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**North Africa 1941-1942: Enhancing the
Combat Power of Armored/Motorized Formations**

**A Monograph
by
Major Paul A. Loveless
Armor**

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**School of Advanced Military Studies
United States Army Command and General Staff College
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ABSTRACT

NORTH AFRICA 1941-1942: ENHANCING THE COMBAT POWER OF ARMORED/MOTORIZED FORMATIONS by Major Paul A. Loveless. USA. 50 pages.

U.S. tactical units are organized with weapon systems of varying mobility, firepower, and protection characteristics that must be combined to develop combat power. Differences among these capabilities are most apparent in units organized with armor and mechanized infantry as well as motorized infantry. While mobility characteristics of these formations' tracks and high mobility, multipurpose, wheeled vehicle (HMMWV) mounted infantry are almost equal, firepower and protection capabilities are not. The problem is how best to combine these different weapon systems in order to enhance combat power. Because of the similarities to current armored/motorized formations of the units involved, this paper examines North African battles from WWII to determine applicable lessons for enhancing the combat power of these formations today.

The monograph first discusses the elements of combat power and how they relate to enhance its development. Next, two battles from North Africa, the Crusader Battle, November-December 1941, and the Battle of Gazala, May-June 1942, are analyzed using the elements combat power. Following this historical analysis, changes which have occurred within each element since Gazala are discussed before applicable lessons are related to current armored/motorized formations. The current organization and operating principles of the 9th infantry Division (ID) are discussed next as an example of contemporary armored/motorized formations. Each element of combat power is compared with current operating principles, theory and history, as well as battlefield changes, to provide considerations for developing combat power by armored/motorized formations. Finally, implications and future missions for the 9th ID are discussed.

The paper concludes that while there are applicable lessons from the WWII battles analyzed, they all cannot be transferred directly to current battlefield situations. What is clear, as with both the Axis and Allies, is the need to combine all the elements to develop combat power fully. Finally, while this paper does not fully address all the issues, armored/motorized formations can provide a mobile and relatively heavy antiarmor threat with a relatively small investment of strategic lift.

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Table of Contents

I. Introduction	1
II. Developing Combat Power	4
III. Historical Analysis	8
IV. The Modern Battlefield	24
V. Development of Combat Power by the 9th ID	28
VI. Conclusions	36
VII Implications and Future Missions	39

Maps:

A. Crusader 18-23 November	41
B. Crusader 24 November-1 December	42
C. Gazala 27 May-13 June	43

Endnotes	44
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Bibliography

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I. INTRODUCTION

U.S. tactical units are organized with weapon systems of varying mobility, firepower, and protection characteristics that must be combined to develop combat power. Differences among these capabilities are most apparent in units organized with armor and mechanized infantry as well as motorized infantry. While mobility characteristics of these formations' tracks and high mobility, multipurpose, wheeled vehicle (HMMWV) mounted infantry are almost equal, firepower and protection capabilities are not. The problem is how best to combine these different weapon systems in order to enhance combat power.

Axis and Allied forces fighting in North Africa used organizations based on weapon systems similar to those contained in current armored/motorized formations. A panzer division in the German Afrika Korps was organized with tanks, anti-tank weapons, and motorized infantry. As with current armored/motorized formations, these systems were almost equal in mobility but differed in firepower and protection capabilities. Nevertheless, they were effectively combined to develop combat power. Because of the similarities to current armored/motorized formations of the units involved, this paper will answer the question: What are the lessons learned from North African battles.

1941-1942, for enhancing the combat power of current armored/motorized formations?

Before outlining the methodology used to answer the research question, two assumptions must be stated. First, this paper assumes that tactical commanders will select appropriate objectives against which combat power can be applied. It further assumes they will develop sound tactical plans for the application of their combat capability. These assumptions are necessary to separate the question of the development of combat power from those of applying that power, which would significantly expand the scope of the investigation.

The answer to the research question begins with a discussion of what combat power is and how it is developed. Combat power is defined as that property of combat action which influences the outcome of battle.(1) The U.S. Army Command and General Staff College (CGSC) teaches that combat power is a product of mathematical calculations based on specified norms. ST 100-9, The Command Estimate, gives U.S. and Soviet units, according to type, a specific comparison value based on unit strengths and capabilities. Combat power is equal to the number of units available multiplied by their comparison values. Relative combat power is determined by a mathematical comparison of U.S. and Soviet units. This same type of procedure is used in many exercise simulations.

In his unpublished paper, "Understanding and Developing Combat Power". Brigadier General Huba Wass de Czege, argues that this type of analysis is too simplistic. He maintains that combat power is based on the effects of maneuver, firepower, protection, and leadership.(2) Because of their importance to a division's development of combat power, the effects of intelligence and sustainment will be added in this analysis. These elements will be the basis of the analysis of developing combat power.

Next, two battles from North Africa, the Crusader Battle, November-December 1941, and the Battle of Gazala, May-June 1942, will be analyzed. The analysis will be based on how each force, Axis and Allied, developed combat power using the effects of intelligence, maneuver, firepower, protection, sustainment, and leadership.

While there are lessons for today from these battles, changes have occurred within each element since Gazala. These changes will be discussed before applicable lessons are related to current armored/motorized formations.

The current organization and operating principles of the 9th Infantry Division (ID) will be discussed next as an example of contemporary armored/motorized formations. The 9th ID is transitioning from a motorized division to a mechanized division. However, operating principles developed, emphasizing wide frontages and maneuver, during its motorized experience may still be valid. Each element

of combat power will be compared with current operating principles, theory and history, as well as battlefield changes, to provide considerations for developing combat power by armored/motorized formations.

II. Developing Combat Power

Combat power is defined as that property of combat action which influences the outcome of battle. Combat power is always relative and has meaning only as it compares to the enemy's combat power.(3) As mentioned earlier, it consists of six elements: intelligence, maneuver, firepower, protection, sustainment, and leadership.

Intelligence is the information and analysis of terrain, weather, enemy capabilities and intentions which provide the basis for tactical planning. Intelligence has two components. The first component is collection. To do this, intelligence operations may employ any of a unit's resources--units in contact with the enemy, cavalry units, patrols, electronic warfare units, field artillery radars--and they routinely rely on higher levels of command for intelligence support.(4) The second component is analysis. The information obtained must be analyzed to assess enemy capabilities, potential courses of action, and determine possible effects on friendly capabilities. The effect intelligence has to combat power is based on the

advantages it provides a commander for the maneuver, firepower, and protection of his force.

