Portrait of the Israeli Soldier* (Westport, CT: Greenwood Press, 1986), 212–14. Gal was chief psychologist of the IDF.

9. Adan, *On the Banks of the Suez*, 23–24.

10. Ze'ev Schiff, *A History of the Israeli Army: 1874 to the Present*, 2d ed. (New York: Macmillan, 1985), 215.

11. Avigdor Kahalani, *The Heights of Courage: A Tank Leader's War on the Golan* (Westport, CT: Greenwood Press, 1984), 55–57; and T. L. Morony, "Artillery Support in the Yom Kippur War," *Field Artillery Journal* 43 (September–October 1975):42.

12. Jerry Asher and Eric Hammel, *Duel for the Golan: The 100-Hour Battle That Saved Israel* (New York: William Morrow, 1987), 141; Morony, "Artillery Support," 41; Ellsworth Grev, "Employment of Field Artillery: The Mid-East 1973 War," Student

paper, U.S. Army Command and General Staff College, Fort Leavenworth, KS, 1976, 12, 15; and U.S. Army Command and General Staff College, RB 100–2, *Selected Readings in Tactics: The 1973 Middle East War*, vol. 1 (Fort Leavenworth, KS, 1980), 5-20.

13. Kahalani, *Heights of Courage*, 42.

14. Asher and Hammel, *Duel for the Golan*, 141.

15. Ibid., 107; Geoffrey G. Prosch, "Israeli Defense of the Golan: An Interview With Brigadier General Avigdor Kahalani," *Military Review* 59 (October 1979):4; and material obtained from Ze'ev Eytan, a former Israeli tank battalion commander who studied this problem of unit transfers between the two fronts and published an article about this subject in an Israeli military journal.

16. Vernon B. Lewis Jr., "Evolving Field Artillery Tactics and Techniques," *Field Artillery Journal* 43 (January–February 1975):46; and Grev, "Employment of Field Artillery," 12, 15.

17. Richard Gabriel, *Operation Peace for Galilee: The Israeli-PLO War in Lebanon* (New York: Hill and Wang, 1984), 20–21. Gabriel wrongly states the IDF had no artillery brigades in 1973 when, in fact, there were three, one each for the area commands. Admittedly, the Israelis expanded their artillery in large measure for offensive purposes, but defensive considerations, when the IDF would have to face massive artillery fire, played an important part as well.

CHAPTER 8

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