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Defensive Military Structures in Action: Historical Examples

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In recent history three examples stand out to support the viability of terrain-oriented, defensively-specialized military structures: the Russo-Finnish "Winter War" (1939-1940), the Battle of Alam Halfa (summer 1942), and the Battle of Kursk (summer 1943).

In the Winter War the Finnish Army relying on poorly equipped, guerilla-style light infantry, operating without sizable heavy reserves thwarted a large-scale mechanized thrust. Despite an eventual Soviet victory resulting from a grotesque imbalance of forces, Finnish achievements in minimizing damage and terrain losses remain remarkable. Thousands of low-scale tactical victories added up to strategic success.

At Alam Halfa the British Army finally stopped Rommel's "Afrika Korps" by employing a checker-board system consisting of artillery/infantry strong points secured by mechanized cavalry and backed-up by relatively small elements of heavy armor in a counterattack function. The tactical success of the British forced the Germans to give up an operational, if not strategic, offensive.

In the Kursk salient the Red Army's layered defense -- up to 250 km deep and 750 km wide -- was based on infantry/engineer/artillery components and supported by heavy armor. The tactical-operational victory won by the Soviets was of strategic relevance. This is paralleled by the fact that the "battle" of Kursk had, indeed, grand dimensions: covering an area larger than most East European countries of today.

A review of these campaigns and battles should serve to remove any sense that defensively-oriented operations imply passivity or that they need rely on stolid fortifications like those of the Maginot line. In all cases the defensive battle involved intensive maneuver either within and around a prepared area or unbounded by field preparations but heavily dependent on terrain. The examples should also dispel any notion that defensively-specialized structures entail homogenous light units or weapon monocultures. Instead, the examples illustrate a distinctive combined-arms synthesis -- one that draws on the full-range of arms but combines them in a unique fashion and ratio. The battles of Alam Halfa and Kursk show artillery ascendant in an anti-armor role; the Winter War draws attention to the potential of lighter troops -- as does the action of anti-tank infantry at Kursk. Finally, the three cases suggest the flexibility of defensive arrangements. The applications cover areas ranging from 2500 kilometers to over 300,000.

Defensive preparations range from the intensive (Alam Halfa, Kursk) to the selective (Finland). The Finnish case, in particular, shows that defensive principles do not imply a single, uniform application even within a single nation. This flexibility makes the approach relevant to a variety of terrain, demographic, and economic conditions.

Russo-Finnish Winter War, November-March 1939

The initial Russian attack, which began after Finland refused to cede to Russia naval basing rights and a large strip of land along the Karelian Isthmus, saw 19 Soviet divisions and 5 armored brigades (800 tanks) take on nine Finnish divisions (100 tanks). The tank balance was 800 Soviet to 100 Finnish; the balance in personnel, more than 400,000 Soviets to 175,000 Finns -- with 80 percent of the Finnish personnel drawn from reserves.

The war commenced with the Red Air Force attacking Helsinki and Viipuri, while amphibious assaults were attempted along the southern coast. The Soviet 7th Army conducted the main ground effort, attacking northwest from Leningrad into the Karelian Isthmus. The Soviet 8th Army (four divisions) attacked northwest across the border above Lake Ladoga. In the far north a Russian column seized the port of Petsamo on the Barents Sea. Finally, several Soviet columns (six divisions total) pushed westward along the eastern Soviet-Finnish border.

The main effort into the Karelian Isthmus confronted the Mannerheim defensive line, which ran from the Gulf of Finland to the Vuoksi River. Here the Finns had concentrated their six active divisions. The Russian effort proved futile. Dramatic failure likewise met the attempts at amphibious landing along the southern coast and the thrusts by much larger ground forces above Lake Ladoga and along the eastern border. Even in the north the Russian units that had successfully captured Petsamo were quickly contained when they tried to move south.