Maneuver is the movement of forces in relation to the enemy to secure or retain a positional advantage.(5) Maneuver relies on the components of unit mobility, use of terrain, organization, and knowledge of the enemy.(6) Maneuver allows a commander to concentrate forces at the critical point to apply firepower advantageously and to achieve the effects of surprise, psychological shock, physical momentum, and moral dominance which enables his force to defeat the enemy.(7) It is these effects created by maneuver, not maneuver alone, which contributes to combat power.(8)

Firepower is the force available to defeat the enemy's ability to fight through destruction of weapons, disruption of command and control or by inflicting casualties.(9) The components of firepower are its accuracy and volume of fires, the lethality of munitions, and the flexible employment of weapon systems.(10) Its effect is the suppression of enemy fires, neutralization of his tactical forces, and destruction of his ability to fight.(11) Again, it is the effect of firepower, not its unapplied or misapplied potential which contributes to combat power.(12)

Protection is the conservation of the fighting potential of a force.(13) Protection has two components.(14) The first includes all actions such as

mobility, deception, and cover, that are taken to counter the enemy's firepower and maneuver by making soldiers, systems, and units difficult to locate, strike, and destroy. The second component of protection includes actions to keep soldiers healthy and to maintain their fighting morale. The effects of protection are measured by the fighting potential available at the moment of decisive combat.(15) As with the other elements, it is the effect which contributes to combat power.

Sustainment at the tactical level is the support necessary to man, arm, fix, fuel, and transport men, equipment, and supplies.(16) The components of sustainment are the available support equipment, supplies, organization, training, and the initiative of combat service support personnel. The sole measurement (the effect) of successful sustainment is the fighting potential available to the commander.(17)

Leadership is the act of providing purpose, direction, and motivation in combat.(18) The components of leadership are the attributes discussed in FM 22-100, Military Leadership, October 1983. All leaders must "be" men and women of character. They must "know" themselves, soldiers and the material tools of war. There are several things leaders must "do". They must be able to provide direction, implement plans, and motivate subordinates. The effect of leadership on combat power is measured through the overall

effect the leader creates vis-a-vis the enemy by the proper application of intelligence, maneuver, firepower, protection, and sustainment.(19)

Combat power is determined by the combined effects of all the elements discussed. No single element decides the outcome of battle. Combat power is relative and is determined by a two way equation.(20) The goal is to maximize one's own combat power effects while working to degrade the effects of the enemy's. The figure below represents the simple logic of the basic analytical model previously described.

The Relative Combat Power Model

$$L_f(I_f+M_f+F_f+P_f+S_f-D_e)-L_e(I_e+M_e+F_e+P_e+S_e-D_f)= \text{The Outcome of Battle}$$

L_f - friendly leadership effect	L_e - enemy leadership effect
I_f - friendly intelligence effect	I_e - enemy intelligence effect
M_f - friendly maneuver effect	M_e - enemy maneuver effect
F_f - friendly firepower effect	F_e - enemy firepower effect
P_f - friendly protection effect	P_e - enemy protection effect
S_f - friendly sustainment effect	S_e - enemy sustainment effect
D_e - enemy degrading of friendly firepower, maneuver, and protection effects	D_f - friendly degrading of enemy firepower, maneuver, and protection effects

This equation states that the outcome of battle depends upon what leaders do with intelligence, maneuver, firepower, protection, and sustainment. Also, combat power is affected by the efforts on the part of the antagonists to degrade the combat capabilities of the other while attempting to

minimize the effects of such action on their own combat capabilities.(21)

III. Historical Analysis

Two North African battles of WWII will be analyzed in relation to the elements of combat power. They are the Crusader Battle, November-December 1941, and the Battle of Gazala, May-June 1942. The weapon systems of the units involved and their organizations are similar to the weapons and organization of current armored/motorized formations. Although the Axis lost Crusader, they were generally successful developing superior combat power although numerically inferior in both battles.

Crusader Battle Overview (Map A and B)

In November 1941 both the Allies and the Axis were contemplating attacks. The Axis forces needed to capture Tobruk to secure their left flank in preparation for operations further east. The Allies desired to reoccupy Cyrenica.

The British plan of attack for Crusader was for the infantry divisions of XIII Corps to mask, then surround and capture from the rear, the Axis forces defending along the frontier between Sidi Omar and Sollum. In conjunction with this attack, the armor of XXX Corps would cross the frontier south of Sidi Omar and then swing north to Tobruk. A

decisive tank battle was to be fought between the 7th Armored Division, XXX Corps, and the Afrika Korps at Gabr Saleh. After the Afrika Korps defeat, XXX Corps would then join hands with the Tobruk garrison and together they would sweep westwards to break through the Axis forces in the Gazala line defenses and retake Cyrenica.(22)

Rommel was focused on the capture of Tobruk, not the threat of attack from the east. There were numerous indications of the coming Allied attack. However, Rommel refused to believe them and took minimal action to prepare for an Allied attack.(23)

Under cover of a rain storm, the Allies attacked on 18 November 1941. By 19 November there had been little reaction from the Axis. Initially positioned at Gabr Saleh, General Cunningham, commander of 8th Army, ordered the 7th AD to push on with two separate brigades to Bir el Gubi and Sidi Rezegh.(24) The same day, Rommel ordered General Cruell, commander of the Afrika Korps, to "destroy the enemy battle groups in the Bardia-Tobruk-Sidi Omar area".(25) In a series of battles, 19-23 November, the Afrika Korps destroyed the 7th AD and much of XXX Corps in the vicinity of Sidi Rezegh.(26) Rommel then pushed east with what remained of the Afrika Korps to destroy 8th Army LOC's and, through the shock of his attack, cause his enemy's moral collapse.(27) However, the XIII Corps had lost little in the initial fight and the XXX Corps, left alone, was able to

reorganize. The balance of power shifted in the Allies' favor when Rommel attacked east. Out of contact with their commander, Rommel's staff recognized the situation and recalled the Africa Korps from the east. Rommel's attempt to hold on at Tobruk failed and he was forced to begin his retreat to El Agheila, 7/8 December.(28) On 2 January 1942 the Axis frontier defenses at Bardia and Halfaya surrendered. In killed and wounded the Germans and Italians lost 24,500, and in prisoners 36,500, whereas the British losses were about 18,000.(29)

Crusader Analysis

Prior to the battle, both sides possessed good intelligence based on multiple sources: however, the Axis failed to capitalize on their knowledge. According to General Bayerlein, through wire intercepts and prisoner interrogation, the Axis knew "that large quantities of enemy war material and strong contingents of troops were steadily pouring into Egypt".(30) Rommel had further evidence of an impending attack based on pictures of a new British railway being built eastward from Mersa Matruh.(31) However, German ground reconnaissance failed to verify any Allied build up. Allied radio listening silence prevented detection of their approach marches to assembly areas. For these reasons, and an outstanding British deception plan (to be explained later), Rommel refused to alter his plans for attacking

Tobruk. The British attack went almost undetected for 24 hours.

