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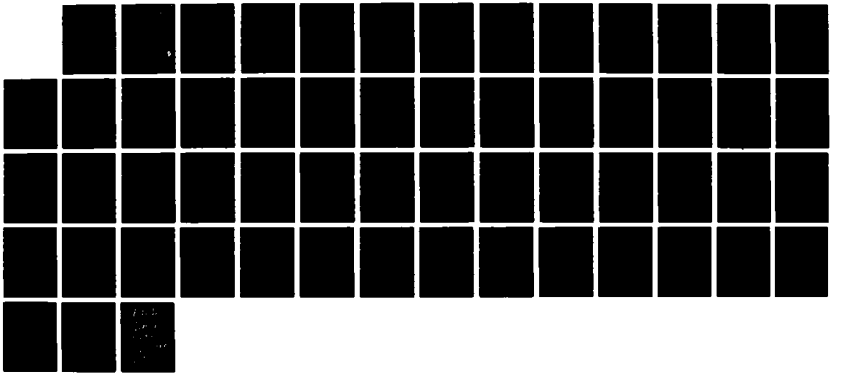

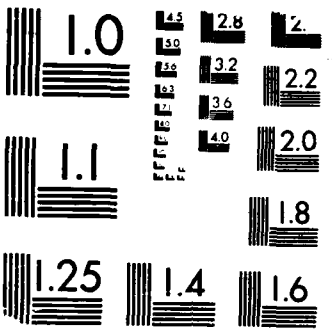

The Corps Artillery in the AirLand Battle: A Study of Synchronization, Change and Challenges

by

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This monograph investigates two key periods of change in the role of the corps artillery. The key change agents examined are peacetime doctrinal development and combat experience. The comparison of these periods, first, during the development of AirLand Battle doctrine and, second, during World War II shows the U.S. Army's and Field Artillery's ability to change in both peace and war.

Section II examines the role of the corps artillery in Airland Battle doctrine. This section traces the evolution of operational concepts that began in 1977 and led to the adoption of the 1982 version of Field Manual 100-5, Operations. Included is a review of the Central Battle, the Integrated Battlefield, the Extended Battlefield, and Corps 86. Finally, this section focuses on the AirLand Battle's tenet of synchronization. (continued on back)

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Section III examines the changes in the role of the corps artillery during the combat experience of World War II. The uses of the American artillery at the Battles of Kasserine and Ardennes are compared. An analysis of America's "first battle" at Kasserine reveals the IId Corps' failures in synchronizing operations and properly employing its fire support assets. A review of the IIId Corps' offensive in the Battle of the Ardennes shows the growth in the effectiveness of the corps artillery.

This study reveals that change can be a double-edged sword. The corps artillery demonstrated its importance on the battlefields of World War II. The adoption of the Active Defense doctrine, in 1976, and the subsequent decline in the role and size of the corps artillery headquarters, proved to be a step backwards. The acceptance of the AirLand Battle doctrine, in 1982, with its emphasis on the corps as a tactical, warfighting headquarters, has had a positive impact on the corps artillery. One significant consequence of this latest doctrinal change is the expanded role and size of the corps artillery headquarters.

AirLand Battle doctrine's emphasis on the corps presents the corps artillery with many challenges. The complexities involved in meeting these challenges are magnified when examining synchronization in AirLand Battle doctrine. The tenet of synchronization provides a framework for examining the requirements for planning and executing fire support in the dimensions of time - simultaneous and sequential actions; space - the close, deep and rear battles; and purpose - achieving unity of purpose by harmonizing fire support in accordance with the corps commander's concept of the operation.

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ABSTRACT

THE CORPS ARTILLERY IN THE AIRLAND BATTLE: A STUDY OF SYNCHRONIZATION, CHANGE, AND CHALLENGES by MAJ Joseph R. Cerami, USA, 49 pages.

This monograph investigates two periods of change in the role of the corps artillery. The key change agents examined are peacetime doctrinal development and combat experience. The comparison of these periods, first, during the development of AirLand Battle doctrine and, second, during World War II shows the U.S. Army's and Field Artillery's ability to change in both peace and war.

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> Corps plan and conduct major operations and battles. They synchronize tactical activities including the maneuver of their divisions, the fires of their artillery units and supporting aerial forces, and the actions of their combat support and CSS units.
>
> Field Manual 100-5, Operations[1]

I. INTRODUCTION

AirLand Battle doctrine recognizes the importance of the corps as a warfighting headquarters. This is a significant change from the Active Defense doctrine of 1976, which emphasized the division, fighting what we now call the close battle. The 1982 version of AirLand Battle also added the tenets of agility, initiative, depth and synchronization -- historically derived factors which have marked victory in combat in past wars and are accepted as keys to success in future conflicts. In addition, AirLand Battle doctrine recognizes the importance of depth on the battlefield and includes the notion that a battle consists of three related operations -- close, deep and rear. Thus, in a relatively short period, US Army doctrine has undergone a significant reappraisal and change.

The first major purpose of this paper is to examine the impact of these doctrinal changes in shaping the corps artillery. AirLand Battle's emphasis on the corps' tactical role has led to changes in the corps artillery. The adoption of the tenet of synchronization and the concept of the three-part battle also has had consequences for the corps artillery. By examining the operational concepts that are the foundation of AirLand Battle, and the tenet of synchronization, this paper provides insights into the resulting challenges facing the corps artillery.

The second major purpose of this paper is to investigate the impact of combat experience in shaping the corps artillery. Painting a clear picture of the evolution in thinking about the role of the corps artillery requires a longer-term view than is provided by examining only the 1976-1982 period. The adoption of AirLand Battle doctrine was preceded by a study of military history and theory. These studies revealed those tenets and principles of war that are reflected in the current version of FM 100-5. Similarly, understanding the role of the corps artillery in the AirLand Battle requires some historical depth. Therefore, the growth of the corps artillery in World War II will be examined through a comparison of the use of artillery in two battles -- Kasserine Pass and the Ardennes.

Thus, this monograph examines changes in the corps artillery during World War II and the development of AirLand Battle doctrine -- two dynamic periods in US military history. By focusing on the corps artillery we can gain insights into the nature and causes of change within the Army. Critics of the US military have emphasized the conservative nature of the armed forces, its branch and service parochialism, its growing bureaucracy, and its resistance to change.[2] This study reveals quite different results than would be predicted by outside reformers. Examining the evolving role of the corps artillery shows the US Army's and Field Artillery's ability to change in both peace and war.