The Mannerheim line along which the Finns foiled the Soviet main effort was a system of field fortifications knitted into rugged terrain and wooded areas. Technically, much of it resembled the defensive lines of the First World War, although less extensive: simple trench lines with prepared, mutually supporting fire positions, constructed in depth. Unlike the contemporary French Maginot line, the Finnish defense did not feature large fortress artillery except on its extreme flanks. The defensive line ran across the Isthmus for about 43 miles (70 km) and was anchored by heavy coastal batteries at Koivisto in the west and Kaarnajoki and Yllapaa at the Lake Ladoga end. The River Vuoksi covered the eastern third of the position. Between the Vuoksi and the Gulf of Finland were broad stretches of lake and swamp. Between and behind these natural barriers the Finns laid their trench lines.

Despite the attention that many accounts give to the Mannerheim line, the Soviets suffered their most dramatic and costly reversals in their efforts north of Lake Ladoga and along the eastern border, where well-prepared defensive positions played little role. In these contests the Finns relied on tactics, technology, and unit structures that made the most of difficult and enclosed terrain, and that were adapted to defensive operations. The Finns also benefitted from a road and rail communication net that facilitated re-allocation of forces. It is noteworthy that Reserves provided much of the Finnish strength in the battles outside the Karelian Isthmus.

In one of the Soviet thrust along the eastern border the 163rd Division moved in two columns over narrow roads through densely wooded areas aiming for the village of Suomussalmi. During the

Division's advance, Finnish Civil Guard units conducted continuous small-scale flanking attacks. On 11 December elements of the Finnish 9th Division blocked the beleaguered and depleted Russian 163rd. A Russian motorized division came to the aid of the 163rd, but by 25 December both were fighting desperately to extricate themselves. Having circled around the invaders, the Finns blocked their lines of supply and retreat. They then waited until cold and hunger exhausted the intruders before attacking in force to break them up.

Farther to the north another thrust involving three divisions made it halfway to Gulf of Bothnia, past Salla to Kemijarvi, before being driven back by a Finnish division redeployed from the south by rail. In this case, too, Civil Guard units served to slow and attrite the advancing Russians, wearing down the invaders and buying time for redeployment.

North and south, the defense had benefitted from rugged, broken terrain. Numerous lakes, swamps, and thick forests cramped the Soviet thrusts at every turn, feeding them into narrow channels of advance. The Finnish road and rail network barely facilitated the Soviet advance. In those areas where the lines connecting to Russia were better developed, as in the south, they fed into a deep and well-integrated net of defensive works. However, along the 650 mile north-south border, which spanned very difficult terrain, few communication lines connected the two countries and those were mostly of poor quality. Back from the border, the lines improved, facilitating force re-allocation on the Finnish side. As long as Finnish Civil Guard units could successfully weaken and slow an invading force during its passage through the most difficult areas, regular units could redeploy relatively rapidly from the south to block a break into the Finnish heartland.

Although the Finnish operational plan was well-conceived, the overall geostrategic situation cast its success in doubt. The depth of Finland, measured east-west from its long border with Russia, varies between 200 and 600 kilometers. During the initial invasion, the theater force ratio favored the Soviets by 5:2 in terms of personnel and much more in terms of armor and aircraft. Together with the advantage of surprise, the disparity in combat strength should have allowed the Soviets to assemble overwhelming local force advantages. By unleashing five widely-separated and simultaneous ground thrusts (together with air and amphibious assaults) the Soviets hoped to bring all their power to bear at once, thus drawing Finland's much smaller forces off in several directions. A major success in any two of these efforts might have been sufficient to win Soviet war aims, which were moderate.

The Finnish forces, however, were also prepared at the tactical level to make the most of the advantages conveyed by defense in broken and wooded terrain. Civic Guard units were well-trained in small unit sapper and guerilla tactics, refusing to meet the Soviet thrusts in mass. A typical tactic was to halt long columns of approaching armor and motorized troops on narrow, poor roads and attack their flanks and rear, cutting them off from support -- a practice the Finns called *motti* or "logging" tactics. The Finnish units were trained to move quickly across any kind of terrain, strike fast, and withdraw -- thus compensating for inferior numbers with tactical flexibility and movement. The Finnish units were well-equipped for conducting their chosen tactics in their home environment. Good skis and warm clothing were key to their combat kit. They were also expert field innovators, compensating for equipment shortages with inventions such as the Molotov Cocktail.