Unfortunately for the Allies, by piecemealing their armor into the attack, they were unable to capitalize on this surprise. 7th AD's three armored brigades were initially divided between the mission to defeat the Afrika Korps and the need to provide protection for the infantry of XIIIth Corps. Allied senior leaders believed tanks were the battlefield's main tank killers.(32) Rather than depend on anti-tank guns for armor protection, the commander of the XIIIth Corps demanded that the 4th Armored Brigade, 7th AD, provide left flank protection for his units.

Gabr Saleh was then chosen as the place to defeat the Afrika Korps as a compromise between the desire to keep 7th AD's armor concentrated and XIIIth Corps demand for armor protection.(33) General Cunningham felt its location was close enough to 4th Armored Brigade's intended position that, if needed it could come to support the 7th and 22d Armored Brigades. However, it was not a location vital to the Afrika Korps.(34) When it did not come as expected, General Cunningham sent the 22d Armored Brigade to Bir el Gubi and the 7th Armored Brigade to Sidi Rezegh in search of it.(35) This further separated 7th AD's armored brigades.

When Sidi Rezegh was ultimately identified as the location to fight the Afrika Korps, the Allies did not maneuver to concentrate against it. The Afrika Korps first

fell on the 7th Armored Brigade, 7th AD, at Sidi Rezegh.(36) When the 22d and 4th Armored Brigades, 7th AD. joined the fight on 22 November, they did so an hour and a quarter apart.(37) Instead of the entire 7th Armored Division fighting the Afrika Korps from a defensive position. it was destroyed trying to fight it one brigade at a time.

The British possessed a minimal understanding of combined arms/mobile warfare and depended on brigades versus divisions for maneuver.(38) When the British attempted to maneuver brigades separately to the point of decision. they were doing so with units that did not understand. and were not trained in. the cooperation of arms. Because of this. the British were slower to concentrate, and piecemealed their units into the fight.

The Afrika Korps' flexibility and superior tactical mobility enabled them to maneuver quickly and offset the initial British advantage of surprise. Flexibility came from a system of warfare based on speed and mass, perfected in Europe and adapted to the desert.(39) Its mobility was a product of doctrine and organization. A German panzer division was a highly flexible formation of all arms. It fought and moved as a division IAW German doctrine.

Within the theater. the Axis forces were outnumbered 3:2 in tanks, but for several reasons achieved greater firepower effects than the Allies.(40) First. the Afrika Korps, concentrating against separate British brigades.

achieved a numerical superiority approaching 2:1. Besides retaining their concentration, the Afrika Korps increased their firepower effect with superior telescopic sights and anti-tank fire.(41) Best known of the German weapons is the 88mm anti-aircraft gun used in an anti-tank role. The German 50mm anti-tank gun was also effective against Allied armor. Additionally, much of the German armor was equipped with a high velocity 50mm weapon which was effective against Allied armor. Essentially, the Axis could engage and penetrate tanks at greater ranges than the Allies.

The British Crusader tanks were numerous but undergunned for the armor they faced. Although the British had anti-aircraft weapons similar to the German 88mm, their doctrine prevented using them in an anti-tank role.(42) An additional problem for the British was the poor reliability of their Cruiser main battle tank. Mass-produced straight from the drawing board and shipped directly to Egypt from British assembly lines, most arrived with bolts only hand tight.(43)

The greatest protection effect for the British was due to a combination of secrecy "which had been thrown over Eighth Army by radio discipline and freakish nature" and perfected by a deception plan which enabled almost total surprise.(44) The deception plan used codes and signal equipment captured from a German agent to send messages suggesting the British main effort was not focused on the

western desert. Rommel was fed what he wanted to hear and refused to believe that the build up in the west was more than a cover.(45)

For the Axis, greater protection was provided through their superior use of combined arms. The Allies habitually used their armor and infantry separately. Further, the British believed the main anti-tank weapon was the tank, not anti-tank weapons or artillery. The Germans rarely attacked without all three.

The Germans did prove what could happen if motorized infantry moved too closely to tanks in an attack. On 23 November 1941, three tank regiments, two German and one Italian, followed closely by motorized infantry, attacked an Allied position at Sidi Rezegh. The motorized infantry was ordered to follow at a distance of 200 yards and to stay in its carriers: hopefully, until they were on the objective. This attack charged into almost 100 guns. The tanks absorbed some of the fire, but the thin-skinned carriers of the infantry moving with them could not. Almost all the infantry's officers and NCO's leading the attack were dead before they reached the objective.(46)

The tactical sustainment capability of the Germans, especially their ability to recover, repair and get damaged tanks back into the fight, helped offset the British numerical superiority. Many skilled German mechanics were maintained far forward. Tanks were often recovered while

battle was still in progress. On several occasions one tank was towed out of action by another during the battle, both firing as they moved.(47)

Leadership effects were felt at all levels. There are many examples of heroic small and large unit leadership, but the greatest leadership effects were made by three men.

First, General Cunningham, commander of the Eighth Army, was not technically or tactically prepared to command Crusader.(58) He was unfamiliar with the desert and had never commanded at the army level. He knew little about armor and only had two months during a period of frantic activity to prepare for the battle. He failed to keep his armor concentrated, and the 7th AD was destroyed piecemealing its attack. As the battle unfolded, he became overwhelmed by its events; and when Rommel attacked east, he lost his confidence.(49) It was only through the intervention of General Auchinleck that the British did not retreat.

Rommel allowed a preconception of British intentions to deny what numerous intelligence sources and his subordinate commanders identified as the British main effort. He positioned the Afrika Korps to support the attack on Tobruk not to defend against an attack from the east. Rommel's attack east has been called both a tactical error and the only possible choice to ensure total defeat of the 8th Army. Rommel misjudged the effect this attack would have on his

enemy. Worse, he attacked east leaving his own line of communication exposed to an enemy he had not destroyed.

It was Auchinleck's decision to over-rule Cunningham's request for retreat that saved the battle for the Allies.(50) There would be another three weeks following this decision before Rommel was finished. However, it was this decision which most significantly influenced the outcome of the battle.