> When the new manual [FM 100-5, Operations] was published in July 1976 it became one of the most controversial field manuals ever published by the US Army.
> Colonel Robert A. Doughty[3]

II. CHANGE AND DOCTRINE: THE CORPS ARTILLERY IN THE AIRLAND BATTLE

Although the 1976 version of Field Manual 100-5 may have represented what Robert A. Doughty calls the "zenith of emphasis on firepower during the three decades since World War II," its Active Defense doctrine was major setback for the corps artillery.[4] The Active Defense's emphasis on the division as the major warfighting headquarters led to significant changes in the corps artillery. In 1976, the counterfire mission was moved from corps to division level.[5] Then, in 1977, the corps artillery headquarters and headquarters battery was reduced in size to a fire support section.[6] The corps artillery's World War II role as a tactical command and control headquarters declined, and, under the Active Defense, it became primarily an allocator of resources.[7] This was to change ten years later with the reestablishment of the headquarters battery of the corps artillery. However, major efforts were required to make the doctrinal and organizational changes necessary for reestablishing the tactical roles of the corps and corps artillery.

For Army doctrine writers, the period between 1976 and the publication of the 1982 version of FM 100-5, was a very busy time. Five change agents -- leadership, threat perceptions, technology, combat experience, and doctrine -- played a part in

the revision of the operations manual and its controversial Active Defense doctrine. During this period, however, doctrine was the primary change agent involved.

Combat experience played an important and somewhat different role as a change agent than in the past. The 1982 manual did not focus solely or primarily on the lessons learned from the latest occurrence of combat. As noted by L.D. Holder, one of the principal authors of the 1982 version, the 1976 manual was a break with US experience and tradition, and placed disproportionate weight on the 1973 Arab-Israeli War.[8] The new manual was based on a long-term view of warfare. The 1982 manual had a "sense of history" and a theoretical content derived from the writings of classic military writers, such as Sun Tzu and Clausewitz.[9]

Threat perceptions also played a role. The 1976 version was criticized for its European orientation. Ironically, one of the principal reasons for changing the doctrine was that Army commanders became convinced, as a result of field training and war games, that US forces would be unable to defeat the Soviets in Europe using the 1976 doctrine.[10] Those calling for change also noted the geographic scope of the Army's worldwide commitments. Critics of the Active Defense pointed out that the Army's doctrine had to cover all the major threats facing the US, including hostile forces in the Warsaw Pact and North Korea, as well as Soviet-sponsored insurgencies.[11]

The lethality of modern weapons, a theme of the 1976 manual, was echoed in the 1982 version. However, technology's role was somewhat different from what it had been in past doctrinal developments. The new doctrine sought to accomodate future as well as contemporary technological changes.[12] The 1982 doctrine was designed to guide the development and integration of new systems, such as the M-1 Abrams tank and the M-2 Bradley infantry fighting vehicle.

In sum, the 1982 AirLand Battle doctrine defined the focus and scope of the way the Army would fight in the present and future. The doctrine was worldwide in application, built upon historical and theoretical foundations, and capable of incorporating new systems and technologies.

The leadership of General Donn A. Starry, the Commanding General of the Training and Doctrine Command, was an important factor in bringing about this doctrinal change. He outlined his process in an article entitled "To Change an Army."[13] Key to his approach was the building of consensus through the development of operational concepts. As these new operational concepts were debated, war-gamed, and modified, they evolved into the AirLand Battle doctrine. Four of these operational concepts were particularly significant in the resurrection of the corps and corps artillery as tactical, warfighting headquarters. These concepts included the Central Battle, Integrated Battlefield, the Extended Battlefield, and Corps 86.

THE CENTRAL BATTLE

The Central Battle established a corps level focus to the Training and Doctrine Command's (TRADOC) doctrinal initiatives.[14] The Central Battle was the "part of the battlefield where all elements of firepower and maneuver came together to cause a decision."[15] Starry's long-term goal for TRADOC was to analyze and describe the Central Battle, where the corps' primary function would be to fight "at the place where all combat systems and combat support systems interact on the battlefield."[16]

Starry used an historical approach in developing his methodology. Previously, his V Corps staff had conducted an analysis of 150 battle situations in its sector and a study of tank battles of the past, along with an assessment of threat tactics.[17]

> The V Corps historical analysis added depth to the then current TRADOC perspective which had drawn chiefly on the most recent experience of significant armored and combined arms battle, the 1973 Mideast War.[18]

From the beginning of his tenure as TRADOC commander in 1977, General Starry set the parameters for the future of US Army doctrinal development. The corps would regain its position as a warfighting headquarters. Historical study would be placed alongside quantitative methods in analyzing warfare. The new operational concepts would be based on a foundation that was broader than the Active Defense's focus on incorporating new weapons technology and the lessons of the 1973 Arab-Israeli War.

THE INTEGRATED BATTLEFIELD

The Integrated Battlefield was a significant step in the progression of operational thinking that led to the acceptance of AirLand Battle doctrine. The Integrated Battlefield looked at both enemy capabilities and the tactical solution to defeating the enemy.

As noted by Wass de Czege and Holder, two of the authors of the 1982 FM 100-5, the threat emphasizes combined arms operations which include the use of nuclear, chemical and conventional weapons. Soviet doctrine envisions fighting on an integrated battlefield.[19] Therefore, Army doctrine has to anticipate operations in a nuclear/chemical environment.[20] The second important aspect of the Integrated Battlefield was that US commanders would have to use their full range of weapons to defeat the threat. A criticism of the 1976 FM 100-5 was that it treated tactical nuclear and chemical warfare as specialized and separate operations.[21]

The Field Artillery School's vision of the Integrated Battlefield, first briefed in 1979, pictured future battle as one requiring combat systems integrated in space and time.[22] "Integration" included conventional and nuclear fire support, and maneuver forces; and air-land operations.[23] In the medium of space, deep interdiction would destroy, delay, and disrupt the enemy's second echelon. In the medium of time, attriting the enemy's mass and delaying and disrupting his velocity would slow his momentum. This in turn would open a window of opportunity,

giving the commander time to act, and thus gain the initiative. Commanders from brigade to corps level would thus gain a "planning horizon" for defeating the enemy's first and second echelons.[24] For the Field Artillery School, this meant integrating all available fire support systems -- nuclear, chemical, conventional, and air -- to attrit the second echelon and create the time to gain the initiative, and ultimately defeat both enemy echelons. The seeds of the AirLand Battle were contained in the Integrated Battlefield concept.