More important than any individual technology, tactic, or operational concept was the consistent adherence of the Finnish approach on every level to the requirements of conducting a

terrain-oriented defensive war against a numerically superior foe. At the strategic level the Finns entertained no illusions about beating Russia if it chose to bring the full brunt of its power to bear -- the strategic balance was too skewed. However, the Finns could make conquest unappetizing and, more important, buy time for intervention by friendly powers. And, indeed, both France and Britain, enrapt by Finland's resolute resistance, seriously contemplated the dispatch of an 50,000 soldier expeditionary force. In the end, however, Swedish and Norwegian opposition to intervention, and concerns about opening a second front against a new foe, eroded French and British enthusiasm for intervention.

In February the Soviets renewed their efforts, increasing their invasion force to 45 divisions with a total of more than 1 million troops. On 1 February the Russian 7th and 13th Armies, comprising 14 divisions, launched massive attacks against the Mannerheim line, which nonetheless held for two weeks. The Russians also launched a large force across the Gulf of Finland, landing in the Finnish rear. By 12 March the war was over. Victory had required three and one-half months of fighting, a final theater force advantage of more than five to one, and, by some accounts, 200,000 Russian lives. The Finns, outgunned from the start, lost 25,000 lives.

Alam Halfa, 30 August-3 September 1942

The war for North Africa was decided in Egypt between the months of July and November 1942. Although most historical attention has focused on the two swirling battles of El Alamein that anchor this period, it was the four-day battle of Alam el Halfa, which came between them, that finally exhausted Rommel's strength and set the British firmly on the road to victory. What unites all three battles, besides geography -- Alam Halfa is a ridge about 40 kilometers to the southeast of El Alamein-- is the importance of defensive preparations to the conduct of operations on both sides. For two years the combatants had ranged back and forth over a 1000 kilometer stretch of desert. Now the campaign would be decided in a four month series of battles fought over a 60-kilometer west-east stretch. Distinguishing these battles were deep defensive areas -- marked by minefields, wire, and strong points -- prepared by both sides along a line stretching 50 kilometers from the northern coast to the impassable Qattara Depression in the south.

On the British side, the line served to halt Rommel's summer offensive -- even though the defensive positions had not yet been fully articulated. However, when the British attempted to assume the offensive in the first battle of El Alamein, they were unable to best Rommel in mobile armored duels. Even on this relatively constricted playing field and with German strength down, fast-paced mobile operations gave the advantage to Rommel. The British units were less well-coordinated than the German and their various combat arms fought in a fragmented, not combined, fashion. These are critical weaknesses under any circumstances; mobile war greatly magnifies them.

When the British broke off their attack, Rommel was happy to oblige. Although he had proved able to parry their riposte, his strength was insufficient to breech the British defensive positions. Both sides took time to receive reinforcements and build their defenses. By the beginning of August, Rommel's tank strength had grown by a factor of five. British strength was also reinforced. In a net assessment, the two sides entered the next phase -- the battle of Alam el Halfa -- more evenly matched than before. Although the first battle of El Alamein had stopped Rommel, he could still win the campaign -- providing success in an effort to penetrate to the British rear and cut off their main line of communication east.

In some important respects the battle of First El Alamein, which raged for 3 weeks, had not broken with the established pattern of the North African campaign. It was a battle of multiple parries, thrusts, and ripostes -- although contained by geography and the defensive disposition of the British forces. Continuity was assured by the British desire to "mix it up" with the Germans in mobile warfare -- albeit, mobile warfare of a more contained type. The subsequent four-day battle of Alam el Halfa truly broke the mold: for once, the defensive mode was to predominate throughout -- and it would ensure Rommel's eventual defeat.

On the eve of Alam Halfa the British had 712 tanks available -- of which 500 would figure in the armor battle; the Axis forces had 515 tanks -- of which 440 mounted guns. The defensive British line ran about 40 kilometers north to south, with its left flank ending at the edge of the Qattara Depression. This line was held by four infantry divisions deployed in fortified "boxes" -- actually large fortified areas about ten kilometers deep, anchored by prominent ridges, and with extensive minefields laid to give all around protection. Direct- and indirect-fire artillery as well as mortars covered the minefields from mutually supporting positions.