Gazala Overview (Map C)

In May 1942, the British 8th Army's defensive positions stretched from the sea to Bir Hachiem, a distance of 45 miles. The region was without tactical features, which required General Ritchie, the 8th Army commander, to "entrench" his troops behind an "unmanned" minefield in a series of fortified positions known as "boxes".(51) From north to south there were four main boxes--Gazala, the 50th Divisional Box, Knightsbridge, and Bir Hachiem. The tactical value of these boxes depended largely on mobile forces positioned to their rear which could come forward to block penetrations. If bypassed, the boxes were to continue to fight until relieved. The defensive line was split between XIIIth Corps in the north and XXXth Corps, with the bulk of the available armor, in the south.

Rommel's plan of attack was to hold his front with dismounted Italian infantry while moving all of his mobile

force around the 8th Army's southern flank. He planned to engage and destroy the enemy's armor, seizing the line El Adem--Sidi Rezegh, by the night of the first day. On the second day, he planned to wheel westward and attack the British defenses from the rear. On the third day, he would turn north and take Tobruk.(52)

Rommel attacked on 26 May 1942. Moving in three divisional columns, he passed south of Bir Hachiem and moved north. By the evening of the 27th, Rommel's infantry closed on all the Allied boxes and his advance screen reached the line Acroma, El Duda, and Sidi Rezegh.(53) From 28-31 May, vicious and confused fighting occurred between the contending armored forces, primarily in an area west of the Knightsbridge box. This area came to be called the "Cauldron". On the night of 31 May, with both sides exhausted, Rommel fell back to a position within the Allied minefield to resupply. Rommel held this position, 1-5 June, against repeated Allied attacks. He took from 5-10 June to reduce the Bir Hachiem box. On 12 June, with his rear protected, he attacked north. On 13 June, the Allies tried once more to stop Rommel at Knightsbridge. Failing in this, General Ritchie ordered a withdrawal.(54) Tobruk, not prepared to defend, was in Rommel's hands by 21 June. Resupplied with Allied fuel, he resumed his attack east and was not stopped until he reached El Alamein on 30 June 1942.

Combat Power Analysis

British operational intelligence was excellent, but tactical failures negated its payoff. By 2 May ULTRA intercepts correctly identified Rommel's attack coming between 20-31 May.(55) Units were placed on alert, but no special reconnaissance efforts were taken. On the day Rommel attacked, a single Allied reconnaissance plane was in the air, and it was shot down.(56) Although ground units reported the movement of Rommel's tanks, a breakdown in the communication system prevented the information reaching 8th Army HQs.

The Axis did not have the Allies' operational capability, but they were better at the tactical level. The Germans were well served by their Wireless Intercept Section.(57) It was able to place units by call-sign and direction finding as well as reading signals transmitted in lower grade operational codes. They were helped by the poor radios and radio discipline of the Allies.(58) The Germans also performed ground reconnaissance prior to Gazala to include missions forward to familiarize themselves with the terrain over which they would be fighting.(59) Rommel did not know everything about the Allied defense, but with his intelligence was better informed about the requirements to attack than the Allies were to defend.

There were several problems with the Allied plan that contributed to poor maneuver. The brigade boxes were not

mutually supporting, and minefields between the boxes were not covered by fire or observation.(60) These boxes were quickly isolated. The British also established vast supply bases well forward in preparation for an attack of their own. Protection of these supplies was on the minds of British commanders making them hesitate to maneuver their armor in any way that might uncover them.(61) A plan that depended on a mobile defense should have divided the available infantry and armor between XIIIth Corps and XXXth Corps. One corps would have received the mission of conducting the static defense and one the mobile defense. However, Ritchie simply divided the defense into north and south sectors giving XXXth Corps the preponderance of available armor. Further, General Auchinleck directed General Ritchie to keep XXXth Corps' two armored divisions intact, but this guidance was not followed.(62) Ritchie attempted to use his armored brigades to cover multiple avenues of approach rather than keep his divisions concentrated. His armored brigades were committed to battle one after another, and neither corps or divisional headquarters, had any control over the battle.(63)

The British commanders embraced a theory of war which virtually discarded regular divisional organizations and the principle of concentration, to rely on maneuver and extreme dispersion.(64) The attacking formations adopted by the British were seldom larger than a brigade group. Infantry

and armor within the armored divisions seldom worked together. Possibly the most serious consequence of their dispersion was the fragmentation and decentralization of their artillery which deprived division commanders of their most flexible source of firepower.(65)

The fundamental difference in the German and British tactics lay in the fact that, however grouped, the Germans moved in large masses at close intervals so arranged that tanks, guns and motorized infantry could each support the other without the need for elaborate redeployment.(66) When on the move, a German panzer division was preceded by its reconnaissance unit, with the main body following in a mass formation. The tanks led, moving in several ranks, with some 88mm and 150mm artillery close behind. The whole formation formed a square inside which travelled motorized infantry with many of their trucks towing more anti-tank weapons.(67) When an enemy defensive position was identified, it was carefully reconnoitered. Then the "division", tanks first followed by their infantry, attacked under cover of artillery. Antitank guns accompanied tanks closely. They were frequently sighted among abandoned vehicles and other equipment, ready to open fire when Axis tanks forced British tanks within range.(68)

The bait and trap was a standard German tactic. If a heavy force of British tanks was encountered, tanks attacked first and then drew the British into an antitank gun line

for their final destruction. With these tactics and the principle of mass. the Germans, although outnumbered almost 2:1, defeated the British in detail.

Deception was used by the Germans to assist in protection of their forces. A demonstration was conducted in the northern sector of the Gazala line to draw the attention of the British.(69) This was accompanied by vehicles raising dust clouds to represent armored forces. Use of cover also contributed to protection. In defensive positions both sides dug in their infantry and weapon systems. When sand storms occurred they were used to cover movement. For the Afrika Korps, greater protection was again accomplished through the use of combined arms. Allied armor and infantry continued to operate without each others support or the support of antitank weapons in offensive roles.

At the tactical level, German sustainment efforts to arm, refuel, and fix forward once again paid off. Recovery and repair by the Germans were efficient as in every previous battle.(70) They were assisted by the German practice of remaining on the battlefield at night. The Allies normally withdrew at night leaving their equipment to the Germans.

