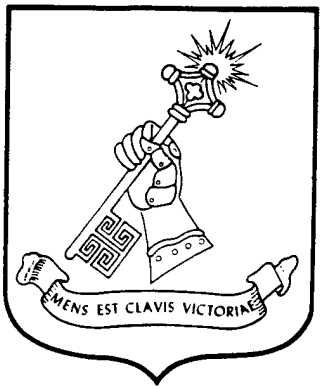
CUTTING TEETH TO INCREASE THE TAIL - THE ELIMINATION OF ECHO COMPANIES FROM THE HEAVY DIVISION

A MONOGRAPH
BY
Major Thomas L. Rousseau
Infantry



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ABSTRACT

CUTTING TEETH TO INCREASE THE TAIL -- THE ELIMINATION OF ECHO COMPANIES FROM THE HEAVY DIVISION by MAJ Thomas L. Rousseau, 56 pages.

This monograph examines the U.S. Army's decision to eliminate Echo companies from the Heavy Division force structure. Since the introduction of the tank onto the modern battlefield the struggle between tank and anti-armor weapon has dominated the thinking of maneuver warfare. Three important elements have had significant impact on anti-armor warfare; technology or new equipment, organizational structure, and doctrine. Framing these elements is the evolving threat and the proliferation of advanced weaponry through new equipment and retrofitting of new technology on existing equipment in third world nations.

The monograph traces the development of the combined arms concept as envisioned by J.F.C Fuller and Liddell Hart. A brief examination of the historical development of the current U.S. Army anti-armor warfare doctrine followed by a short threat analysis focusing on the relevance of anti-armor warfare in the future. This monograph uses three case studies, *Operation Crusader, Operation Goodwood,* and *The Yom Kippur War* to further discuss the impact of technology, organizational structure and doctrine on the future of anti-armor warfare. A doctrinal review and discussion concerning current Bradley equipped mechanized battalion capabilities establishes the discrepancies between doctrine and organizational structure.

Finally, this monograph establishes the relevance of a balanced combined arms team that incorporates specialized organizations that contribute to the synergistic effect to combined arms operations. The doctrinal "firestorm" caused by the Division 86 concept in response to the 1973 Israeli/Arab conflict is a harbinger for future doctrinal debate. The disruptive effect that technology places on doctrine and the influences that it has on the emerging threat will continue to dominate force structure development. Finally the monograph concludes with two recommendations; either change doctrine to reflect current mechanized force structure, or incorporate specialized anti-armor units back into the mechanized battalion.

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I. INTRODUCTION

Since the introduction of the British Mark I tank onto the modern battlefield at Flers, France, 15 September 1916 and the subsequent "antitank" battle that raged between it and German machine-guns and 77-mm artillery, the struggle between tank and anti-armor weapon has dominated the thinking of maneuver warfare.[1] Like his predecessor of World War I, the modern mechanized task force commander faces the dilemma of how to preserve combat power while countering the enemy's armor mobility on the modern battlefield. The answer for the World War I commander was to use artillery and armor piercing machine gun bullets to stop a slow moving armor vehicle. Modern-day commanders rely on the combined arms team that once included anti-armor companies in the mechanized battalion. Today, the current mechanized "How-to-Fight" doctrine carries forward this combined arms approach to anti-armor warfare.

Now, a potential void in anti-armor doctrine exists since the Army's decision to remove the anti-armor company from mechanized battalions in the fall of 1994. How does the mechanized battalion task force commander defeat the armor threat in his area of operations? The quick answer is to suggest using one of the maneuver companies, either tank or Bradley equipped, to handle any immediate armor threat. The use of the Bradley or tank in this manner questions whether this is the most effective use of the combined arms team to defeat the armor threat on the modern battlefield.

This monograph will answer the question as to the effectiveness of mechanized battalions that are without specialized anti-tank units. A brief look at the development of anti-tank units in the U.S. Army will provide an opportunity to explore the anti-armor

company's relevance to combined arms operations. The review of three historical cases will illustrate the organizational impact and challenge of anti-tank integration. *Operation Crusader* highlights the impact of new technology on anti-armor warfare, while *Operation Goodwood* will demonstrate the dramatic effect of an organizational structure that balances the combined arms team by incorporating anti-tank units. The third case study, the 1973 Israeli-Arab conflict, will focus on the doctrine for anti-tank unit integration by both the Arabs and Israelis. A brief threat analysis followed by a short doctrinal review will highlight inconsistencies of current doctrine. Finally, the monograph will conclude with an assessment of the research question.

Background:

The effects of technology, organizational structure and doctrine are three issues impacting on the complex environment surrounding anti-armor warfare. These three elements will shape the discussion concerning the viability of a anti-tank unit integrated into future mechanized organizations. Technological innovation has left a significant imprint on past conflicts. Well-balanced organizational structure has enabled armies to exploit this new technology. Finally, doctrine incorporates the previous two elements into a successful "How to Fight" philosophy. The presence of these three elements at the start of World War II in response to the tank resulted in the development of specialized anti-tank units.

The tank destroyer doctrine developed during World War II sought to counter threat tanks with lightly armored or towed artillery type weapons. These systems possessed both rapid firing and stand-off capability over the average tank. The M-18 tank

destroyer is an example of such a system. It mounted the impressive 76-mm gun and weighed in at under 20 tons. Unfortunately, it did not enter production until mid-1943.[2] The U.S. Army fielded tank destroyers that proved to be inadequate for the threat and established employment techniques that were doctrinally unsound. To further exasperate the problem at the outbreak of World War II was the conventional thinking on how to defeat armor forces.

"Only tanks could fight tanks..."[3] This reasoning dominated the thinking of the British high command during the development of early armor divisions. So, as these early tank formations in Allied organizations began to take shape, specifically British, they lacked the concept of a balanced combined arms integrative approach. The British high command ignored this fundamental upon which General Heinz Guderian would design the formidable German armor units of World War II.[4] By ignoring the lessons of past combined arms' operations, the U.S. Army could fall victim to the same myopic thinking that the British leadership of the 1930s and World War II did. After World War II, the dawning of the nuclear age was a leading contributor to a single focus approach to modern warfare.

In the 1950s, the threat of a nuclear holocaust and the search for a "bigger bang" for the shrinking defense "buck," cast a shadow over the future of conventional forces. The pervasive thinking at the time advocated that any future conflict between the U.S. and its primary adversary, the former Soviet Union, would require nuclear means to deter aggression. This shift from a conventional strategy to one of nuclear deterrence allowed the U.S. conventional forces to experience massive reductions.[5] The 1973 *Yom Kippur*

War shed a new light on the subject of conventional warfare; specifically anti-armor warfare.

The 1973 Israeli-Arab conflict was significant from the standpoint that it exposed the weaknesses inherent in U.S. anti-armor warfare doctrine. The *Yom Kippur War* had an immediate effect on the U.S. Army. The TRADOC commander, General DePuy, saw the importance of a more balanced approach to combined arms operations. The integration of fires became the focus of the 1976 *FM 100-5, Operations.*[6] This focus is still present in current doctrine and demonstrated during *Operation Desert Storm* with varying results.

Frustrated by the limitations inherent in M901 Improved Tow Vehicle equipped Echo companies, mechanized task force commanders during *Operation Desert Storm* commented as to the effectiveness of Echo companies. These assertions leaned more toward the inadequate equipment and training of anti-armor companies instead of failed doctrine.[7] Commanders demanded an anti-armor company equal in ability and sustainability to the Bradleys and Abrams of the line companies.

Pending fielding of the Line of Sight Antitank system (LOSAT), the M-3 BFV equipped Echo company had the potential to test the hypotheses whether Echo companies are victims of inadequate equipping or failed doctrine.[8] However, as currently organized without an Echo company, the combined arms team could face an uphill struggle in handling the conventional as well as the unorthodox armor threat from third world countries on future battlefields.

Today, third world countries field more than 90,000 of the world's 121,000 Main Battle Tanks.[9] In an era of "new world order" (defined as a future that is without the specter of imminent superpower conflict[10]), this proliferation of armor vehicles is causing a new challenge for planners. Planners trying to determine the right mix of combat power to deploy into low intensity conflicts where American interests lie must fully understand this new unconventional armor threat. The quality of armor vehicles is improving drastically. The latest tanks incorporate advanced armor that gives the vehicle a very high degree of battlefield survivability against kinetic energy and chemical energy attacks.[11] This technology is currently available to the highest bidder on the open arms' market. This evolving threat will continue to impact on U.S. Army doctrine.