The heavily-defended British division areas stopped about 15 kilometers short of the Depression, although the minefields continued to the edge. At the point that the British north-south line seemed to "let up," a series of ridges turned eastward. On and among these high points the British deployed their armored brigades and additional infantry and artillery, also protected by minefields. The eastern-most of these ridges was Alam Halfa.

A bird's eye view from the south would reveal a continuous and deep "L"-shaped defensive line resting squarely on good, defensible terrain. The bottom leg of this "L" ran east-west parallel to the Qattara Depression and about 15 kilometers to its north. Hence, an "open" corridor existed between the "L" and the Depression -- but the ground in this corridor was relatively soft. And at the end of the corridor the British had placed an armored division. The British plan was to hold the northern area as strongly as possibly while inviting and then threatening from the flanks an enemy advance along the southern corridor.

Rommel's only hope of preempting the continuing build-up of British strength was to breech the lightly defended minefields in the south, push fast and deep along the southern corridor, and then swing north toward the coast and into the British rear area. This line of advance was obvious, and Rommel knew it; he could not surprise the British with his choice of place. But he calculated that the British would respond in typical fashion with a fragmented and piecemeal armored riposte.

When Rommel attacked he discovered that the minefield belt at the opening of the corridor was deeper than expected. With their advance slowed, the Axis columns clogged the corridor and became easy targets for British aircraft. Rommel tried to compensate for lost time by turning north sooner than originally planned, but this led his units onto soft ground at the foot of a major British armored position sitting astride the Alam el Halfa ridge. Rommel pressed the attack but the British, under specific orders from Montgomery, refused to be drawn into mobile warfare. Instead, they responded to the German assaults and flanking maneuvers with fire from well-sited tanks and numerous artillery pieces.

Montgomery had modified an earlier British plan by increasing the number of artillery pieces allocated to the southern flank from 50 to 250 guns. For almost two days the Germans persevered under heavy artillery and air attack while the British closed in with additional armor, attacking

Rommel's right flank and sealing off the possibility of advance to the northeast or east. The British choice of ground and unit dispositions facilitated their use of air power; while British ground troops boxed Rommel's units, British aircraft pummeled them. But Montgomery was too rigid in his reluctance to plunge in with armor; when the opportunity arose to close the trap on Rommel by attacking the weaker Axis units holding open the corridor in the west, Montgomery refused it. The Germans were thus able to retreat to their starting point -- although at great cost.

Alam Halfa had permanently altered the material balance to the advantage of the British; perhaps more important, it had altered the balance of morale. For once the British were left in good order while the Afrika Corps beat a hasty retreat. At Alam el Halfa Rommel's time had run out. He would look forward to the Second El Alamein, as he wrote in his diary, as a "battle without hope." Indeed, Second El Alamein would send Rommel into strategic retreat -- but not before his own defensive preparations gave the British a nasty surprise. At the beginning of the 12-day battle the force balance favored the British by between 2:1 and 4:1, depending on the standard of measure. However, the British repeatedly failed to breech the deep German minefields and rings of anti-tank guns, exhausting much of their momentum in the attempts. This, and a sudden bad turn in the weather, gave Rommel the respite he needed to retreat quickly to the west with the remnants of the Afrika Corps.

The Battle of Kursk, July 1943

Operation Citadel -- the German attack on the Kursk salient in the summer of 1943 -- was meant to rescue Hitler's effort along the eastern front at a critical time. During the previous winter and spring the Wehrmacht had suffered defeat and reversal before Moscow and Stalingrad as well as in North Africa. An allied drive on Italy seemed imminent. A shortening of the German line in Russia could serve to strengthen the German position there and free troops for use in southern or western Europe. A withdrawal to the west was the surest and easiest way to accomplish this objective, but this option ran counter to the spirit of Hitler's enterprise.