The Axis leadership effect was superior to the Allies. British leaders were methodical and possessed little understanding of combined arms tactics.(71) They recognized

the superiority of German methods in several training notes and tactical summaries published prior to Gazala. However, they were not able to incorporate these lessons within their doctrine. There was a tendency to plan, and later fight, separate battles.(72)

In contrast, German leaders from the lowest to the highest, were aggressive and well-versed in combined arms tactics. The Afrika Korps was not a special unit prepared specifically for the desert. The unit and its leaders were products of military training which emphasized the doctrine of forward movement and the interdependence of all arms.(73) Also, German generals were not strangers to their soldiers. Generals were present on the battlefield to take control and issue directions.(74)

Rommel was a bold, physically tough commander who led from the front.(75) He did not turn away from tough decisions and was an extremely resilient leader. There are no doubts concerning his technical/tactical capabilities and willingness to take risks. However, Rommel demonstrated during Crusader that gambles should not be misinterpreted as risks.

Analysis of the Crusader and Gazala battles provides several lessons concerning the development of combat power. Accurate intelligence was essential to developing an effective scheme of maneuver and, ultimately, the application of firepower. Operational and tactical assets

provided this intelligence. However, it still had to be correctly interpreted to have a positive effect. The Afrika Korps' superior maneuver capability was based on their doctrine, organization, and superior tactical mobility. Superior firepower was more a product of massing weapon systems than it was a product of weapon capabilities. Although armor protection was important, protection was primarily achieved through deception, use of terrain, and combined arms, not the armored skin of combat vehicles. The sustainment capability to recover combat vehicles during battle and repair them far forward was critical to the success of the Afrika Korps. None of these things would have been possible if leadership had not been up to the task of combining all the elements of combat power into a sound plan.

IV. The Modern Battlefield

The elements of combat power have the same relevance on the modern battlefield as they did during North African WWII battles. However, there have been changes affecting each element's components. These changes will be discussed next.

Intelligence continues to provide information to judge enemy intentions relative to friendly capabilities. However, changes have occurred within its components of collection and analysis. Essentially, there are a greater number of assets available for collection today. These assets range from long range surveillance patrols, units in contact to a variety of electronic warfare capabilities. These assets provide a tremendous amount of information not available during WW II. Analysis is complicated by the amount of information available and today's increased battle tempo which requires decisions to be made quicker. The amount of information provided, combined with the desire to remove uncertainty, often conflicts with the need for quick decisions. Reducing this problem requires a sophisticated intelligence system for collection and analysis, assumption of risk, and good judgement.

Maneuver's component of unit mobility has been affected by the enhanced speed of modern combat vehicles. Enhanced mobility has contributed to an increased battlefield tempo. Tempo has also been increased through today's close

cooperation between ground and airborne/air assault units. Also, the speed with which today's forces can concentrate and the high volumes of supporting fires they can bring to bear make the intermingling of opposing forces nearly inevitable.(76) The modern battlefield will be non-linear.(77)

Although tempo has increased, the U.S. Army does not have a qualitative advantage in the speed of its equipment. This factor, combined with a non-linear battlefield, makes movement advantages dependent on unit flexibility. As with the Afrika Korps, a unit's capability for rapid response to changing conditions will provide the maneuver advantage. Flexibility is also required for units to overcome the differences in the capabilities of their vehicles. Most of the Army's equipment, even within combat units, does not share similar capabilities for speed or endurance which makes organization for movement difficult.

Technology has dramatically affected firepower's components of accuracy, volume of fires, lethality, and the flexibility of weapon systems. In North Africa, antitank fire had high probability of hit ratios out to 2000m. Today, there are direct fire systems with effective ranges in excess of 3 kilometers. Attack helicopters have high hit capabilities using antitank missiles at ranges of 6 kilometers.(78) Multiple Launch Rocket Systems and nuclear weapons were not present during WW II. Improved target

acquisition and control systems as well as position indicators have enhanced the flexibility of modern weapon systems. The capability exists to acquire and hit targets almost in real time. These changes again are relative to the enemy's capabilities. Superior firepower still depends on a unit's capability to concentrate its systems against the enemy.

The armor protection available to certain combat vehicles limits the number of weapons and types of rounds that can penetrate them. Although vulnerable, U.S. and Soviet tanks are well protected against many weapon systems. However, the majority of vehicles and weapon systems on the modern battlefield have little or no armor protection. Additionally, the range, accuracy, and flexibility of numerous weapon systems have made vulnerable rear area units previously protected by their distance from the forward edge of the battle area (FEBA). Realizing this, speed, use of terrain, and deception are still critical to protection of forces.

High rates of usage and sophisticated equipment make the sustainment mission increasingly important while the increased vulnerability of rear support areas makes the sustainment mission increasingly difficult. Rommel's supply bases, where major repairs were conducted, enjoyed relative safety. The British benefited from vast amounts of material supplied by the U.S. Neither of these advantages are

available to the U.S. Army. Weapon system replacement will depend on repairs made by highly skilled soldiers in logistic areas subject to numerous threats.

The components of leadership have not changed but the problems for modern leaders are more complicated. The most complicated problem is maintaining command and control. The increased lethality of the modern battlefield has forced units to disperse in order to decrease its potential effects. Enhanced vehicle endurance and improved night vision devices make continuous operations the norm today rather than the exception. To reduce the impact of both these factors, leaders depend on sophisticated command and control systems at a time when electronic countermeasures make these systems extremely fragile.(79)

Control of large units is difficult, but without command and control systems it is impossible. Command and control systems must be redundant using leadership techniques and correctly placed communication assets. Rommel's command and control was based on leaders who could act within his intent but without constant instructions. Additionally, his communication nodes were placed correctly allowing him to talk to his headquarters from any German headquarters in the field.

For the many reasons discussed leaders must "be", "know", and "do" more today. Most important, they must be prepared now, not sometime in the future, to do their jobs.

The effects required from each element are the same today. However, changes to components have complicated attaining the desired effects. To capitalize on the effects of intelligence, collection and analysis systems must be organized to support today's rapid decision cycles. Successful maneuver requires unit mobility at least equal to the enemy. More important is the flexibility required for quick response to rapidly changing battlefield situations. The lethality of the battlefield has increased with weapons of greater range and accuracy. These changes are relative to enemy capabilities, making concentration of weapons more critical to achieving superior fires. Protection, however, still depends on speed, use of terrain, and deception. Sustainment depends on the technical skills of soldiers as well as their ability to protect logistic centers. To maintain control, unit leaders must use redundant systems which incorporate leadership techniques with correctly placed communication nodes.

The elements of combat power were valid during WWII and they are valid today. Recognizing what has changed, considerations for the combination of these elements by 9th ID to develop combat power will be discussed next.