The U.S. Army defines doctrine as the "statement of how America's army, as part of a joint team, intends to conduct war and operations other than war."[12] Current U.S. doctrine may lack the flexibility to meet both the unorthodox armor threats found in many third world countries and the more conventional ones from nations like China or North Korea. Given that doctrine is how we intend to fight, the potential for altering the harmonic relationship between members of the combined arm team is substantial when you cut organizational structure without changing the doctrine to reflect the new structure. With the removal of Echo companies from mechanized forces, there is now a need to modify doctrine to reflect the changes in roles and missions among the "players" of the combined arms team.

This monograph postulates that anti-armor warfare will continue to be an intricate part of the modern battlefield. The emergence of a deadlier and more survivable family of

armor vehicles on the modern battlefield, especially from some of the more unstable third world countries like Iraq and Iran, will continue to challenge planners. To fight and win in this environment, the mechanized battalion commander must have the right combat mix to meet any likely future armor threats. The proper organizational structure that provides flexibility and versatility will achieve the stated goal -- defeat the armor threat in the most efficient manner.

II. HISTORICAL ANALYSIS

a. J.F.C. Fuller and Liddell Hart's influence on mechanized warfare.

J.F.C. Fuller and Liddell Hart wrote several volumes on warfare, and in particular the mobility of the armor and mechanized forces. This short synopsis of their influences on mobile warfare is not an attempt to equate the two theorists as identical in their philosophical approaches toward warfare. Their contributions and descriptions concerning maneuver warfare set the framework for future combined arms operations. However, Fuller's earlier experience with tanks and his "Plan 1919" demonstrated his attempt to take advantage of the technological breakthroughs occurring in armor warfare.

In 1932, J.F.C. Fuller wrote a foretelling book called "FSR III" (Field Service Regulations, Vol. III). This manual and his "Lectures on FSR II" presented a potential doctrine for future armor warfare based on what Fuller knew concerning technological advancements and his World War I tank experience. This extremely predictive and far-sighted manual received minimal attention from Fuller's fellow peers and military theorists in Britain. S.L.A. Marshall writes in the preface to J.F.C. Fuller's book *Armored Warfare*

that this manual became the "armor bible," on par with Clausewitz's *On War,* for the German army officer. A British military attaché reported that in August 1942 General Guderian had read the writings of Major General Fuller at length.[13]

General Guderian also read Liddell Hart and patterned the German "Blitzkrieg" after Hart's writings on deep tactical and strategical penetrations along the indirect approach.[14] Hart, seventeen years younger than Fuller and far less experienced in warfare, corresponded with Fuller throughout the twenties. The similarity between their writings boiled down to envisioning armor warfare as a fluid operation that entailed mobility. Fuller advocated that the tank, with support from anti-tank and artillery units (if they could keep up with the tank), could defeat its opponents through mobility and fire power. Hart also saw the advantages of the tank, but was more balanced in his writings and featured mechanized infantry and self-propelled artillery working in unison with the tank.[15]

Fuller's emphasis on mobility to ensure the flexibility of the tank highlighted the organizational requirement for anti-tank systems. The use of artillery in the direct fire mode was the precursor to the development of weapon systems that could specialize in destroying tanks on the battlefield. Fuller predicated accurately that when tank armor became penetrable future tank development would lead to more emphasis on firepower and maneuverability at the expense of protection, not obsolescence as many early theorists had suggested.[16]

As World War II began, the anti-tank gun or destroyer fit the requirement to facilitate the maneuver of tanks on the battlefield. The issue of flexibility and agility was accomplished by using a less expansive, but highly lethal anti-tank system. Fuller lectured

on the importance of anti-tank systems to protect friendly tanks, and in the attack, to tie up opposing forces' tanks.[17] During movement, Fuller stated tanks would lead and protect the anti-tank "wing" and "auxiliary" troops. At a halt, the anti-tank wing would deploy and provide protection for the tanks and auxiliary troops.[18] This combination of forces provided the basic philosophy behind combined arms operations.

Regardless of the differences between these theorists, a common theme of a balanced, combined arms team to exploit the mobility of the tank linked them. Although both of these farsighted individuals accurately predicted the correct force structure for the future conflicts of the twentieth century, the current leadership, either blinded by their prejudices or lulled into a false sense of security by the fact that nations were at peace, ignored Fuller and Hart's recommendations. The sweeping technological revolution in modern warfare made most of the "pre" World War II doctrine obsolete.

b. Anti-Armor Development in the U.S. Army.

Current organization from 1973 to Present:

The 1973 *Yom Kippur War* caused a firestorm with the U.S. doctrine. The effects of a modern battle being waged by nations possessing most of the latest technology stimulated a doctrinal debate led by General DePuy. The lessons learned from this conflict focused on the devastating effects from highly lethal and accurate fire-power in conjunction with a balanced combined arms team. General DePuy attempted to reconcile these lessons through doctrinal and organizational changes.

DePuy outlined the basic concept for the anti-armor company in a 1976 message to LTG Starry, the V Corps commander. In this message, DePuy envisioned an

independent company under the control of the mechanized battalion commander. Previously, mechanized infantry battalions typically attached TOW sections to maneuver companies from the Combat Support Company. Company teams in turn gave the TOWs to infantry platoons for command and control purposes. DePuy felt this style of employment either placed the infantry or TOWs in locations that benefited only one or the other.[19]

To maximize the effects of the TOW, DePuy felt strongly that a separate company would be necessary. Training and employment requirements of the TOW necessitated a unique approach to organization. DePuy felt so strongly about this point, that he called the future Echo company a third maneuver element alongside the tank and mechanized infantry.[20] From June 1976 to December 1979, DePuy directed TRADOC to conduct a series of force structure studies, wargames, and field tests under the "Division Restructuring Study and Evaluation." Each study recommended a separate TOW company.[21] After DePuy's retirement, the new TRADOC commander, General Starry, halted the Echo company initiative. From retirement General DePuy argued successfully for the reinstatement of the anti-armor company back into the mechanized battalion structure of the new Division 86 concept.[22] Although the Echo company structure had limitations, it provided infantry battalions a fifth maneuver company capable of placing twelve mobile TOW firing platforms on the battlefield. Shortly after Echo company's integration into the mechanized battalion structure, it began to experience equipment compatibility issues.

As infantry battalions began to receive the M-2 and M-3 BFV as replacements for the M-113 troop carrier, a new equipment dilemma began to surface. The greatest deficiency exhibited by the Improved Tow Vehicle was its inability to maintain the pace during offensive operations with the more modern equipped M-1 Abrams and BFV task forces.[23] Complaints concerning the reliability of the Improved Tow Vehicle surfaced at the NTC and during *Operation Desert Storm*. In 1991, then Chief-of Staff of the Army General Carl Vuono directed a study concerning the feasibility of replacing Improved Tow Vehicles with M-3 cavalry vehicles. This study resulted in the directive to replace the Improved Tow Vehicle with the M-3 BFV version as an interim vehicle until the fielding of the LOSAT.[24]

With virtually the same vehicle characteristics as the M-2 Bradley equipped infantry company, several commanders raised concerns about the relevance of Echo companies in the mechanized battalion organization. With pending personnel cuts, CINC USAREUR General Saint cut the Echo company structure from the U.S. Army Europe force structure one month prior to deployment of units to *Operation Desert Storm*.[25] Because of the pressure to cut additional force structure, the Chief-of-Staff of the Army decided in October 1994 to eliminated Echo companies from the heavy force structure and reprogram the spaces into combat support and combat service support units.[26]

Anti-tank development from 1939 to 1945:

The employment of the tank during World War I influenced the future WW II doctrine of the U.S. Army. The first mass use of tanks came during the Battle of Cambrai, 20-22 November 1917. Until this point in the war, the Allies committed the few tanks

available in piecemeal battles. The Allies used their tanks to penetrate the initial wire obstacles and trench-lines to allow the infantry following in close support to exploit the gap.[27] This tactical method relegated the tank to an infantry support system and reinforced the wrong lessons learned concerning anti-armor warfare by the Allies.