Hitler found hope in one operation his army had executed during the previous spring -- the successful encirclement of a bulge in the Russian line at Izyum on the River Donets. Despite setbacks elsewhere this operation had constituted an advance, not a retreat, and had bagged thousands of Russian troops. Another bulge in the Russian line now seemed ripe for attack: the 160-km wide Kursk salient that ran between Orel in the north and Belgrod in the south. A giant pincer movement here could compromise hundreds of thousands of Soviet troops and significantly shorten the German line. As it existed in May 1943 the salient's perimeter extended about 470 kilometers; a successful attack could shorten this line by 250 kilometers. And, if launched soon, the attack could avoid what Hitler considered his most serious opponent: the Russian winter.

Marshall Zhukov looked forward to summer 1943 as the time to begin a general counteroffensive that would eventually drive the Germans back to Berlin. His intelligence service told him of the German plans regarding the Kursk salient; Reconnaissance, common military sense, and experience with the foe led him to the same conclusion. Although the Russian High Command, and especially Stalin, considered preempting any attack on the salient, Zhukov thought otherwise.

"I considered it pointless for our forces to go over to the offensive in the near future in order to preempt the enemy. It would be better for us to wear them out on our defenses, to smash their

tanks, and then, by introducing fresh reserves and going over to a general offensive, to beat the main enemy force once and for all."

After the war the head of the British Military Mission to Moscow, Lieutenant General G le Q Martel claimed to have played a key role in advising against a preemptive move. Asked by his Russian hosts to recount the reasons for British victory in North Africa he had argued that the British "success at Alamein was largely due to the fact that we had let the Germans smash up...their armored forces on our defenses. When they were committed and had been badly knocked about, then was the time to assume the offensive."

At any rate, the Soviets' basic plan evolved from an approach that they had already employed in the battles around Moscow and Stalingrad. They would allow the Germans to open the attack, but under heavy artillery and air bombardment. The Soviet armies would defend every point with great determination, forcing the Germans to fully commit, thus revealing their main concentrations and points of vulnerability. Once the German forces had extended themselves and their momentum had begun to flag, the Soviets would go over to the offensive.

The Soviet plan (and Zhukov's confidence) hinged on a degree and quality of defensive preparation not previously seen in the war. This time the Soviets could not count on the weather as their ally. Instead, they would transform the ground into an ally, and claim their knowledge of that ground as an ally as well. Expecting the attack to rely heavily on tanks and aircraft, Zhukov transferred antitank forces from quiet parts of the front and from the GHQ reserve.

On a west-east line extending 170 kilometers from the salient's perimeter the Soviets prepared six lethal belts through which the Germans would have to pass. Behind this they deployed the Steppe Front (comparable to a Western Army group) as a strategic reserve, and then another deep belt of field fortifications along the east bank of the Don River.

Field preparations in each belt included:

- Alternate artillery, tank, and troop positions (mutually-supporting and protected or hidden),
- Antitank obstacles including ditches (that could be flooded or set afire), minefields, mined bridges, and fields of dragon's teeth,
- Trench lines anchored on natural obstacles and reinforced with pill boxes, and
- Communications trenches and protected, alternate supply depots and Headquarters.

The communications lines, which tended to be arrayed perpendicular to the front, could serve as lines of defense from which the defenders could attempt to laterally contain a penetration. Between each line of fortification was a maneuver zone in which units could redeploy under air and artillery cover.

Within each belt the density of the defense and troop deployment was not homogenous, but corresponded to the degree of expected danger. This was true not only on the tactical level, where tank-able terrain and important road lines received special attention, but also on the strategic level, where the extreme flanks of the Kursk salient received special attention. On the tactical level heavily-defended antitank areas were created. Within these, battalion resistance centers were set up and prepared for perimeter defense.

The typical antitank battalion area stood behind a deep layer of mines, obstacles, and wire. In a forward trench, antitank guns, antitank rifles, and machine guns covered the layer of obstacles. Arrayed behind or just in front of a second trench line were additional antitank and machine guns as well as mortars (which had sufficient range to reach out into the forward minefields). Finally, behind a third trench line, a less heavily defended rear zone existed. Communications trenches crisscrossed the area between the main trenches. Pillboxes, protected firing positions, and tank traps also dotted the ground between the trenches. To simplify fire control and make it more reliable, a network of observation posts with permanent communications was established. Mortar detachments carefully adjusted their fire to ensure rapid and accurate response to a variety of contingencies.