THE EXTENDED BATTLEFIELD

The Extended Battlefield further refined the Integrated Battlefield concept. Leadership in developing the new concept again came from the four star level:

> General Starry played an important role at this juncture as a catalyst for the evolving concept. Soon after its approval by General Meyer, he wrote an extensive article on extending the deep, integrated battlefield in the several dimensions of distance, time, and additional combat resources ....[25]

In part, the problem with the Integrated Battlefield was that over time it became identified with only the nuclear-chemical dimension of the battle.[26] The new term, the Extended Battlefield, was designed to continue where the Integrated Battlefield concept left off. While the "deep attack was a leading idea" of the Extended Battlefield, the concept continued to stress the integration of systems -- air and ground, and firepower and maneuver.[27]

General Starry described the concept in his article "Extending the Battlefield." In effect, the battlefield's extension is portrayed in terms of space, time, and systems. The space for the central battle is extended deep into enemy territory to engage second echelon elements not yet in contact. The objective of deep attack is to disrupt the enemy timetable, complicate his command and control, weaken his initiative and frustrate his plans. In Starry's vision, deep attack is necessary for winning.[28]

To be effective, the deep and close battles have to be coordinated in time. The picture is of one battle, with coordinated actions -- deep and close. Deep targets, to be of value, must have a payoff for the close-in battle. The timing of these two battles is critical, and the maneuver, fire and logistics plans must anticipate the vulnerabilities and time windows created by deep attacks.[29]

Accomplishing the tasks necessary for coordinated actions in time and space means the corps and higher headquarters have significant roles. The division itself does not have the systems necessary for fighting on the Extended Battlefield. Starry notes that a range of assets are needed, requiring more emphasis on the higher level Army and sister service acquisition means and attack resources. The required systems include those providing greater lethality and range, automated command and control, and sensors.[30] The corps commander needs deep attack assets other

than divisional equipment, both for intelligence collection and analysis and for attack weaponry.[31]

Starry's writing also reflects a concern for the principle of unity of effort. Under the Extended Battlefield concept the corps commander plays a key role. The corps commander is responsible for fighting one integrated battle with parts interrelated over time.[32] Through the intelligence preparation of the battlefield and target value analysis processes, the corps commander finds and disrupts the second echelon divisions of the first echelon army.[33] Working together, the corps and division commanders plan and fight the deep and close battles at the same time.[34] This close coordination requires a plan from a single commander, with a unified scheme of maneuver, and fires planned for the whole battlefield. Success depends on the careful coordination of present and future actions throughout the depth of the battlefield.

The dimensions of space and time are closely interrelated on the Extended Battlefield. The corps commander designs his deep attack plan to give the division commander space and time to finish off the first echelon, and prepare for the second echelon's attack.[35] Part of the solution to the challenge of fighting on an Extended Battlefield had to be found in organizational changes.

CORPS 86

The Army 86 studies, which included Division and Corps 86, were designed to provide the organizations necessary for executing the Extended Battlefield Concept.

> The aim of the Corps 86 Study was to develop the most combat effective organization for the Army's heavy corps, one that would integrate new and advanced weaponry and equipment, operational concepts, and human resources.[36]

The operational concept was published in Training and Doctrine Command Pamphlet No. 525-5, The AirLand Battle and Corps 86.

This document is important in several respects. First, it establishes the corps commander as a key warfighter on the battlefield. He would do more than manage corps resources and allocate combat power to his divisions.

> The corps commander commands operations against the enemy main effort. At the same time, he directs the interdiction battle against follow-on enemy forces, handing off those forces to divisional commanders as they close and become part of the divisional battle.[37]

Fighting the corps battle would require thinking in terms of space, time, and systems. Doctrine is a decisive factor in shaping both how the force would fight as well as how new technology would be incorporated. The concept of the AirLand battlefield is included in the TRADOC Pamphlet, and the "integrated conventional-nuclear-chemical-electronic and extended battlefield" were brought together in a single, overarching vision of future battle.[38] The concept of the Extended Battlefield became a cornerstone of the AirLand Battle.

> First, the battlefield is extended in depth....
> Second, the battle is extended forward in time....
> Lastly, the range of assets figuring in the AirLand Battle is extended toward more emphasis on higher land Army and sister service acquisition means and attack resources.[39]

The "essence" of the doctrine writers "message [is] distilled in four primary notions":

> First, deep attack is not a luxury; it is an absolute necessity to winning.
> Second, deep attack ... must be tightly coordinated over time with the decisive close-in battle .... maneuver and logistical planning and execution must anticipate by many hours the vulnerabilities that deep attack helps create. It's all one battle.
> Thirdly, it is important to consider now the number of systems entering the force in the near and middle term future.
> Finally, the AirLand Concept is designed to be the unifying idea which pulls all these emerging capabilities together so we can realize their full combined potential for winning.[40]

The Corps 86 concept places several major requirements on the field artillery. Artillery interdiction is viewed as one of the primary means for deep attack.[41] Interdiction is seen as:

> key to battlefield success. The enemy's momentum can be altered by attacking high value second echelon targets, reducing his ability to mass and build up momentum.[42]

Performing interdiction requires establishing and training target cells in fire support elements (FSE). The target cell fuses target acquisition and intelligence data, and plans for the "simultaneous engagement of enemy forces throughout the corps and division area of influence."[43] The notional FSE target cell has Army and Air Force "targeteers" who integrate nuclear, chemical, conventional, and electronic warfare weapons. Its operations

cell includes all attack systems representatives.[44] Under the Corps 86 Concept, the corps artillery is responsible for the battlefield tasks of counterfire; interdiction; target servicing in support of the close battle; and intelligence, surveillance and target acquisition.[45] The corps fire support cell's tasks include "performing target analysis, integrating fire planning, and coordinating other fire support systems such as close air support/ offensive air support."[46] Part of the interdiction task involves the suppression of enemy air defense.[47]

As part of the Corps 86 Concept, the proposed reorganization included reestablishing the headquarters and headquarters battery for the corps artillery.[48] In future combat this headquarters is expected to perform a multitude of tasks. On the integrated battlefield, the corps artillery is responsible for integrating all fire support means, including conventional, nuclear, chemical, air and ground fires. On the extended battlefield, it must synchronize fire support for the close, deep and rear battles of the corps and its divisions. In addition, the corps artillery headquarters must be prepared to serve as the corps' alternate command post.[49] Performing this multitude of complex and important tasks will present a challenge for the corps artillery on a future battlefield.

These operational concepts evolved into the AirLand Battle, which became the Army's warfighting doctrine in 1982. A closer look at the tenet of synchronization reflects the ideas developed in these operational concepts, and provides a framework for

gaining insights into the role of the corps artillery in the AirLand Battle.

SYNCHRONIZATION AND THE AIRLAND BATTLE

As defined in FM 100-5: "Synchronization is the arrangement of battlefield activities in time, space, and purpose to produce maximum relative combat power at the decisive point."[50] Clausewitz provides some guidance concerning synchronization.