V. Development of Combat Power by the 9th ID

The 9th ID is organized with tracked and mechanized infantry battalions as well as motorized Combined Arms

Battalions (CAB). The CAB(H) contains two TOW companies and one infantry company. The CAB(L) is organized with one TOW and two infantry companies. One armor battalion, one mechanized battalion, and one CAB(H) form one brigade. Two CAB(H)s and one CAB(L) form an additional brigade. The division's roundout ground unit is a separate armored brigade. The bulk of the division's active unit infantry is motorized, and much of its antiarmor capability depends on long range missile fire.

The division's current operating principles are based on over nine years of motorized experience.(80) A motorized division needs wide frontages over which it can take advantage of its flexibility and agility to maneuver. The CAB's mission is to maneuver into direct fire range of an enemy force's flanks or rear in order to destroy or capture it, or to repel its assault by fire, close combat, and counterattack.(81) The CAB depends on enhanced mobility to concentrate and disperse rapidly to accomplish this mission. The problem for the 9th ID is to incorporate this capability, developed during its motorized experience, with the capabilities of its mechanized and armor battalions as the unit transitions to a mechanized division.

Combat Power Development Considerations

As with Rommel, the 9th ID's dependence on maneuver makes intelligence extremely critical. Recognizing this.

the division has organized its assets and trained to meet its collection requirements. Forward Support Intelligence Companies maintain habitual relationships with maneuver brigades. Division controlled collection sources have been frequently down-linked directly to maneuver brigades.(82) The division also recognizes the importance of the Intelligence Preparation of the Battlefield (IPB) process. This is a continuous, not just prebattle, process that drives intelligence collection.

Without the addition of new equipment, only organization and training will maximize the division's intelligence capability. The IPB process must be used to synchronize intelligence collection assets to gain the information necessary to maneuver. Corps and echelons above corps (EAC) assets can "see out" the distances needed to support 9th ID's maneuver. Assets available from these sources must be linked, through the IPB process, to assets within the division in order to maximize the collection effort.

As intelligence is gained, analysis must be the responsibility of the entire staff, not just the G-2. Analysis, as possible, must occur simultaneously in order to support the quick decision cycles on today's battlefield. As required, this is an internal fix based on the needs of the commander.

Tactical mobility and flexible organizations must be used with knowledge of the terrain to capitalize on maneuver. The CAB is a very agile, highly mobile unit. With these units, as well as its armor and mechanized battalions, the 9th ID has the mobile and flexible organizations needed for maneuver.

All of the division's units do not share this mobility or flexibility. The division's primary problem is its towed field artillery weapons. As long as its artillery support is towed, 9th ID will find attaining the tactical mobility and flexibility of the Afrika Korps difficult. Self propelled artillery will enhance the division's maneuver capability.

The strength of the CAB, and possibly the division, is its ability to disperse and concentrate rapidly. With this ability, the potential exists for the motorized brigade to conduct deep attacks or exploitation of penetrations created by the division's heavier units. Operating as a covering force or flank guard, the ability to concentrate rapidly enables the motorized brigade to transition quickly to a reserve or thicken a defense if required.

The idea is to capitalize on the motorized brigade's tactical mobility and not tie it to any system, such as towed artillery, which negates this strength. There is obvious risk operating without sustained artillery support. However, the 9th ID's greatest maneuver effect will come

from the motorized brigade. It can either move faster than the division's opponent or, because of its flexibility, slow an opponent down to assist the maneuver of the division.

The principle of mass is essential to the development of firepower by the 9th ID. For Rommel this was easy because the terrain and enemy allowed him to maneuver battalions in massed battle groups. The division currently uses engagement areas offensively and defensively to concentrate its firepower. The 9th ID must achieve the effect of mass by maneuvering its battalions to brigade/division engagement areas or objectives separately, but synchronized to arrive simultaneously. This is easier said than done. However, unless the division's firepower capabilities are concentrated, they will not be effective.

Rommel had a further firepower advantage in that his tanks, while effective against enemy armor, were exceeded in capability by rapid fire antiarmor gun systems. The preponderance of the 9th ID's antiarmor capability, without its roundout brigade, is the TOW II. It has greater standoff, but lacks the rapid fire capability of a tank or gun system. There are two solutions to this problem.

The first is a reversal of Rommel's "bait and trap" tactic. Rommel used tanks to bait British armor into kill zones for his anti-tank weapons. The reversal of this tactic would be to use HMMWV TOW's, firing at maximum range as bait, to draw enemy armor into an engagement area "trap"

executed by tanks. HMMWV TOW's, upon receiving effective indirect fire, could withdraw around or to a position within the tank trap. However, as recognized by the division, the CAB needs depth within a defensive position because of the TOW II's slow rate of fire. Using the bait and trap tactic, with engagement areas in depth, will accomplish this and assist withdrawal to subsequent positions.

The second solution is to provide a rapid fire antiarmor weapon as originally intended for the CAB. This weapon does not need to be a "tank killer". There are plenty of potential targets that do not require a heavy chemical or kinetic energy round to be penetrated. What the CAB needs is a weapon system, such as the Marine's LAV, that is as mobile as a HMMWV but capable of destroying vehicles of similar armored protection. The TOW II can engage tanks and leave everything else for the LAV or a similar system.

As recognized by the division, protection of its units will primarily result from deception, speed, and use of the terrain. The problem for the division is the need to move tanks and motorized infantry together. Based on the experience of the Afrika Korps, motorized infantry sacrifices its protection when it moves closely, with or within, an attacking armor formation. Tanks have the advantage of speed and armor for protection. Motorized infantry only has the advantage of speed. The 9th ID must depend on its motorized infantry for the close fight

associated with reduction of a defensive position. However, the motorized infantry must use their speed to arrive simultaneously on the objective, and not formed, with its supporting armor.

Without the armor protection provided by an M113 or M2/3, the CAB needs significant engineer support during defensive missions requiring retention of terrain. One engineer company per battalion is needed versus the current one company per brigade. The Army has recognized the need for more engineer assets in support of maneuver units. The current E-Force study is considering methods of reorganizing "current assets" at corps and division to provide enhanced forward support.(83) The concept of this study is to provide more engineers at division level with improved command and control. Until more engineers are available, the only solution is to prioritize their efforts as required.

The division's sustainment is enhanced by the reliability of the HMMWV. Its reliability has been proven by 9th ID on numerous division exercises and NTC rotations. It is a tough, durable vehicle. It is an asset for sustaining the division's maneuver.