Should an enemy thrust pierce the forward line of a battalion area, troops in the forward zone could fall back to alternate sites, under cover of fire from the second line of defense. This line could be further reinforced from the rear area. Should the battalion have to abandon its base, egress through a rear trench could be covered by the rear area units.

Complementing these more or less fixed areas were mobile antitank detachments, both at the division and Army level. Their function was to reinforce threatened units or establish a hasty defense should the enemy find a gap between units. At the division level the antitank detachments consisted of one or two sapper companies; at the Army level, an engineer battalion reinforced by machine gunners. Complementing these were artillery antitank reserves.

In the maneuver area between the defensive belts indirect-fire artillery units could deploy and tank units had freer play. If reinforcement by mobile antitank detachments of an area under attack proved futile, both the defenders and their reinforcements would withdraw. The defensive areas to the left or right of the breech would receive these units as reinforcement and prepare for all-around defense. As the enemy thrust pushed into the zone between the defensive belts, it would meet friendly artillery, aircraft, and tank units. If these could not defeat the penetration from its flanks, they could at least contain it. Should the enemy force choose instead to push deeper forward, it would confront another defensive belt. Success would require nothing less than defeating six such belts and then besting the Steppe Front, waiting in the strategic rear.

As it turned out, the attackers did not get nearly so far. On 5 July a German force, comprising 2800 tanks, 1800 aircraft, 1000 assault guns in two large bodies, attacked the north and south faces of the bulge. Within the bulge there awaited a Russian force comprising 3600 tanks and self-propelled guns, 6000 antitank guns, 1000 Katyusha rocket-launchers, 12,000 other artillery pieces, 3000 aircraft, and 1.3 million troops.

In the north, General Model's Ninth Army was able to advance only 19 kilometers. In the south, the Fourth Panzer Army halted after 10 days, having progressed 32 kilometers. This more successful of the two efforts failed, however, to bag much of the Russian force, which simply withdrew deeper into the defensive array, as planned. The Russian counterattack commenced on 15 July. By 25 July the German armies called a halt, having lost 100,000 men, 1000 tanks, and 1000 airplanes.

Reflecting on the battle, General Walter Watlimont of the German Operations Staff concluded that Kursk "was more than a battle lost; it handed the Russians the initiative and we never recovered it again right up to the end of the war." By the end of 1943 the Russians had forced a withdrawal all along the front south of Smolensk, recapturing 100,000 square kilometers of their territory.

Russian progress came at a high cost because the German armies relied on defensive operations to check the Russian advances. Trading space for time, they repeatedly withdrew behind hastily constructed defensive lines. Still, they could not reverse the decision at Kursk, which had turned the force balance irreversibly to the Russians' favor. What the situation had called for was a strategic withdrawal. This Hitler refused to contemplate until too late.

A Recent Counter-example: The Failure of Iraqi Defensive Preparations in the Gulf War

The most salient factor in the Gulf War was a disparity in the capabilities of the combatants far more pronounced than that found even in Arab-Israeli conflicts. For instance, the Allied-Iraq ratio in theater combat aircraft was three-to-one; in advanced aircraft, 25:1. Having marshaled an air force three times as large as Israel's and many times more capable, the allies fought the war principally by means of air power -- talk of AirLand Battle notwithstanding. Revised intelligence estimates now show that the Allies also enjoyed pre-war numerical superiority in the number of ground troops in the southern theater. Iraqi troops in and around Kuwait numbered about 350,000, not 540,000 as originally estimated.

Compounding Iraq's disadvantages was its political isolation, six months of effective embargo, and the need to guard against powerful enemies on several fronts. These circumstances set this war apart from intra-regional ones, historical and potential. Nevertheless, the war holds some general lessons about regional armed forces and their practice of defensive operations. These lessons will become increasingly relevant should the war's outcome stimulate a new regional arms race, as seems likely.