> The rule, then ... is this: all forces intended and available for a strategic purpose should be applied simultaneously; their employment will be the more effective the more everything can be concentrated a single action at a single moment.[51]

General DePuy, a former TRADOC commander, agrees with Clausewitz's contention that the more combat power concentrated at the decisive point the better: "Victory in ... combat has classically gone to the commander who concentrates (and applies) superior combat power at the point and time of decision."[52] In a well synchronized operation this would occur. However, Clausewitz also notes that this is a difficult task:

> There is then no factor in war that rivals the battle in importance; and the greatest strategic skill will be displayed in creating the right conditions for it, choosing the right place, time, and line of advance, and making the fullest use of its results.[53]

The commander will have to make several crucial decisions to determine the right conditions, place, and time for synchronizing the battlefield activities of his force. The synchronization factors of space, time, and purpose serve as a framework for placing these decisions in perspective.

The first key factor, or dimension, in synchronization is that of space. Thinking in spatial terms under AirLand Battle doctrine means considering the close, deep, and rear battles. AirLand Battle doctrine clearly emphasizes the primary importance of the close battle.

> Close operations bear the ultimate burden of victory or defeat. The measure of success of deep and rear operations is their eventual impact on close operations.[54]

This guidance, however, does not always make supporting the corps' close battle the first priority for the corps artillery. The corps must also consider the three battles of the subordinate divisions.

> At any echelon, close operations include the close, deep, and rear operations of subordinate elements. Thus the close operation of a corps includes the close, deep and rear operations of its committed divisions or separate brigades.[55]

The corps artillery commander is concerned with supporting the close, deep, and rear battles of the corps. At the same time he must consider the close, deep, and rear battles of his divisions. Thus, the corps artillery commander's fire support plan becomes more complex and crucial when optimizing fire support for the corps' six, nine, or twelve battles, depending on the number of divisions assigned to the corps.

The dimension of time is also a key aspect of synchronization. The Clausewitzian ideal of the simultaneous application of combat power may not be the most difficult task to accomplish. Given sufficient time and resources, including

intelligence, target acquisition, protection, range, ammunition, etc., firepower can be brought to bear at the same place and time. However, conducting sequential operations will be even more complex. Naturally, trade-offs will have to be made when selecting from among various fire support options. Nevertheless, it will be difficult to decide in favor of allocating fire support assets for the deep battle at the expense of current operations in the close battle. It also will be hard to gauge the potential benefits of achieving the proper effects, or consequences, of alternative courses of action. This is especially true when attempting to estimate the payoffs of actions that will not be felt until some time in the future. In fact, this is one of the requirements of AirLand Battle doctrine.

> Some of the activities which must be synchronized in an operation - interdiction with maneuver, for example, ... must occur before the decisive moment, and may take place at locations far distant from each other. While themselves separated in time and space, however, these activities are synchronized if their combined consequences are felt at the decisive time and place.[56]

Thus, in the time dimension, the corps artillery commander has two major considerations for planning and executing fire support activities. Fire support activities can be synchronized to occur simultaneously or sequentially. In the corps' central battle, it is likely that the corps artillery will conduct both simultaneous and sequential actions. For example, the corps artillery could perform interdiction against a deep target to delay a second echelon force from entering the close battle for a

period of time. At the same time, as the friendly force counterattacks the enemy's first echelon, the corps artillery could provide close support, reinforcing fires to weight the main effort in the ground forces' scheme of maneuver.

The preceding discussion shows the complexities involved in planning and executing fire support when considering time-space relationships in the AirLand Battle. Purpose, the third key factor of synchronization, works to simplify matters somewhat. General DePuy writes that: "Synchronization is the responsibility of the maneuver commander."[57] The commander selects the concept of the operation, chooses the decisive place and time, and coordinates fires and maneuver to achieve the objective.

> In the end, the product of effective synchronization is maximum economy of force, with every resource used where and when it will make the greatest contribution to success and nothing wasted or overlooked. To achieve this requires anticipation, mastery of time-space relationships, and a complete understanding of the ways in which friendly and enemy capabilities interact. Most of all, it requires unambiguous unity of purpose throughout the force.[58]

While synchronization is the responsibility of the maneuver commander, the force artillery commander has a large role to play. Because of the time and resource costs of any course of action, the corps artillery commander must consider the trade-offs of various alternatives when considering fire support options for the corps. Integrating fire support assets on an extended battlefield, which may include nuclear and chemical warfare, is a challenge for the corps artillery commander. A

look backward to World War II, the American Army's last major conflict involving the extensive use of corps artilleries, provides useful insights for evaluating the corps artillery's capability to meet the challenges of the AirLand battlefield. The development of the corps artillery during World War II also provides insights into the role of combat experience as an agent of change.

> We won the war and it was largely won by the artillery. I think it is very important that you now record on paper what you did (not what you think you did), so that the artillery in the next war can start off where you stopped.
> General George S. Patton, Jr., 30 May 1945[59]

III. CHANGE AND COMBAT EXPERIENCE: THE CORPS ARTILLERY IN WW II

The second half of this monograph examines the role of combat experience as a change agent. Two important battles are discussed: the Battle of Kasserine Pass in 1943 and the Battle of the Ardennes, or Bulge, in 1944. Kasserine is one of the America Army's well known and chaotic "first battles." The Bulge includes the heroic episode of the relief of Bastogne, and shows the Army at the high point of its fighting skill in World War II.

The comparison is one of marked contrasts. As such, comparing the artillery's role in the two battles provides insights into change and the development of the corps artillery. First, Kasserine was essentially a defensive operation. In contrast, the III Corps' offensive during the Bulge will be examined. Second, Kasserine is an example of an army that lacked combat experience. The Bulge shows an army hardened by several years of combat in North Africa, Italy and Western Europe. Finally, Kasserine shows an army unable to synchronize its actions, while the Bulge demonstrates the payoffs of synchronized operations.

BATTLE OF KASSERINE PASS

> As a consequence of the Battle of Kasserine Pass, the U.S. Army instituted many changes. Officers worked to improve fire-direction control, to obtain better battlefield intelligence, and to gain more effective air support.
>
> Martin Blumenson[60]

The Battle of Kasserine, in February 1943, included eight engagements.[61] There were examples of both grave failures and significant successes. The three dimensions of synchronization -- time, space, and unity of purpose -- provide a framework for exploring both the successes and failures during the engagements, and the use of artillery in the Battle.