The problem will be recovery of heavy armor required due to maintenance failures and battle damage. With or without its round-out brigade, tanks are critical assets for the division. The Afrika Korps ability to recover

equipment from the battlefield and repair it far forward is an example of what is needed. The ability to do this was a product of training and the initiative of their CSS soldiers. This concept is familiar to the U.S. Army. However, many times battlefield recovery is only practiced after, not during, simulated battles. Recovery needs to be practiced under direct and indirect fire conditions.

Just as speed must be an operating principle for the division, it must be a state of mind for the division's leadership. Speed is not just a product of vehicle capabilities. Speed was attained by the Afrika Korps because its leaders understood mobile warfare better than the allies did. The Afrika Korps' leaders planned and acted more rapidly than the allied leadership. Their ability to do this was a result of training, doctrine, and experience.

Several of the lessons from North Africa provide considerations for the development of combat power by the 9th ID. As in North Africa, the elements of combat power must be used in combination to achieve the greatest combat power effect possible. Intelligence, to be effective, must use the IPB process to synchronize the use of all available collection assets. Intelligence gained must receive the simultaneous attention of the entire staff to provide sound analysis and timely recommendations. The 9th ID must use the agility and flexibility of the CAB to enhance the effect of its maneuver. While mass is necessary to maximize

firepower. the division also needs depth (space) to effectively use the TOW II. Again, protection depends primarily on speed, deception, and use of terrain. As with any U.S. division, recovery and repair of equipment far forward is critical to weapon system replacement. To be effective battlefield recovery techniques must be practiced under conditions as close to battle as possible. None of this can be done without effective leadership prepared for war today.

VI. Conclusions

Analysis of the Crusader and Gazala battles with the elements of combat power provides several lessons. Intelligence was essential to both sides ability to maneuver. and ultimately apply firepower. Assets available for intelligence collection were limited. However. the primary problem. for both the Axis and the Allies. was correct interpretation of the information gained. Additionally, a failure to link operational and tactical efforts by the allies prior to Gazala contributed to their defeat.

Successful maneuver by the Afrika Korps resulted from its flexibility, organization, and doctrine. Superior weapon systems were a factor in the development of firepower. However, it was the Afrika Korps ability to

maneuver and mass their weapons that enabled a greater firepower effect.

Although armor protection was important, protection was primarily a product of deception and combined arms. Recovery of equipment and repair far forward was critical to the Afrika Korps in offsetting the allies' numerical superiority. Finally, none of these things would have been possible if leadership was not up to the task of combining all the elements of combat power into a sound plan.

A comparison of historical lessons to the modern battlefield indicates some similarities and some differences. The differences are the result of numerous factors effecting the components of each element.

Intelligence collection is less a problem today. However, timely analysis of the vast amounts of information is a complicated task. This task is further complicated by the need to make decisions faster on the modern battlefield.

Maneuver still requires the support of superior intelligence. It has been most affected by the increased tactical mobility of combat vehicles with the resulting increase in battle tempo. The advantage of maneuver will go to units with the organization and flexibility allowing fast movement as well as quick reaction to changing situations.

Firepower has been affected by dramatic increases in lethality, accuracy and the flexibility of current weapon systems. However, no single system provides superior

firepower. Superior firepower is still greatly influenced by the ability to concentrate weapon systems to achieve greater volumes of fire.

Protection is still based more on deception, speed, and use of terrain than the skin of armored vehicles. The expected high rates of equipment usage makes the sustainment mission more important today. For the many reasons previously discussed, this mission is more difficult today. Finally, as often repeated, leaders must be tactically and technically prepared "today" if they expect success on today's battlefield.

There are many differences between potential battlefields for the 9th ID and the North African battles analyzed. However, many lessons from history are applicable.

Intelligence is critical to any offensive or defensive mission the division will undertake. Only organization and training can enhance current collection and analysis capabilities. The operating principles of the division emphasize maneuver. The division must capitalize on the flexibility of its CAB's to maximize its maneuver effect.

Protection of the division's units will result from combined arms tactics, deception, speed, and use of terrain, not just the armored skin of certain weapon systems. As with the Afrika Korps, sustainment's success will depend on the skills and initiative of the division's CSS personnel.

To succeed on the battlefield, the division's leadership must be equal to the missions it receives.

One lesson that does not transfer well to the division is the Afrika Korps use of mass to achieve greater firepower. Mass is still important. Dependence on long range missiles, with slow rates of fire, for defeat of armor makes depth equally important.

VII. Implications and Future Missions

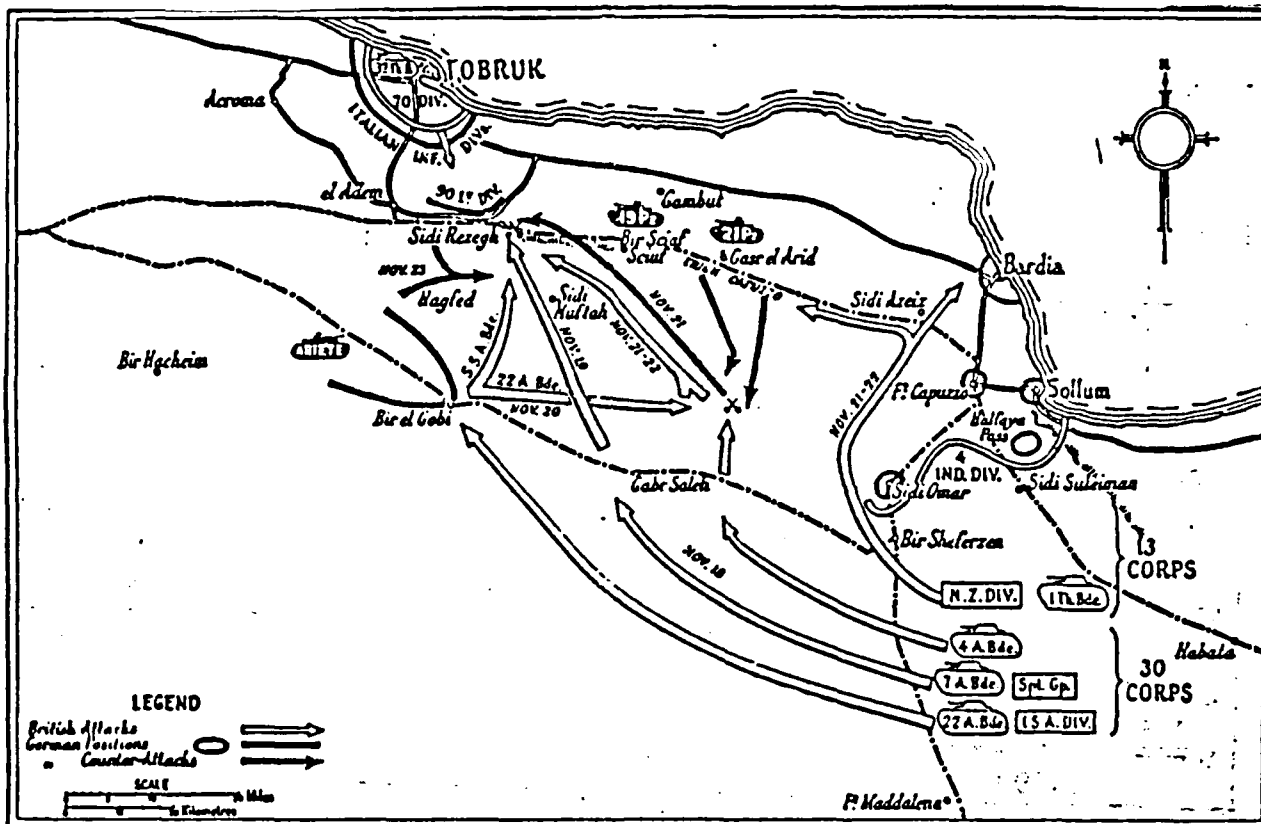
The 9th ID's original concept for development was based on the need for a strategically deployable unit with a credible antiarmor capability for use in a mid-to-high intensity environment. As the High Technology Light Division (HTLD) test bed, the division attempted to develop this capability within a limitation of 1000 C-141 sorties.(84) Combat, combat support, and combat service support units were designed to maximize fire and maneuver within the constraints of strategic lift. As emphasis for strategic deployment switched to light infantry, the HTLD lost momentum.