Allied planners for each nation failed to foresee the enormous potential and devastating consequences that the tank would exhibit in the next great war. The lack of tanks employed by the Germans during World War I reinforced a lesson, albeit wrong, that specialized anti-tank guns were insignificant. The British and French leaders believed that existing artillery resources would be adequate to handle any future armor threat.[28] The reliance on artillery as the primary weapon for the destruction of tanks would be a fatal mistake. The speed at which the World War I tanks moved (5-10 MPH) reinforced this assumption. Slow moving vehicles were easy targets for massed artillery. A 1918 British pamphlet, reprinted by the U.S. War Department, emphasized that artillery should be positioned in depth throughout the sector, with mobile batteries held in reserve in order to block any enemy tank penetrations.[29] This reliance on artillery ignored the mobility and armor improvements developed by the Germans in the inter-war period.

The "pre" World War II doctrine, which assumed artillery could defeat any armor threat, failed to address the tank's improved capability and new employment techniques. The response to this new reality of armored warfare led to the development of the tank destroyer units of the U.S. Army. In 1941 General McNair summed up the sentiments that contributed to the formulation of tank destroyer units: "Certainly, it is poor economy to use a $35,000 medium tank to destroy another tank when the job can be done by a gun

costing a fraction as much."[30] The concept of using a relatively inexpensive weapon system that had stand-off capability and mobility equal to or greater than the tank became the goal for the U.S. Army. The logical progression for U.S. planners was the tank destroyer.

The name "tank destroyer" conjures up the mythical image of a hunter-killer team searching out and destroying enemy forces' tanks. This in fact was the intent, and the tank destroyer doctrine was offensive in nature. General Marshall, then Chief-of-Staff, blamed the passive defensive doctrine at the start of the war as a major contributor toward the loss of France and most of Europe to Germany. To defeat the tank, Marshall advocated a more offensive doctrine that would feature a weapon and an organization that would counter the Germans advantage in armor forces.[31] The initial tank destroyer units fielded a 37-mm gun mounted on a 3/4 ton truck as an early expedient. Unfortunately, the American tank destroyer was woefully over-matched by the German tanks.

The tank destroyer organization was put to the test during the 1941 Louisiana and Carolina maneuvers. Poor officiating and understanding of the penetration requirements for armor vehicles gave the 37-mm gun, and even some .50 caliber machine-guns, more credit for kills than would bear out against actual German tanks.[32] The solid tank formations that attacked the anti-tank defenses during the maneuvers bore little resemblance to the "real-world" German doctrine. Despite General McNair's enthusiastic response to these maneuvers, the mobile anti-tank units did not prove themselves in Louisiana and Carolina. General Jacob Devers, then commander of the armored force during the '41 maneuvers, commented on the tank destroyer's success by stating: "We

were licked by a set of umpire rules."[33] The initial focus for the tank destroyer, to defeat a single-arm threat (the tank), was too narrow and ignored the effects of combined arms' synergism.

The 1941 doctrine for employment of the anti-tank systems in the defense emphasized holding the majority of the guns in a mobile reserve, then to counterattack into the point of enemy tank penetrations.[34] This technique automatically yielded the advantages of the defense, where a well-entrenched tank destroyer could enjoy some measure of parity with the heavily armored German tanks. A lightly armored, under-gunned tank destroyer fell easy prey for the German's own anti-tank guns or artillery before the German tanks were within effective range of the tank destroyer units. The 20 pound kinetic energy shot from the 88-mm anti-aircraft/tank gun could knock the turret off a British Matilda tank at 1000 meters.[35] By comparison, the U.S. 57-mm towed anti-tank gun could penetrate 81-mm of armor up to a range of 500 meters. U.S. tank destroyers, operating usually in an independent role, failed to match the German 88-mm fire power being employed creatively as part of a combined arms team.

Although much debate still prevails concerning the effectiveness of the 1940-45 tank destroyer doctrine, the basic principles hold some merit worth exploring. Prior to their disbandment after World War II, the tank destroyer units contributed significant lessons towards anti-tank warfare. First, any anti-armor system must also have supplemental roles when not facing tanks. In this role, tank destroyer units were highly successful against other types of mechanized forces to break up the effects of combined arms teams.[36] This mission is similar to one found in *FM 7-91, Tactical Employment of*

Antiarmor Platoons, Companies, and Battalions advocating the use of Echo companies to destroy "the integrity of the enemy's combined arms team."[37]

To be effective in disrupting the enemy's synchronization, anti-tank systems need to possess a weapon that can kill the opposing force's tanks. The 37-mm and the 57-mm anti-tank guns did not meet this requirement. Their rounds bounced off the almost impenetrable armor of the Panzer or Tiger tank (most of the German tanks possessed armor 80 - 100-mm frontal slope).[38] Finally, tank destroyer units had a significant impact on future anti-armor thought in that they gravitated it toward that "old edict" on the use of tanks. General Devers summed up this oversimplified wisdom: "the best antitank weapon was the tank itself."[39] This logic concerning the use of tanks sounds a lot like the Hobartian doctrine that the British professed as they proceeded to enter the North African campaigns at the start of World War II.

c. *Operation Crusader* - November 1941.

Operation Crusader emphasizes the dramatic impact that technology can have on the battlefield. Although not designed for anti-tank operations, the German 88-mm antiaircraft gun demonstrates the effects of new technology and innovation. The Germans fielded armor vehicles, specifically the PzKw IIIs and IVs, which possessed better armor and a superior main gun than their opponents did in the desert of North Africa. Technology and innovation played a significant role in *Operation Crusader*.

Background:

Operation Crusader was a British campaign designed to relieve the besieged garrison of Tobruk during World War II. In the process, the British High Command

intended to defeat the German/Italian armor forces under the command of General Rommel in North Africa. This operation ran from approximately 18 November to 8 December 1941. The commander of the British VIII Army, General Cunningham, had only a few short weeks to make this unit a mobile fighting force capable of defeating some of the finest armor forces in the world. With a lack of experience in mobile warfare and a few training weeks to jell the armor forces under his command into an effective force, General Cunningham's outlook for success was slim.[40]

The British armor formations and the doctrine for their use lacked the basic concept of true armor warfare as espoused by Liddell Hart and J.F.C. Fuller. The British entered the North African campaigns with the stigma of World War I firmly etched on their doctrine. The combination of tanks with artillery, anti-tank guns, and infantry was an alien concept. During the inter-war period the ideas of armor theorist, General Hobart, competed directly with those of the cavalry and infantry minded British leadership. The British choices for armor doctrine exhibited little imagination: use the tanks in support of the infantry, much in the same manner as horse cavalry, or look for the decisive tank on tank battle. In spite of the dramatic success that the Germans had in Europe up until 1940, the British missed the lessons learned of combined arms effects and adopted the Hobartian concept of armor warfare.[41]

General Hobart envisioned the situation where tank would kill tank and then massacre the enemy's infantry and artillery.[42] The British organizational structure reflected this concept of armor warfare. General Cunningham organized his forces along the lines of mobile versus static corps with the preponderance of the tanks in the mobile

corps. The basic plan for *Operation Crusader* was for British forces to attack west toward Tobruk to seize a piece of terrain that favored the British, and then defeat Rommel's Panzer-Divisions in one great tank battle.[43] Unfortunately, the Germans had other ideas on how to wage armor warfare. The forecasted great tank versus tank battle would never come to the British commanders in North Africa.

Operational Overview:

Operation Crusader offers a doctrine as employed by two differently trained organizations. With their cavalry influence on armor warfare, the British armor doctrine focused on the tank on tank grand battle which highlighted mobility. Fresh from their stunning mobile style of combined arms operations in Europe, the Germans understood the nuances of fighting as a combined arms team. The German validation of balanced combined arms operations as compared to the British single focus style doctrine would provide significant lessons for anti-armor employment.

The Germans were the masters of combined arms operations. The Battle of Sidi Rezegh, 22 November '41 (part of the *Operation Crusader*) highlighted the effectiveness of the German's use of anti-tank systems in support of their attack. As the German's attacked the airfield at Sidi Rezegh, their 50-mm towed anti-tank guns ignited the British tanks of the 7th Armor Brigade into flames.[44] In an envelopment, the German tanks swept to the rear of the British brigade and forced them to surrender. The British could do little to prevent this decimation of armor and envelopment because of the failure to integrate artillery and infantry into their defense.