The engagement at Sidi bou Zid is the story of an overall failure to synchronize forces. In terms of time-space relationships, the artillery was often at the wrong place, at the wrong time. For example, one corps medium artillery battalion was overrun during the fight. "As if forgotten," it remained east of Sidi bou Zid during an American withdrawal to the west and was overrun, losing all eighteen of its howitzers.[62] The shortage of artillery also contributed to the rout. Additionally, the artillery was often positioned where it could not support the battle.[63]

Early in the Battle the Germans provided an example of synchronized operations. They demonstrated the effectiveness of a deep attack well-coordinated with a close battle. A planned American counterattack by Combat Command C of the 1st Armored Division was hit with long range German field artillery and a coordinated air attack "at just the critical moment when the [US]

units were massed for attack."[64] The result was that the planned dawn counterattack was disrupted and delayed, with the US force unable to cross the line of departure until after noon.[65] Then, German infantry, tanks, air, and artillery succeeded in knocking out fifty US tanks. The American tank battalion commander was captured, and 15 officers and 298 enlisted men were reported missing.[66]

The factor of time also worked against the US forces, both in terms of planning and execution at Sidi bou Zid. One example is the case of three forward observer parties joining Combat Command C just prior to the engagement, unaware of the maneuver unit's plans, formations, or even radio net procedures.[67] The overrun battalion, east of Sidi bou Zid, was also a victim of poor timing. It was not ordered to move until it was too late.[68]

Overall, the lack of unity of purpose accounts for a great deal of the confusion at Kasserine. The problems of Major General Lloyd Fredendall, the II Corps Commander, have been reviewed in several writings.[69] As the situation developed and Fredendall lost control over his own forces, the problem worsened and later in the battle:

> In lieu of a single commander providing unity, in the Kasserine area alone there were more than nine major commanders with their fingers in the command pie.[70]

The lack of effective unity of purpose, especially at the corps level, led to inefficient planning and coordination and "bore heavily on the artillery's ability to support."[71] In part,

this accounts for the observation that at Sidi bou Zid, "artillery support was practically nonexistent."[72] The fire support problems were aggravated by the fact that throughout the Battle of Kasserine Pass, there was no artillery commander at II Corps.[73] It was not until after the battle, on 6 March 1943, that the 13th Field Artillery Brigade finally joined II Corps as its corps artillery.[74] The lack of a controlling corps artillery headquarters accounts in part for the misuse of artillery assets and loss of effective fire support.

During the Battle of Kasserine Pass, in the engagements after Sidi bou Zid when artillery was much more effective, it was the unity of purpose of well-led and well-trained division artilleries that made a difference. At Sbiba, the 34th Infantry Division Artillery maintained its unit integrity, deploying under the effective command and control of the division artillery commander.[75] The engagement at Sbiba is an example of a well-synchronized operation by US forces. One hundred artillery concentrations were planned on and around minefields covered by an American infantry division in prepared defensive positions.[76] The strong defense, enhanced by the accurate and high volume of artillery fires, led Rommel to alter his attack plans.[77]

The engagement at Sbiba marked the first time in the theatre that US fire planning and tactical control were coordinated above the battalion level.[78] A second instance of effective fire control above battalion level is seen in the activities of the 9th Infantry Division Artillery at Thala. In less than one

hundred hours the division artillery moved its forty eight howitzers more than eight hundred miles.[79] Initial orders were received on 17 February. By 22 February the division artillery, assisted by British army-level artillery, had emplaced, been placed on a common surveyed grid, and was ready to fire. As a result of these efforts the unit contributed to stopping Rommel's forces at Thala, causing him to end his offensive operations.[80] For its participation in the Battle, the 9th Division Artillery received a Distinguished Unit Citation.[81]

During the Battle of Kasserine Pass, the engagements included examples of both successes and failures in artillery support. In the 1st Armored Division, the piecemeal employment of artillery reflected the division's confusion concerning the appropriate role of artillery in mechanized warfare.[82] One participant noted the division's treatment of artillerymen as "another bunch of tankers and, at that, ones who could not keep up."[83] In contrast, the 9th Division Artillery "functioned as a unit in textbook fashion."[84] The American artillery doctrine at the time recognized the importance of unit integrity and maintaining centralized control for massing fires. It was a lesson learned from the French in World War I.

> By the end of the last war [World War I] great masses of artillery were directly controlled by the corps artillery commander, a major general on the staff of the corps commander.[85]

In part, the artillery failures at Kasserine Pass were due to organizational problems at the division and corps levels.

There were two major causes of failure. First, the Allied commanders failed to employ US formations as integral units, with corps and divisions "split into small parcels and physically separated."[86] This was not in accordance with established American doctrine. Compounding the problem was the fact that artillery commands were designed to function at the corps and division levels. Second, there was a failure to achieve centralized control of field artillery, which was also in the doctrine of the time.[87] Corps artillery battalions and some divisional field artillery battalions were either attached to maneuver units, or placed in supporting roles, without the control of a higher artillery headquarters.[88]

Artillery doctrine also called for having heavy, long-range weapons for counterbattery, reinforcing and general support fires available for the division and corps commanders.[89] A 1944 article by an instructor from the Field Artillery School published in Military Review explained the role of the corps artillery in combat:

> Corps artillery executes two general types of fires:
>
> 1. Fires in support of the corps as a whole.--These include counterbattery, long-range interdiction, etc. Targets are obtained by long-range observation, higher echelons of intelligence, map study, etc., or may be prescribed by the force commander.
> 2. Fires reinforcing the division artillery.--These are against targets reported by division artillery observers and are usually fired on call, although fires requested by the divisions are also included in prearranged schedules. Reinforcing fires constitute the majority of missions executed by the corps artillery.[90]

The purpose of long-range artillery was to add depth to the battlefield, give weight to the critical sector, and permit the higher level commanders to influence the action.[91] At Kasserine, there were no heavy or long-range weapons assigned to II Corps.[92] In was not until the end of 1943 that new heavy and long-range howitzers and guns were added to the corps artillery.[93] However, for the remainder of the war greater proportions of the heavier weapons were assigned in support of major formations.[94]

Thus, Kasserine demonstrated the importance of massed fire at the division artillery level, and revealed the weaknesses in doctrine, organizational structure, and equipment at the corps level. After the rapid mobilization and hurried training efforts at the start of World War II, the failures at Kasserine did not come as a complete surprise to the Army's leadership.[95] Since 1942, Army Ground Forces, under LTG Leslie J. McNair had been involved in efforts for reorganizing the "fixed" corps structure.[96] Similarly, the Field Artillery School had endorsed the formation of artillery groups to achieve organizational flexibility in the corps artillery: "Groupements for counterbattery, for reinforcement of a division artillery, or for long-range fire were recognized as routine."[97] As part of McNair's reorganization efforts, in March of 1943, forty-five field artillery groups were activated.[98] Nevertheless, it was the lesson from Kasserine that led to the final authorization for implementing the proposed changes.