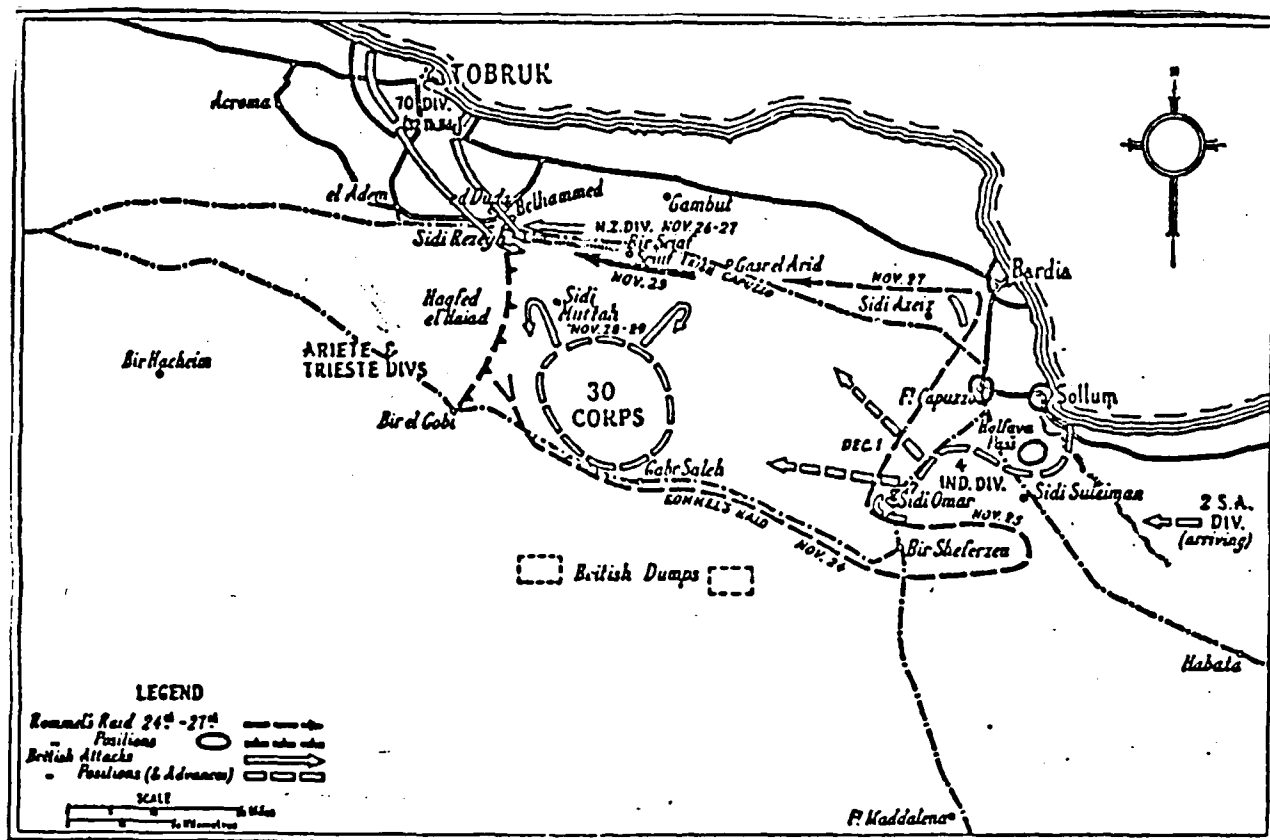
The original mission requirement has not been fully met. Although a light division can deploy in a relatively few sorties, it has limited capabilities for fire and maneuver once on the ground. This is a critical problem considering the increasing armor threats in third world

countries.(85) The 9th ID can provide the augmentation needed to fill this gap in mobility and firepower.

Although the 9th ID is transitioning to a mechanized division, it still has one motorized brigade. The primary advantage of this brigade is its comparative lightness combined with superior tactical mobility and a reasonable antiarmor capability. This capability could be enhanced with the addition of a weapon system, such as the Marine's LAV. to complement the TOW II. The idea is not for the brigade to deploy by itself. It should be tactically employed as a "building block" to augment other strategic army assets when deployed. While it can operate successfully in numerous potential theaters, the mobility of the CAB makes it extremely effective in areas providing wide frontages for maneuver.

The purpose of this monograph was to examine battles from North Africa to determine if there were applicable lessons for today's armored/motorized formations. The answer is that while there are applicable lessons, they all cannot be transferred directly to current battlefield situations. What is clear, as with both the Axis and Allies, is the need to combine all the elements to develop combat power fully. Finally, while this paper did not fully address all the issues, armored/motorized formations can provide a mobile and relatively heavy antiarmor threat with a relatively small investment of strategic lift.





OPERATION "CRUSADER" (24 Nov-1 Dec)

MAP B

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43

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