The Germans used their anti-tank screen to its fullest capability. When they refueled and rearmed, they would do it outside the British direct fire systems by placing their own 88-mm and 50-mm anti-tank guns in front. The only effective means to interdict these operations was to use artillery, which the British failed to incorporate. As if confused, a couple of German tanks would move outside their anti-tank screen to lure British tanks out of their defensive positions. When the British tanks would pursue, the deadly fire of the 88's and 50-mm anti-tank guns would knock them out of action.[45]

Lessons Learned:

British after-action-reports directed most of the blame for their failure on equipment inferiority. Equipment inferiority only partially explained the situation. British failure to grasp the complexities of operational techniques of mobile operations and organization contributed directly to their problems.[46]

The British leadership failed to acknowledge adequately the lack of a combined arms strategy and the piece-meal style of attack that their armor forces conducted during *Operation Crusader*. Rommel summed up British tactics and generalship as related by a captured British officer: "What difference does it make if you have two tanks to my one, when you spread them out and let me smash them in detail? You presented me with three armored brigades in succession."[47]

The belief by the British that only tanks could defeat tanks was partially responsible for the dispersion of the British armor. Instead of incorporating their anti-tank systems like the German's did with their 50-mm and 88's with the infantry, the British relied on tanks: "The *Crusader* operation was fought to an unending accompaniment of

screams from one infantry division headquarters, or field maintenance centre, after another for tanks to come and protect them against the presence or threat of enemy tanks."[48] This dispersion of armor and the fact that most of the leaders, including the infantry commanders, bought into the Hobartian edict concerning the destruction of tanks, made Rommel's job easy.

The main lesson for future planners and leaders is to understand the full capabilities of a balanced, combined arms team. The *Crusader* campaign highlighted the need for an integrative approach to armor warfare. The Germans trained their infantry with anti-tank guns and artillery to fight against enemy armor allowing for the concentration of their own. In the offense, the Germans would move anti-tank guns forward with the tanks in close support to suppress enemy armor thus allowing for free movement of the German tanks. The effectiveness of this type of combined arms operation gave as much credit to the German anti-tank guns in the immobilization of British tanks as that by Axis tanks.[49]

The British attempt to reconcile the lessons learned during *Crusader* appeared in the first paragraph of a training pamphlet circulated to troops in England shortly after the campaign:

> The role of armoured forces is usually the destruction of those of the enemy. This task can only be accomplished by the direct attack if our tanks are better 'gunned' than the enemy's, or if we are greatly superior in numbers. At the moment we are neither better 'gunned', nor is it possible to be certain of adequate numerical superiority. It is only by obtaining the maximum support from artillery for our armour that we can carry out this role.
>
> (*Notes from the Theatres of War*: No. 2 Part 1, para 4).[50]

This quotation from an early British Training Circular indicated that the British High Command at least thought about the importance of combined arms in the confines of

Cairo and Whitehall. It was quite another to enforce combined arms operations when the leaders in the field did not enforce it through training or during actual operations. The British were slow to realize that tank dominated units that lack a balance of infantry, artillery, engineer, and anti-tank units can not achieve combined arms effects. This mindset will show its character again when we look at another British campaign; *Operation Goodwood.*

d. *Operation Goodwood* - July 1944.

Organizational structure responds to new technology. *Operation Goodwood* depicts the relationship between organizational structure and technology. The Germans demonstrated the advantages that combined arms units possess over tank dominated organizations such as those found in the British VIII corps. From an organizational standpoint, *Operation Goodwood* highlights the importance of balanced combined arms units.

Background:

Shortly after the Allies landed at Normandy, *Operation Goodwood* kicked off the attempt to breakthrough the formidable German defenses surrounding the coast of Normandy on 18 July 1944. The purpose of this operation was to force the German commitment of their armor reserves into the British sector, thus relieving pressure on the main effort in the American sector.[51] General Sir Bernard L. Montgomery commanded the 21st Army Group in northern France which included the VIII British Corps. The British intent for this operation was to attack with three armor divisions in column, then quickly move to attacking abreast to exploit the penetration. The British Commander was

confident that his armor forces would easily penetrate the German defenses thus enabling the Americans to breakout.

The Hobartian influence, even after the disaster in the desert during *Operation Crusader*, continued to feed British thinking on armor warfare. The British planners, true to their training circular concerning tank operations, focused on the requirement for overwhelming numerical numbers of tanks and forgot the effects of well-placed mobile anti-tank systems and dug-in infantryman with hand-held anti-tank systems. Unfortunately for the British, the Germans combined arms defense had plenty of experience in stopping a primarily armor force as evidenced during the North African Campaigns.

Operational Overview:

An enormous Allied bombing campaign initiated the attack. Some 4,500 sorties of nearly 2,000 aircraft dropping over 7,800 short tons of bombs achieved operational surprise for British forces.[52] The goal for the lead armor division, the main effort, was to seize the Bourgébus Ridge thus allowing the Corps to continue the attack south and east. The follow-on divisions would set-up blocking positions to defeat enemy counterattacks. The operation would involve 250 tanks on the flanks and 750 with the main effort.[53] A formidable force that should easily overwhelm any defender simply by the sheer volume of resources allocated against such a narrow sector of terrain.

German Battle Group "Luck" faced the British at the point of their breakthrough. Its order of battle consisted of the 125th Panzer-Grenadier Regiment, part of the 22nd Panzer Regiment, the Tigers of the 503rd Heavy Tank Battalion and the formidable guns of the 200th Assault Gun Battalion, consisting of no less than seventy-eight heavy anti-tank

guns.[54] The Germans organized their defense with tanks and anti-tank systems in strong-point positions throughout their sector. Behind the German initial defense waited the I SS Panzer corps vicinity of the Bourgébus Ridge. The German plan hinged on the success of their fires to separate the British infantry from their tanks. The British task organization would assist the Germans in this effort as well as the depth of the German defense (approximately 15 kms, which would facilitate the "stringing-out" of the Corps). The main ingredient missing from the British task organization was infantry.

The basic structure of a British armor division, split along the lines of an infantry brigade and armor brigade, facilitated the German mission. As the British infantry cleared obstacles and reached the first villages, the British tanks rolled on without infantry support. Just as the British Commander, Montgomery, announced to SHAEF (Supreme Headquarters Allied Europe Forces) and Allied Press Corps that *Operation Goodwood* was a resounding success, the armor spearhead halted in a mass of burning tanks short of the Bourgébus Ridge.[55] The British fed their tanks into massed anti-tank fires coupled with well-placed artillery and infantry positions. The British tank losses surmounted even those of *Crusader*: 493 tanks or approximately 36% of the total strength for the British VIII Corps.[56]

Lessons Learned:

The British did achieve operational surprise through the use of their bombing campaign. The air campaign did set the conditions for the attack, however, the British exhibited synchronization problems that enabled the Germans to reorganize their defenses. The British attempts to achieve concentration through the massing of armor forces in this

narrow sector failed. The piece-meal approach to the attack, complemented by restrictive terrain (to include British-made obstacles produced by the bombing campaign), limited the point of attack for the entire corps to one battalion abreast. The basic British plan lacked the use of combined arms in a mutually supporting role, thus limiting their flexibility.

The Germans provided several lessons on the conduct of a defense. Again, as in *Crusader*, the Germans employment of the combined arms team prevented a total British breakthrough. The depth of the German defense surprised the British planners which succeeded in separating the infantry from their tanks. This depth, along with inter-locking anti-tank fires, enabled the Germans to attack the British formations from several different directions. The basic German defense evolved around dug-in infantry with anti-tank systems positioned in mutually supporting locations and tanks held in reserve to block or envelop enemy forces as they became strung out in sector. To facilitate the coordination and control of the defense, the anti-tank force remained under the control of the German SA 200 Battalion (Anti-Tank Battalion) Commander through-out the fight.[57]

The British continued to focus on tank versus tank encounters. The lack of logistics and a nearly collapsed economy assisted the Allies in their breakout of Normandy. Eventually, the Allied logistic superiority would overcome the logistically strapped Axis forces. German General von Mellenthin would comment on the Allied armor tactics in his writings on *Panzer Battles 1939-45*:

> Contrary to the generally accepted view, the German tanks did not have any advantage in the quality over their opponents, and in numbers we were always inferior ...To what then are we to ascribe the brilliant successes of the Afrika Korps? To my mind, our victories depended on three factors - the superiority of our anti-tank guns, our systemic practice of the principle of "Co-operation of All Arms", and - last but not least - our tactical methods.[58]

This concept would resurface again during the 1973 Israeli - Arab conflict. First the Arabs, than the Israelis, would demonstrate their adroitness in combined arms operations.

e. *The Yom Kippur War* - 1973.

"How to Fight" doctrine tries to maximize the advantages from technology and organizational structure. *The Yom Kippur War* is a superb example of Armies adapting doctrine to new technology and organizational structure. The anti-tank wire guided missile (ATGM) is an example where doctrine unlocks the full potential of technology complimented by organizational structure. *The Yom Kippur War* emphasizes the importance of doctrine to unleash the potential of the combined arms team.