After Kasserine, General McNair reorganized the corps to achieve greater mobility and flexibility, and established a unified doctrine for the organization and employment of the corps artillery.[99] The changes established the corps artillery headquarters as a major tactical headquarters. The order authorizing these changes was published in July of 1943 and "every one of the organizational changes dealt with areas in which problems were encountered at Kasserine."[100] The following changes were made in the field artillery's force structure :

> -- Brigade and regimental headquarters were replaced by a corps artillery headquarters.
> -- Group headquarters would be attached to corps artilleries to control variable numbers of assigned battalions.
> -- The corps artillery commander became the chief of the artillery staff at corps.
> -- The ratio of field artillery to armor in the armored divisions was increased.
> -- The battalion was established as the lowest level self-sustaining field artillery unit [instead of the regiment].[101]

While McNair's reorganization was leaning in the direction of adding flexibility to the corps artillery as a tactical headquarters, it was combat experience which proved to be the decisive change agent. The experience at Kasserine established the importance of the corps artillery headquarters in World War II. As recorded by Martin Blumenson:

> The Americans made many mistakes in this first large-scale engagement of the war in Europe, but they learned from their errors and made adjustments that enabled them to go on to victory in Tunisia and beyond. The defeat at Kasserine showed the Army what troops had to learn and to do.[102]

Overall, the action at Kasserine shows the consequences of a failure in synchronization. Fire support, especially at Sidi bou Zid, was not well-coordinated in the dimensions of time, space, or purpose. In most engagements the US forces employed insufficient artillery assets, demonstrated shortcomings in integrating fire plans with offensive and defensive schemes, and failed to influence the action through massed fires.[103] During several engagements well-led and well-trained division artilleries demonstrated the effectiveness of massed fires. Still, the corps was unable to use artillery assets to influence the battle.

Changes were not long in coming. During operations in the Tunisian Campaign after Kasserine, artillerymen demonstrated the effectiveness of the centralized control of artillery by the newly formed II Corps Artillery at the Battles of El Guettar and Mateur.[104] At El Guettar:

> the artillery preps fired by eleven battalions under centralized control made a real believer out of General George Patton, the new II Corps Commander.[105]

THE BATTLE OF THE ARDENNES

> Of the principal arms which could be brought to bear directly upon the enemy, infantry, armor, and air were seriously handicapped by weather and terrain. Through all, however--day and night, good weather and bad--the flexibility and power of our modern artillery was applied unceasingly... A lesson, then from the Battle of the Bulge--Artillery constitutes a most formidable striking power continuously available to any commander of combined arms for application wide and deep over the battle area.
> General Courtney, H. Hodges, March 1946[106]

The second historical case study for examining the role of the corps artillery in combat is in the Battle of the Ardennes, during the III Corps offensive, in December 1944. Significant changes had occurred since the time of Kasserine. The corps artillery had matured, and it played a significant role in this battle. The field artillery group -- a tactical headquarters without organic, assigned, subordinate battalions -- demonstrated its important synchronizing role.[107] Most of all, this battle shows the flexibility of field artillery, which could be task organized for combat in various ways, and still be massed quickly to provide indirect fire support at the time and place of the maneuver commander's choosing.

In terms of space, the battlefield was divided for the close and deep battles. The division artilleries were responsible for the close battle, while the corps artilleries handled long-range fires.[108] The artillery's organization, equipment and doctrine reflected this division of responsibilities. The division artilleries were equipped with shorter range, smaller caliber weapons. Long-range, heavier cannon were reserved for the corps. By design, the division artilleries contained the minimum artillery necessary for facing weak resistance.[109] For

controlling fire support in the close battle, the division artillery's battalions were assigned forward observers and liaison officers responsible for coordinating close support for the maneuver force.[110] Observation battalions at corps level had the longer range target acquisition assets, including sound and flash equipment and aerial observers with piper cubs.[111]

While the battlefield was divided, the close battle was considered most important, and the corps field artillery groups were used to weight the main effort in critical sectors. The importance of multiple-battalion massed fires, for which the American artillery won high praises, was largely due to the flexibility in the coordination and organization of the corps and divisional artilleries.[112] The corps artillery commander did not formally command or control the divisions' organic artillery, but he could coordinate the use of direct support artillery.

> When the Corps Artillery Commander, through his knowledge of the flow of battle, is cognizant of the fact that certain battalions of division artillery are not being employed, their fires can and should be utilized by him to reinforce the fire on portions of the front where reinforcements are indicated. This is a matter for thorough understanding and mutual cooperation.[113]

The thorough understanding and mutual cooperation developed from a unity of purpose that existed among artillerymen during the war. This was no accident. Two of the causes for achieving this teamwork were standardized training and a flexible doctrine concerning organization for combat. Massing large numbers of field artillery battalions required the shifting of assets

between various headquarters. For instance, during the time of the III Corps offensive in the Ardennes from 18-26 December 1944, the corps was able to control and employ twenty five different artillery battalions in the relief of Bastogne.[114] Only two of those units were assigned to III Corps, the rest had been attached for the operation.

One analysis of artillery during World War II records this flexibility in assigning tactical missions for supporting various headquarters. For instance, in a one year period, one corps artillery battalion was assigned to seven different groups in three different corps.[115] In another example, during a four month period, one group controlled the fires of nine different battalions in two different corps. The capability for making numerous shifts in artillery support relationships was due in part to the uniformity of training and testing conducted by Army Ground Forces before certifying field artillery groups and battalions "combat ready."[116] In addition, the flexibility inherent in the four standard tactical missions of field artillery organization for combat -- direct support, general support, reinforcing, and general support reinforcing -- also contributed to the success in massing multiple battalions.

In preparation for the counterattack into the Ardennes, the III Corps Artillery received nine artillery battalions from the other corps.[117] Four groups were formed with strengths varying from two to four battalions each. A group was assigned to each of the corps' three divisions. One four-battalion group,

including an observation battalion, was retained in general support of the corps. Just hours before the attack VIII Corps Artillery attached four of its battalions to III Corps.[118] One battalion was attached to the 4th Armored Division, and three were retained by III Corps Artillery for general support. Overall, during this period of offensive action, the corps allocated the majority of its assets to reinforcing the divisions and retained five of the twenty-five battalions in general support. Thus, the system permitted the decentralization of control in offensive operations where there were wide zones of actions, rapid movement, inherent communications difficulties and combat-team level action.[119]

Later in the the operation, when the situation stabilized after the bulk of the Corps' movement was completed, the III Corps Artillery was able to regain more centralized control of its artillery assets.[120] However, even when control was decentralized the ability to mass was not lost. The controlling headquarters just moved one echelon lower, to the division artillery or group headquarters fire direction center.[121]

Divisions within the III Corps also had flexibility in the way they organized their artillery for combat. During the III Corps offensive, artillery task organization varied from complete decentralization in the 4th Armored Division, to centralization in the 26th Infantry Division.[122] Yet, by using the standard artillery tactical missions, the corps and divisions were careful not to violate artillery doctrine while task organizing their

assets in accordance with their situation, mission, and preferences.[123] The factors of common training, standardized testing, and adherence to doctrine made up for the fact that there were no long term, or habitual, support relationships in III Corps at the time. The various corps artillery units had not previously worked with the maneuver units or the other field artillery units involved.[124]

The synchronization factor of time was also important in this operation. The III Corps after action report notes that there was not time for lengthy planning and that "time was the all-important factor."[125] Using standarized missions saved coordination time. Common procedures also assisted in the execution of corps fire support. For example, the Third Army's "SERENADE" procedure for initiating artillery time on target concentrations permitted cooperation among widely dispersed units.