The war reaffirmed the weakness of Arab air forces. Iraq's heavy investment in air power was to no avail and worse: it beggared other areas of military power that might have proved more relevant to the conflict. From a defensive perspective, Iraq would have more wisely invested in modern, mobile air defenses, basic electronic warfare countermeasures, advanced mines and means for their rapid emplacement, reconnaissance drones, and high- performance multiple launch rocket systems.

The war also revealed the vulnerability of centralized air defense and command, control, and communication systems. Had the Iraqi leadership given its subordinate air defense and army units more capacity and freedom for independent action, the allied "blitz" strategy could not have so easily collapsed Iraq's defenses.

From the outset of hostilities, Iraq's defenses seemed inert and one-dimensional. For instance, although the Iraqis stowed their most prized military assets in bunkers under tons of concrete, they failed to systematically employ simple, complementary measures -- like infra-red- and laser-masking smokescreens -- that would have lessened the effect of Allied precision guided munitions. Also, their air defense missiles and guns seemed largely reliant on a single means of target detection and acquisition: radar. Electro-optical and imaging infra-red backups, which would have proved more resistant to Allied interdiction, were relatively scarce.

The Iraqis were complacent in almost every aspect of their defensive operations. For instance, they showed little restraint in operating their radar and C3I systems in the pre-war period, thus providing the Allies with volumes of tactical data. Also, ground security for Iraqi air defense and

artillery systems was lax, leaving them vulnerable to Allied special operations personnel -- many of whom infiltrated into Iraqi-held territory days and even weeks before hostilities commenced.

The outcome of the war is an indictment of "hybrid" armies -- or, more precisely, of their hierarchical segmentation. The Iraqi army in and around Kuwait evinced two forms of hierarchical segmentation: first, in the quality of troops and equipment; second, in their deployment. The Iraqi command placed the least well-trained and equipped troops -- conscript infantry -- far forward to take the brunt of an allied land assault. More capable mobile units were far back in large reserves, but these were not to support the forward line as much as to engage allied units once they penetrated it. Lacking true cooperation, the various Iraqi forces could not multiply each others' effect or cover each others' weaknesses.

With inadequate air defense at lower levels, Iraqi units had no recourse under bombardment but to dig themselves into immobility. The allies reserved the most intense bombing for the weak frontline troops, and sought especially to strip these of their artillery assets -- calling to mind the military maxim that an obstacle not covered by fire is no obstacle at all. With centralized control shattered, the forward troops quickly surrendered to the advancing allies.

We cannot determine how well the Iraqi defensive line along the Saudi border might have withstood a mechanized assault if not for 30 days of unopposed aerial bombardment. Nor, at this time, do we even know the true extent of these Iraqi defensive preparations. Reports from the Marine Corps units that assaulted the Iraqi lines in the south indicate that these were much less elaborate and complete than suggested in the popular press, pre-war. Whatever its extent, several design weaknesses in the system, apart from the inadequacy of its air defense element, were apparent. Lacking a significant, integrated armored element, the forward defense was virtually immobile at the tactical level. Indeed, it was an infantry-based defense with artillery in support, reminiscent of the First World War. By contrast, a more modern defensive system would emphasize artillery and armor with infantry and air power in support.

Moreover, like the Maginot line, the simple linear orientation of the Iraqi system precluded all-around defense. Penetrated at one or a few points, such a system is seriously compromised. The Iraqis repeated the Maginot error on the operational level as well: Having built a defensive line with a flank left open, they failed to prepare for an allied thrust around the open flank.

The weakness of Iraqi defensive arrangements in Kuwait also derives, in part, from their being undertaken in the context of an offensive campaign. There is only so much that can be accomplished in six months across an expanse of 18,000 square kilometers, especially when military personnel must also control a hostile population. Furthermore, operating in foreign territory precluded the Iraqis quickly gaining intimate knowledge of the terrain, such as that the Israelis developed in the Golan in the period between 1967 and 1973. On the other hand, the construction of Iraqi defenses in Kuwait were transparent to the surveillance systems of the United States, which had been closely monitoring Iraqi activities since the beginning of the crisis.

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