Background:

Success breeds contempt. *The Yom Kippur War* was a victim of the successful doctrine employed during the *Six Days' War* of 1967. The resounding success that the Israeli armor forces experienced over the inept Arab coalition in 1967 provided a false sense of security. Israel entered the 1973 conflict with a military doctrine centered on the tank. The strategy behind the employment of the tank emphasized its awe-inspiring "armored shock" effect carried out by a mighty phalanx of armored fighting vehicles. Strategically, the Israelis expected the tank to pierce the enemy front and lead to another German style "Blitzkrieg" shorter than the *Six Days' War.*[59] The impact of new technology between wars was similar to the advancements that the Germans made on the tank between the *Great Wars*. Anti-tank guided missile systems, deployed among dismounted infantry in vast quantities, heralded an ill-omen for armor forces.

The anti-tank system in the *Yom Kippur War* demonstrated its importance in armor warfare. Armor pure units that forgot to incorporate a well-balanced team to facilitate its movement on the battlefield experienced the wrath of the guided missile. Infantrymen no longer ran from the "armor shock" wave as they did in previous conflicts at the first sight of tanks. Two fights during the *Yom Kippur War* highlight this point: the initial Israeli armor counterattack upon the Egyptians penetrating the Bar Lev Line and the desperate slugging match on the Golan Heights. In both examples, the tank, when recklessly sent forward without adequate support, failed to achieve the same effects and successes that it had previously enjoyed during the last 50 years.

Operational Overview:

The Egyptian penetration of the Israeli Bar Lev Line along the Suez Canal in itself was a stroke of military genius. The planning and execution of this operation proceeded flawlessly. The Israelis did not seem to worry needlessly about this penetration and felt extremely confident that once their armor reserve counterattacked it would cut the Egyptian Army "like a [hot] knife going through butter."[60] The biggest surprise waiting for the Israelis once they counterattacked was that the Egyptian infantrymen, facing the onslaught of Israeli tanks, did not run away as did their predecessors during the 1967 *Six Day War*.[61] Instead the Egyptian soldier held his ground and massed hundreds of dismounted anti-tank systems (SAGGERS) at the attacking Israeli tanks. Without adequate support to suppress these systems, the Israeli counterattack force failed to stem the Egyptian tide over the east side of the canal.

The other front witnessed the out-numbered Israeli Defense Force using its limited number of tanks in an anti-tank manner. The Syrians, unlike their Egyptian brethren, followed the Soviet doctrine that envisaged armor warfare in a kind of "Super Blitzkrieg" fashion. Eight hundred tanks and 28,000 mechanized infantry advanced in an armor phalanx that attempted to force a breach in a four-prong pincer movement while maintaining almost a "parade-ground" fashion concentration of armor. The Israelis prepared for the onslaught of tanks by using their own in an anti-tank mode from well-sighted and mutually supporting positions. Nevertheless, the sheer mass of Syrian forces eventually broke through the Israeli defense. The cost associated with this attack forced the Syrians to attempt to imitate the Egyptians by advancing in-line abreast the following day. The Israeli Air Force and ground reserves began to poor into the Golan Heights because of the Israeli's ability to grind the Syrian attack to almost a complete halt. The Syrians were now desperate for their own survival as the flow of battle began to change to the Israeli side. Despite almost a five to one initial tank advantage, the Syrians advanced only 10 miles into the Golan Heights.[62]

Lessons Learned:

The major lesson learned was that attempts to use armor for shock to achieve tactical breakthrough, followed by a strategic penetration to the rear of the enemy, failed in the face of sheer fire-power from the most unexpected source; the Israeli and Egyptian infantryman with dug-in anti-tank systems. From the Israeli perspective, the over reliance on the tank as the "impregnable fortress" of the desert at the expense of the other arms, notably the infantry and artillery, resulted in disaster. All arms needed to work in

orchestration and balance weapon and manpower systems (i.e., anti-tank missile and gun systems versus tanks). The Arab infantryman drove this lesson home by becoming the "one-man - one-tank" destroyer because of their new capability thanks to the mobile suitcase size SAGGER missile system.[63]

This conflict forced the U.S. Army to reevaluate its doctrine in light of the new technology, coupled with the tactics, showcased in the desert. A new undeniable truth faced armies around the world: that armor warfare had changed along with technology. The anti-tank guided missile systems presented a new paradox concerning its employment in the offense. The anti-tank system, designed primarily to halt the armor spearhead of attacking tanks, became a necessity to facilitate the movement of tanks on the battlefield. The anti-tank systems not only strengthened the defense, as demonstrated by the Israelis on the Golan Heights, they also enabled the offense as skillfully employed by the Egyptians in their attack across the Suez Canal. The 1973 Israeli/Arab conflict significantly influenced General William E. Depuy, the commander of the recently formed Training and Doctrine Command (TRADOC). He took the lessons learned from the *Yom Kippur War* to heart and began to drive the train that would eventually change the manner in which the U.S. Army, as well as other services, waged war.

The 1976 FM 100-5 doctrine reflected the impact of technology on both friendly and enemy operations. Technology, as evidenced during the 1973 Israeli/Arab conflict, changed the "rules" of warfare. Advanced technology had and would continue to find its way into the hands of nations unfriendly to U.S. and her Allies. A thorough threat analysis that focused on advance technology found in potential adversarial nations would

contribute toward determining the correct force structure that was capable of defeating any current and future threat.

III. THREAT ANALYSIS

Emerging technology continues to disrupt the process of developing a force structure that is prepared to handle any threat world-wide. The proliferation of armor in third world countries will continue to present new challenges for contingency planners. Currently, third world nations field some 90,000 plus main battle tanks. When a country like Ethiopia, known more for starvation and famine, can field over 300 tanks, U.S. planners must ensure that any contingency plan for that region encompasses a task force that possesses significant anti armor capabilities.[64]

The *Yom Kippur War* case study highlights the spread of advanced technology in third world nations that could pose significant challenges to U.S. strategic interests. Since 1948, nearly 32,000 tanks have fought each other in all of the Arab-Israeli wars, with approximately 4,300 of these being destroyed in combat on both sides.[65] The significance of this fact is that it demonstrates the potential threat for major armor conflicts in third world nations.

Access to advanced weaponry technology either through new equipment purchases or upgrades will continue to find its way into developing nations. Advancements in survivability and lethality make the current and future tanks harder to kill, not obsolete.[66] Redesign and upgrades to existing armor vehicles are the easiest and cheapest method to

acquiring advanced technology. Thanks to "retrofit," a process of improving the current vehicle with new capabilities, many of these tanks are becoming formidable threats.

Through redesign and new composite materials, the new tanks are lighter, present a lower silhouette, and have some new survivability and lethality capabilities. There are three major improvements that these tanks possess: a new variant of Explosive Reactive Armor tiles similar to the Israeli MERKAVA II tank, an optoelectronic countermeasure (SHORTA-1; an anti-tank missile system), and the ability to fire guided missiles out to ranges 5,000-8,000 meters.[67] These capabilities ensure the survivability and lethality of the tank into the 21st century.

The new Explosive Reactive Armor tile, as arrayed by Russian and Ukrainian technicians, provides older tanks a new survivability chance, even against the (still theoretical) "top down" attack weapons. The T-55 tank, the most common tank found in third world countries, when fitted with the KONTAKT-5 (second generation reactive armor) achieves an armor protection from 200 mm of RHA to 400 mm RHA (RHA stands for the penetration requirements a warhead must achieve in order to defeat the armor protection).[68]

The next major improvement is in the field of missile counter-measures. The SHORTA-1 anti-missile system provides electronic jamming and literally an "aerosol" defense that obscures laser designators as they attempt to "paint" the target.[69] A first generation of the SHORTA-1 retrofitted to some Iraqi T-72M1 tanks did not fair very well in *Operation Desert Storm*. Albeit the Iraqi performance during *Operation Desert Storm* provided little if any significant results concerning the effectiveness of this system,

what is more important then the results, is that this technology is being retrofitted onto many existing third world tanks.[70]

The final major improvement is the missile firing tank. The former Soviet Union's tanks (like the T-80 and T-90S tanks) equipped with the 125-mm 2A46 series gun can fire a missile 5,000 to 8,000 meters.[71] The ability to fire anti-tank missiles in ranges greater than 5,000 meters allows for significant stand-off over western tanks and even most attack helicopters. From a lethality standpoint, attack aviation will have to reconsider its own employment doctrine now that the threat can range the attack helicopter. Missile firing tanks that are employed to take advantage of this capability are performing the anti-armor company's role.