> The purpose of the procedure outlined herein, which will be designated as SERENADE, is to expedite the massing of all available fires within a corps sector in entreme emergency when lack of time precludes prearrangement of fire.... If the target is deemed sufficiently profitable, the corps artillery fire direction center assigns the mission to all headquarters whose fire capabilities permit, and who are not engaged on a more important mission.[126]

It is also interesting to note that at the time of the Ardennes offensive the III Corps Artillery was not a battle hardened outfit. In fact, this was their first independent operation as a corps artillery. For less than fifty days

previously -- "a period of tutelage" -- they had been attached to the XX Corps Artillery in operations around Metz.[127] During this break-in period, the III Corps Artillery "gained valuable experience in the lessons of combat."[128] The value of this short exposure to combat alongside a veteran unit served as an important confidence-building measure. Under XX Corps, the III Corps Artillery: "Experimented with the way to organize the field artillery for combat and how to control it. They were comfortable with the operating procedures they developed."[129]

The Battle of the Ardennes is an excellent example for illustrating the growth in the importance of the corps artillery in the conduct of battle during World War II. Since Kasserine, American artillery doctrine, procedures, and equipment had matured to the point that even a green unit could become combat effective in a short period of time. Historian Russell F. Weigley writes of the overall importance of the American artillery in World War II.

> ...an American officer observed that "We let the arty fight the war as much as possible."... Germans...consistently praised American artillery...American artillery [excelled] in the ability of a single forward observer--often flying in a Piper or Stinson liaison plane--to request and receive the fires of all the batteries within range of a target in a single concentrated barrage. The American guns specialized in "TOT"--time on target--concentrations of multiple batteries, or even of numerous battalions, upon designated targets for designated periods of time. To the catastrophic effects of a TOT, German prisoners gave universal testimony. On all fronts, artillery caused more than half the casualties of World War II battles....[130]

Knowing why, when, and how to change is key to maintaining an Army's effectiveness.
Colonel Huba Wass de Czege [131]

IV. CONCLUSIONS

This monograph has provided insights into change as a result of combat experience and peacetime doctrinal developments. The wartime changes came both from the top-down and from the bottom-up. The organizational changes of adding the corps artillery and group headquarters were the result of LTG McNair's restructuring of the corps. At the same time, during the Tunisian Campaign, artillery leaders began implementing the changes necessary to overcome the deficiencies found at Kasserine. While procedures and organizational structures were far from standard in the Italian Campaign, by 1944, doctrine, organization, training and experience came together in the artillery that proved so effective in Western Europe.[132]

Peacetime doctrinal change in the 1970's followed an uneven path. The Active Defense of 1976 was a top-down attempt to change the Army's keystone operations doctrine. The Active Defense was seen as a radical shift in Army doctrine which sought to incorporate the latest lessons learned from the 1973 Arab-Israeli War and the employment of new anti-tank technologies. This top-down attempt at change, using doctrine as the primary change agent, met with strong criticism and led to a major revision in the Army's warfighting doctrine.[133]

The subsequent change from the Active Defense to the AirLand Battle included both a top-down and a bottom-up approach. The

TRADOC commander, General Starry, led the reform movement. He appreciated the importance of building a consensus of support for the new doctrine. His framework for implementing a systematic approach to change includes steps for building this consensus.[134] Developing operational concepts -- Central Battle, the Integrated and Extended Battlefields, Corps 86, and AirLand Battle -- was an important part of the peacetime consensus-building exercise.

Under today's AirLand Battle doctrine, providing fire support for the corps requires synchronization in terms of space, time, and purpose. Synchronizing fire support for the corps' close, deep, and rear battles requires careful judgment in analyzing alternatives, especially when considering both the corps and division battles. Synchronizing activities in time must consider both sequential and simultaneous actions. The corps artillery commander must analyze the trade-offs involved when comparing various fire support options, and harmonizing fire support activities in accordance with the corps commander's purpose. For artillerymen, supporting the commander's concept of the operation requires a common understanding of doctrine, careful planning and coordination, and standard operating procedures and training.

In peace and in war, the corps artillery has undergone significant changes. Unfortunately, adopting the Active Defense doctrine led to the decline of the corps artillery as an important warfighting headquarters. Wass de Czege notes that at times it seems "we continually reinvent the wheel and cannot

advance in sophistication beyond it."[135] By 1977 the corps artillery had regressed to the position it held prior to the Second World War.[136] The reestablishment of the corps artillery headquarters came at the end of ten years of debate and consensus-building. It was not until 1986 that the corps artillery headquarters were given the manpower and equipment necessary to resume their role as warfighting headquarters.[137]

The combat experiences of World War II demonstrated the importance of the corps artillery in large-scale, mechanized warfare. Although the tenet of synchronization was not in the doctrine of World War II, artillerymen were well aware of the significance of the factors of time, space and purpose in the conduct of operations.[138] They also recognized the importance of long-range fires and the importance of coordinating what we now call the corps' deep battle with the division's close battle.[139] They realized that the priority of fires would go to the division's close battle, and the majority of the corps artillery's firepower would be used for reinforcing the division artilleries.[140] During World War II, the corps artillery developed the capability for synchronizing fire support for the close and deep battles.[141] Today, the corps artillery's capability for synchronizing its fire support assets to provide firepower at the decisive place and time, as in the past, will remain one of the keys to victory on future battlefields.[142]

However, under AirLand Battle doctrine, fire support planning and execution will have to increase in sophistication

well beyond what was expected of the corps artilleries of World War II. The corps artillery commander must insure that fire and maneuver work together across the close, deep and rear areas of the battlefield, in accordance with the corps commander's concept of the operation. The corps fire support element will have to master the intelligence preparation of the battlefield and target value analysis processes. Planners must use the full capacity of corps and higher-level intelligence collection and attack assets in developing fire support options. Fire plans will have to synchronize the use of army, air force, and navy assets. Conventional, nuclear, and chemical, ground and air fires will have to be integrated to achieve success on an extended battlefield. Thus, numerous challenges face the corps artillery in refining fire support doctrine, developing standard operating procedures, and conducting multi-echelon, combined arms and joint training in preparing for the complexities of future combat, as envisioned by the AirLand Battle.