A tank that incorporates all three improvements will present serious problems for the ground commander. Increase survivability chances will require additional resources to defeat the armor threat. Missile counter-measures could negate the advantages of precision munitions, while missile firing tanks may change anti-armor doctrine in the near future, if not already.

The future armor threat continues to increase with the potential of evolving into a much more lethal and harder to kill adversary. As the U.S. Army looks for cuts in force structure, making our units less capable to respond to the growing armor threat in third world nations could prove disastrous. The advancements in armor, through either new technology or retrofitting old technology, will continue to find its way into third world "hot-spots." The potential for a U.S. deployment into a nation that possess a significant armor threat is greater now than in the last six years. The challenge for the current U.S.

doctrine and capabilities is to meet the evolving threat and remain flexible to adjust as the situation changes.

IV. CAPABILITIES AND DOCTRINE REVIEW

The mechanized organization consists of four M-2 Bradley equipped infantry companies and a headquarters company with scout and mortar platoons assigned. Even though the current MTO&Es reflect an organizational structure that includes Echo company at battalion level, the personnel and equipment are not resourced. The current doctrine does not reflect the organizational changes involving Echo company. The assumption is that the M-2 Bradley organic to the mechanized infantry company can handle the doctrinal requirements. Each M-2 mounts a TOW launcher with the capability to carry seven missiles. At first glance, this multi-purpose vehicle seems to eliminate the need for a specialized anti-armor company that touts the same capability as the basic infantry vehicle. The significant differences are how the infantry battalion task force employs its assets, and how those individual infantry companies train to accomplish their mission.

There are three basic Field Manuals (FMs) that discuss the employment of anti-armor companies in mechanized battalions. FM 71-2, *Tank And Mechanized Infantry Battalion Task Force*, discusses the employment of the anti-armor company during all types of battalion operations. FM 71-1, *Tank And Mechanized Infantry Company Team,* describes the importance of the anti-armor platoon (sometimes tasked organized with mechanized companies in the defense), but highlights the limitations of the Improved Tow

Vehicle. Finally, FM 7-91, *Tactical Employment Of Antiarmor Platoons, Companies, And Battalions,* provides employment guidance for the Improved Tow Vehicle in the defense. Offensive employment principles for anti-armor companies are similar to defensive ones because they both focus on the support-by-fire positions.

Anti-armor company in the offense allows the mechanized heavy task force to maneuver protected by placing Echo company on the task forces' flank. Prior to the task force assaulting the objective, Echo can also maneuver on a separate axis or on the main axis to maneuver into the dedicated support-by-fire position. Figure 1 shows the different ways Echo companies support offensive operations.

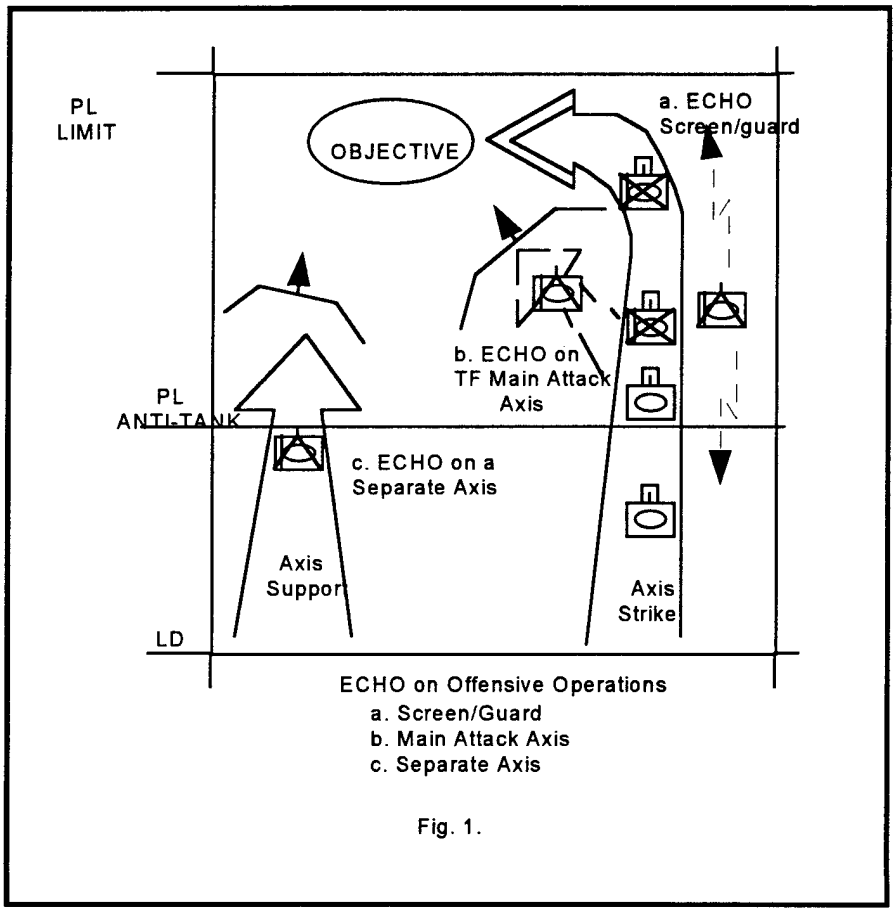

Fig. 1.

FM 71-2 states that the anti-armor company "maneuvers to provide overwatch and support-by-fire, [while] security and economy of force missions are also appropriate."[72] Without the Echo company, one of the remaining maneuver companies must provide this mission. The mechanized infantry task force is considered by many commanders as infantry "poor" in the number of dismounts it can put "on the ground." Comments from the field after *Operation Desert Storm* debate the issue of the shortage of dismount soldiers in Bradley battalions.[73] When a Bradley is placed in the anti-tank role, the number of available infantrymen is further reduced.

In the defense, the support-by-fire position provides flexibility for heavy units to regain the initiative and transition into offensive operations. The employment of the anti-armor company in the defense stresses standoff range, flank shots, and mutual support (i.e., employing TOW systems in pairs to ensure destruction of armor vehicles).[74] If a Bradley company performs this role, the crews and Bradleys are outside the supporting range of its dismounted infantry. If the tank company performs this mission it negates its advantage of mobility because of its dispersion in static defensive positions with the focus on stopping the opponent's mobility. The Echo company is trained differently to perform these missions with its primary focus on long-range fires to defeat the integrity of the enemy's combined arms team.[75]

The methodology for training an infantry company incorporates live-fire exercises that emphasize the 25-mm chain-gun in support of or in combination with the dismounted infantry and the M-1 Abrams. The combined number of dismounted infantry and gunnery related tasks in conjunction with limited resources and time to train prevents the infantry

company from focusing on TOW tasks to the standard that a dedicated company can attain. A serious dilemma occurs if the task force commander decides to place one of his infantry companies in an anti-tank mode. By positioning the infantry's Bradleys to maximize their TOW weapon system (3,750 meters), the commander is in danger of failing to keep the dismounts within supporting range of the 25-mm chain gun (1,200 to 2,000 meters).

The predicament facing the infantry company is a valid point because there is no longer an anti-armor company to perform the anti-tank mission. If one company performs the anti-tank role, that leaves the battalion task force with three maneuver companies. Considering his recent experience during *Operation Desert Storm*, Colonel House, 1st Brigade, 1st Infantry Division, vehemently objects to three maneuver companies especially if he elects to place one in reserve to maintain flexibility.[76] A further reduction in flexibility faces the task force commander if he gives the anti-tank mission to one of his remaining companies. The elimination of Echo companies from the heavy task force will continue to present organizational and operational dilemma's for commanders as well as planners.

This short look at doctrine and capabilities highlights the problems associated with the removal of Echo company from the mechanized infantry battalion. The current FM 100-5 stresses the tenets of army operations as the key to success during warfare. The "pre" *Operation Desert Storm* infantry battalion met the tenet of versatility, the "ability of units to meet diverse mission requirements,"[77] to a higher degree than the "post"

Operation Desert Storm infantry battalion. Future conflicts will be the judge as to what degree this detrimental effect will have on future army operations.

V. COMPARISON AND ANALYSIS

The previous discussion concerning anti-armor warfare provides the framework to discuss the relevance of the future role for a separate anti-tank unit operating under the control of the mechanized battalion commander. The case studies presented and the doctrinal and threat analysis conducted provides limited, albeit important, insight into the issue of anti-armor warfare. This monograph has highlighted three important elements concerning anti-armor warfare; technology, organization, and doctrine.

The first case study, *Operation Crusader,* highlights the effects of technology on new equipment and the failure to adapt to the changing combat environment. The next case study, *Operation Goodwood*, continues to demonstrate the problems with armor warfare when armies fail to incorporate the proper organization associated with the new technology and equipment. And finally, the 1973 *Yom Kippur War* clearly shows the consequences of ignoring doctrine in the face of new technology and organization. Framing these issues is the current and future 21st century armor threat and the current organization structure and doctrinal principles established to defeat this threat.

Doctrine and threat assessment are key to determining if the current organization requires an anti-armor unit in mechanized battalions. There are numerous criteria from which to evaluate the requirement for an organizational change at the battalion level. By using the previous discussion of threat assessment and current doctrine as the framework

for comparison and analysis, the issues highlighted by the case studies will provide the vehicle from which a logical and rational assessment can be made concerning future organization.

On Equipment:

Operation Crusader demonstrates the effect of new technology on the modern battlefield. Anti-tank systems, like the German L60 50-mm and 88-mm guns, made a dramatic impact on the battlefield. Modern-day equivalents like MLRS (extended range artillery "rockets") or the Apache attack helicopter with tank killing capabilities had similar effects on the modern battlefield during *Operation Desert Storm*. As technology continues to evolve, threat improvements on survivability may negate the lethality of precision munitions.

If the SHORTA 1 device and Explosive Reactive Armor tiles prove effective, commanders that rely on precision munitions as the primary method to defeat armor threats may be surprised by the new resiliency of the threat.[78] Fewer systems firing precision munitions could jeopardize organizations that do not possess redundant systems to service the targets if precision munitions fail. Another concern for task force commanders is how responsive these specialized systems, aircraft or attack aviation, will be in supporting their operations.

The use of attack helicopters or other divisional level assets provide a general force protection capability, a role similar to that of the tank destroyer battalions during World War II. As effective as these systems are, the responsiveness is not the same unless they are under the control of the task force commander. Emerging technology will

continue to challenge modern-day commanders in the same manner that it did during *Operation Crusader*. The challenge for doctrine is to remain flexible and responsive to organizational needs. The over-reliance on precision munitions as the panacea for all future threats may be the beginning of a new era of doctrine that relies solely on technology at the expense of organizational structure.

On Organization:

Operation Goodwood highlights the differences between the German's balanced combined arms approach to warfare and the British failure to adapt to the changing combat environment. In defensive operations, the Germans used anti-tank systems integrated with the other combat systems to ensure mutual support. Field Marshal Erwin Rommel's defense in *Goodwood's* area of operations consisted of five defensive belts up to 15 kilometers in depth. Twelve fortified villages consisting of no less than seventy-eight 88 mm anti-tank guns and infantry made up the heavily defended third belt.[79] The German defense incorporated a well balanced combined arms team that was mutually supporting. The German's learned from previous operations the importance of combined arms teams which included anti-tank systems. Their operational combat structure reflected this assessment of the effectiveness of a combined arms organization. The British, on the other hand, continued to struggle with combat organizational structure.

The British continued to organize and fight armor formations that were infantry "poor" in offensive operations. The basic British armor division consisted of an infantry brigade and armor pure brigade.[80] During *Operation Goodwood*, once the few infantry attached to the lead armor elements began to clear obstacles and villages, the tanks

operated unsupported in the attack. This organization led to significant loses for the British forces. The British attacked into the strength of the German defense without infantry, artillery or their anti-tank guns. Modern-day commanders and planners can learn significant lessons from both the British and German combat organizations.

The significant lessons learned from *Operation Goodwood* concerning organization, reinforced the benefits of a well balanced combined arms team that included diverse capabilities of specialized units. Units that are multi-functional are familiar with most of the requirements, but are less likely to be proficient in any one. The importance of an organization that is self-sufficient and versatile enough to meet the diverse roles and missions that it might encounter on the battlefield, gives higher commanders and planners flexibility in planning operations. During *Operation Desert Storm*, commanders raved about the efficiencies and flexibility that combined arms maneuver battalions, which usually included artillery and engineers under the task force commander's control, provided.[81] Similar organizations lend credence to specialized units within the combined arms teams that once included anti-tank companies.

On Doctrine:

The 1973 *Yom Kippur War* emphasized the need to closely tie how units fight to equipment and organization. The Egyptians clearly understood the effects that technology had on operations. Their use of the "suitcase" SAGGER missile incorporated with infantrymen in support of the Egyptian armor clearly affected the way the Israelis fought their own armor forces. The Israelis, true to their doctrine, followed the armor doctrine of

the 1967 *Six Day War* where the tank remained invincible. This doctrinal mindset at the outset of hostilities in 1973 had a negative impact on the Israeli armor tactics.

The Israeli attempts to counterattack into the Egyptian defenses along the Bar Lev Line demonstrated what can happen when doctrine fails to incorporate new technology into organizational structure. The pure armor Israeli forces counterattacked into the Egyptian defenses that incorporated infantry with anti-tank capabilities that reeked havoc on the Israeli armor. The Israelis fixation on counting tanks, both their own and the enemy's, "exaggerating those in their own hands and minimizing those of the Egyptians,"[82] led to a narrowly focused approach to armor warfare.

On the Golan Heights, the Israelis and Syrians provide examples of doctrine that is both flexible and restrictive in nature. The Syrians with their "parade like" armor and mechanized formations attacking in Soviet style the Israeli defenses demonstrates the problems associated with inflexible doctrine. The Israelis, facing superior armor forces, adapted their armor doctrine to the situation by using their tanks in the anti-tank mode in support of the infantry. With the superior marksmanship of the Israeli tank crew, the Israeli tanks turned "tank destroyers" were able to stem the Syrian tide into the Golan Heights. The Syrians, on the other hand, did not recognize that their doctrine was failing quickly enough to prevent the Israeli reinforcements from regaining the initiative. The adaptation of doctrine to a fluid situation enabled the Israelis to achieve success in the Golan Heights.

Summary:

Doctrine is the way we intend to fight future wars. The *Yom Kippur War* case study integrates the effects of emerging technology and organization on doctrine. FM 100-5 states: "Doctrine captures lessons of past wars, reflects the nature of war and conflict in its own time, and anticipates the intellectual and technological developments that will bring victory now and in the future."[83] This statement accurately reflects the lessons amplified by the three case studies presented.

Emerging technology as evidenced during *Operation Crusader* had an immediate impact on combat operations. Catastrophic failure awaits an organizational structure that does not adapt in the face of emerging technology. *Operation Goodwood* demonstrates the stark differences between organizations that adapt and fail to adapt to new technology on the battlefield. Finally, the 1973 *Yom Kippur War* wraps together emerging technology and organization into doctrine. The emergence of technology and its role during the 1973 war changed the future of U.S. Army doctrine. In terms of training, organization, and equipping, the lessons learned from the 1973 conflict had a direct impact on the future success of U.S. forces during *Operation Desert Storm*.

In 1940, the U.S. Army attempted to adapt to emerging technology from the lessons learned from the German sweep across France. The tank destroyer was an answer for the U.S. in an attempt at combining emerging technology and organization with a viable warfighting doctrine. The simple question, then as it is today, was what is more cost effective in defeating an opposing force's tanks? This cost is not only in terms of dollars, but also in flexibility of doctrine.

VI. CONCLUSION AND RECOMMENDATIONS

Conclusions:

There are three major conclusions apparent from this analysis on anti-armor warfare. First, the importance of combined arms operations that incorporate specialized units which result in a synergistic effect. Second, the overly-optimistic opinion as to the effectiveness of precision munitions as the panacea to defeat current and future armor threats. Finally, if the force structure remains as the status quo the U.S. doctrine on employment and training of mechanized task forces must change.

As demonstrated by the case studies, anti-armor warfare will continue to be an integral facet of future conflicts. Historical evidence clearly dictates the requirement for organizational structure that consists of a well balanced combined arms team that possesses specialized and redundant systems. Emerging technology and the proliferation of advance weaponry in third world nations will present complex problems for organizational planners. Developing an organization that is flexible and versatile to meet the current and future threat is the challenge. Flexibility will become one of the touchstones for any future organizational design. Whether the organizational structure is capabilities or threat based, flexibility will be the litmus test as to its ability to defeat this evolving threat.