In General Starry's words: "And so the intellectual search, the exchange of ideas and the conceptual maturation must continue and be ever in motion."[143] Those involved in future changes should be familiar with the potential for negative as well as the positive outcomes. No doubt, they will make better choices if they understand and appreciate the requirements of current doctrine, the importance of an in-depth study of war, and the necessity of a systematic approach for deciding why, when, and how to change an army.

ENDNOTES

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3. Robert A. Doughty, The Evolution of U.S. Army Tactical Doctrine, 1946-1976, Leavenworth Papers No. 1 (August 1979): 43.

4. Ibid., p. 46.

5. David L. Ingle, "The Role of the Corps Artillery in the AirLand Battle Concept" (MMAS Thesis, USA CGSC, 1982): 45.

6. Ibid., pp. 9-10.

7. Ibid., p. 11.

8. L.D. Holder, "Doctrinal Development," Military Review 65 (May 1985): 50.

9. John L. Romjue, From Active Defense to Airland Battle: The Development of Army Doctrine 1973-1982, TRADOC Historical Monograph Series (September 1984): 72.

10. Huba Wass de Czege, and L.D. Holder, "The New FM 100-5," Military Review 62 (July 1982): 53.

11. Holder, "Doctrinal Development," p. 50; and Romjue, p. 39.

12. Holder, "Doctrinal Development, p. 50.

13. Donn A. Starry, "To Change an Army," Military Review 63 (March 1983): 25.

14. Romjue, p. 23.

15. Ibid.

16. Ibid., p. 24.

17. Ibid., p. 23.

18. Ibid., p. 24.

19. Donn A. Starry, "Extending the Battlefield," Field Artillery Journal 49 (September-October 1981): 9.

20. Wass de Czege and Holder, p. 57.

21. William G. Hanne, "The Integrated Battlefield," Military Review 62 (June 1982): 38.

22. Romjue, pp. 35-37.

23. Ibid., p. 35.

24. Ibid., pp. 36-38.

25. Ibid., p. 43.

26. Ibid., pp. 43-44.

27. Ibid., p. 44.

28. Starry, "Extending the Battlefield," p. 7.

29. Ibid.

30. Ibid.

31. William G. Hanne, "*Doctrine, Not Dogma*," Military Review 63 (June 1983): 24. Hanne emphasizes the importance of intelligence systems and deep attack weapons such as the Assault Breaker, Corps Support Weapons System (which has since been replaced by the Army Tactical Missile System - ATACMS - program).

32. Starry, "Extending the Battlefield," p. 12.

33. Ibid., p. 10.

34. Ibid., p. 12.

35. Ibid., p. 13.

36. John L. Romjue, A History of ARMY 86: Volume II, The Development of the Light Division, the Corps, and Echelons Above Corps: November 1979 - December 1980, TRADOC Historical Monograph Series (June 1982): 58.

37. US Army Training and Doctrine Command, Pamphlet 525-5, The Airland Battle and Corps 86 (March 1981): 33.

38. Ibid., p. 4.

39. Ibid., pp. 2-3.

40. Ibid., p. 3.

41. Ibid., p. 10.

42. Ibid., p. 18.

43. Ibid., p. 21.

44. Ibid., p. 22.

45. Ibid., pp. 29-30.

46. Ibid., p. 35.

47. Ibid., p. 53.

48. Romjue, A History of Army 86, p. 144.

49. Ibid., p. 69.

50. FM 100-5, p. 17.

51. Carl Von Clausewitz, On War, edited and translated by Michael Howard and Peter Paret (1976): 209. Note: by "strategic" Clausewitz means coordinating engagements to achieve an objective (p. 132). In present day terms this corresponds to an area between the operational and tactical levels of war.

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54. FM 100-5, p. 19.

55. Ibid.

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61. David W. Hazen, "Role of the Field Artillery in the Battle of Kasserine Pass" (MMAS Thesis, USA CGSC, 1973): 24.

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68. Hazen, p. 43.

69. Blumenson, p. 261.

70. Hazen, p. 101.

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72. Ibid., p. 43.

73. Ibid., p. 104.

74. Ibid., p. 178.

75. Ibid., p. 76.

76. Ibid., pp. 76-9.

77. Ibid., p. 81; and Blumenson, p. 258.

78. Hazen, p. 81.

79. Ibid., p. 127.

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81. Ibid., pp. 131-2.

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83. Ibid., p. 145.

84. Ibid., p. 154.

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96. Russell A. Weathersby, "The Field Artillery Group in Support of the Corps and Field Army" (MMAS Thesis, USA CGSC, 1965): 5.

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98. Ibid., p. 11.

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100. Ibid., p. 182.

101. Ibid., pp. 181-2.

102. Blumenson, p. 265.

103. Hazen, p. 185.

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109. Morton, p. 17.

110. Ibid., p. 15.

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112. The General Board, in Morton, pp. 16, 21.

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114. Ibid., p. 1.

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116. Ibid., p. 24. Appendix 1 contains samples of the standardized tests used.

117. Ibid., p. 39.

118. Ibid., p. 53.

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121. Ibid.

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130. Russell F. Weigley, Eisenhower's Lieutenants: The Campaign of France and Germany 1944-1945 (1981): 28.

131. Huba Wass de Czege, "How to Change an Army," Military Review 64 (November 1984): 33.

132. Weathersby, p. 36.

133. For example see John M. Oseth, "FM 100-5 Revisited: A Need for Better Foundation Concepts?" Military Review 60 (March 1980): 13-19; and Richard Hart Sinnreich, "Tactical Doctrine Or Dogma?" Army 29 (September 1979): 18-25.

134. Starry, "To Change an Army," p. 23. Starry's framework for change requires: (1) an institutional mechanism to identify needed changes; (2) a common cultural bias; (3) a spokesman -- person, institution, or staff agency -- for change; (4) consensus building; (5) continuity among the architects of change; (6) leadership from the top; and (7) trials to demonstrate the effectiveness of the change to a wide audience.

135. Wass de Czege, "How to Change an Army," p. 41.

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139. Burns, p. 209.

140. D.S. Sommerville, "Corps and Nondivisional Artillery," Field Artillery Journal 34 (August 1944): 516.

141. The use of artillery in the rear battle represents a new challenge for corps artillery planners. In the cases examined in this paper, there was no evidence that what we now call the rear battle was a concern of the artillerymen of World War II. For a discussion of the potential use of field artillery in the rear battle see Paul Treolo Jr., "Fire Support for the Rear Battle," Field Artillery Journal 54 (January-February 1986): 28-32.

142. For an analysis of the historical continuity in the role of field artillery firepower on a future battlefield see Robert H. Scales Jr., "Drumbeat for Maneuver Could Muffle Firepower," Army 36 (December 1986): 22-32.

143. Starry, "To Change an Army," p. 27.

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