There are no "silver bullets" for handling this potential evolving threat on the modern battlefield. Precision munitions will make the destruction of most current and past armor threats a relatively easy job. The advancements in the area of survivability have

dampened the effectiveness of precision munitions. When the in-coming missile released by an aerial platform is defeated by the Electronic Counter-Missile system, such as the ARENA Active Protective System,[84] located on-board an armor vehicle, will there be a redundant system that can respond quickly to re-service the target? As the current organization exists, the task force commander will have to plan to use one of his other maneuver elements thereby potentially reducing his flexibility in conduct of operations.

The underlying logic to compel this type of reasoning is that there needs to be some element dedicated to anti-armor warfare. Albeit a missile firing tank to a "bullet" firing gun, some element must train and focus on limiting the enemy's mobility on the battlefield. Training is not an ad hoc exercise. Single focus training will increase the effectiveness of the unit, and also allow it to be responsive to the emergence of new technology and training methods. A dedicated anti-armor unit could adapt to equipment changes through gunnery techniques or other countermeasure training. This would allow the remaining elements of the combined arms team to focus on maneuver to exploit a weakness or drive deep into the enemy's rear area.

Training is what makes doctrine work. If the mechanized task force commander does not have a dedicated company training anti-armor techniques, then he must train another company in this role. Once this unit is trained-up to handle the former Echo company's role, the doctrinal employment considerations must also change. Usually, an infantry company cannot position dismounted infantry with limited range in the same battle space required for TOW anti-tank engagements (ranges out to 3,750 meters). Doctrine will need to address questions like how you separate and what is the accepted distances

that you place the dismounted element from the Bradleys? If the organization remains in the status quo doctrine must change.

Recommendations:

In summation, there are two basic recommendations. First, there is a demonstrated requirement to incorporate an independent anti-armor unit back into mechanized infantry battalions. Whether the anti-armor unit is a platoon or company size element, the type of equipment will determine the exact requirements. To defeat the threat in almost any future confrontation, the organizational structure must be flexible to block Serbians from moving armor vehicles from designated locations to fighting the North Korean armored forces as they attempt penetration down Highway 1 to Seoul. The flexibility that a specialized anti-armor unit provides is critical in maintaining a balanced combined arms team.

The flexibility that Echo companies can provide to units conducting offensive and defensive operations is clear. The challenge lies with equipment. Echo companies equipped with either M-3 Cavalry vehicles or the LOSAT would possess the necessary requirements to fulfill its mission. As the future armor threat evolves a properly equipped Echo company may provide the solution for a balanced combined arms team.

Secondly, the doctrine must adapt to accommodate the current and any future organization. If reduction in force structure is the result of a diminished threat or because we simply cannot afford the end-strength, doctrine must change. The gap that existed between the "pre" World War II doctrine and the technological evolution of weaponry contributed partially to the failures of the British armor forces. If we retain the current

status quo, our "How-to-Fight" manuals must accurately reflect the organizational changes.

In this author's opinion, the optimal solution in the face of evolving threats is to reinstate the anti-armor company back into the mechanized infantry force structure. The U.S. Army is sitting on the threshold of another potential doctrinal revolution in its attempt to reconcile technological advancements. For every technological breakthrough the fielding of a counter measure that is usually less expensive and easily deployable occurs. Technology, organization and doctrine are the keys for future success. Failure to seize upon the two stated recommendations that incorporate all three elements could result in disasters similar to the ones the British experienced in two of the case studies presented.

ENDNOTES

[1] Kenneth Macksey, *Tank Versus Tank* (Massachusetts: Salem House Publishers, 1988), 16.

[2] Dr. Christopher R. Gabel, *Seek, Strike and Destroy: U.S. Army Tank Destroyer Doctrine in World War II* Leavenworth Paper no. 12. (Fort Leavenworth, KS.: Combat Studies Institute, U.S. Army Command and General Staff College, 1985), 27.

[3] Correlli Barnett, *The Desert Generals* (Bloomington: Indiana University Press, 1982), 89. Referring to the pre-war theory espoused by one of Britain's armor experts, General Hobart. Even today, many senior commanders will still purport to this dictum.

[4] Ibid., 107.

[5] Peter Paret, *Makers of Modern Strategy from Machiavelli to the Nuclear Age* (New Jersey: Princeton University Press, 1986), 744. This strategy was outlined in the U.S. 1954 "New Look" policy that relied more on nuclear deterrence and forced its Allies to associate themselves with this strategy.

[6] Maj. Paul H. Herbert, *Deciding What Has to Be Done: General William E. DePuy and the 1976 Edition of FM 100-5, Operations* Leavenworth Paper No. 16. (Fort Leavenworth, KS.: Combat Studies Institute, U.S. Army Command and General Staff College, July 1988), 46, 80-81, 88.

[7] U.S. Army CALL, "Gulf War Collection, Group TAIT Papers, SG BOB, SSG SN1-074. Train The Force, SSG OP. 4-007. Operation Command and Control (OP.4)," Executive summary lessons learned *Operation Desert Storm*. Col. House, Cdr., 2BDE, 1CAV, Comments concerning the effectiveness of Echo company, specifically the ability of the M901 to maintain a pace with the M-1s and M-2s.

[8] The M-3 Bradley cavalry vehicle possesses greater speed and armor protection while maintaining a more reliable firing platform than the Improved Tow Vehicle. The 1st Cavalry Division's Echo companies received M-3 BFVs in the summer of 1994. They did not have their vehicles long enough to test future anti-armor doctrine or to determine the full impact that the M-3 equipped Echo company would have on the modern battlefield. The NTC could have been the arbitrator as to Echo company's value to mechanized task forces.

[9] The International Institute for Strategic Studies, *The Military Balance 1995/96* (London: Oxford University Press, 1995), 13-67, 68-120, 121-150, 151-167, 168-198, 229-262.

[10] Larry Grossman, "Col. John A. Warden III: Air Force Veteran Battles for New World Order," *Government Executive* (February 1992), 46.

[11] Christopher F. Foss, "Old Tanks Rarely Rust they upgrade every way," *Defense Systems Modernization (DSM)* vol. 07 no. 5 (September 1, 1994): 18.

[12] U.S. Army, *FM 100-5, Operations* (Washington, D.C.: Department of the Army, 1993), 1-1.

[13] Major-General J.F.C. Fuller, *Armored Warfare: Lectures on F.S.R. III. (Operations Between Mechanized Forces)* (Connecticut: Greenwood Press, Publishers, 1943), xiii. As told by S.L.A. Marshall in the foreword of Fuller's book. BG T. Denis Daly, who in 1939 as a military attaché to Berlin, confirms this fact from his personal conversations with General Guderian prior to the outbreak of WW II.

[14] Michael Howard, *The Theory and Practice of War* (Bloomington: Indiana University Press, 1965), 173.

[15] Paret, 601.

[16] Ibid., 602.

[17] Fuller, 109. Fuller sees the importance of retaining the flexibility of use of tanks, especially in the attack. He does not advocate tank verses tank engagements primarily because it limits the flexibility of the commander and usually degenerates into stagnate warfare.

[18] Ibid., 24.

[19] Colonel Richard M. Swain, *Selected Papers Of General William E. DePuy* (Ft. Leavenworth, KS.: Combat Studies Institute, U.S. Army Command and General Staff College, 1994), 190.

[20] Ibid., 191.

[21] U.S. Army CACDA, "Division Restructuring Evaluation - Independent Report - Maneuver Battalion Phase, Vol I Executive Summary," (Ft. Leavenworth, KS.: Force Structure and Design Directorate, Combined Arms Center Development Agency - CACDA, September 1978), 16, 18, 28. Other studies include:

-U.S. Army CACDA, "Division Restructuring Study Evaluation - Independent Evaluation Report - Brigade Phase, Vol I Executive Summary," (Ft. Leavenworth, KS.: Force Structure and Design Directorate, Combined Arms Center Development Agency - CACDA, December 1979), 11.

-U.S. Army CACDA. "Division Restructuring Study Evaluation - Independent Evaluation Report - Brigade Phase, Vol VI (Phase III Organization Development)," (Ft. Leavenworth, KS.: Force Structure and Design Directorate, Combined Arms - CACDA, December 1979), 1-6, 2-17, 2-31.

[22] John L. Romjue, "A History of Army 86, Vol 1: Division 86: The Development of the Heavy Division, September 1978 - October 1979," (Office of the Historian, Training and Doctrine Command - TRADOC, June 1982), 50-51.

[23] Captain Edward G. Gibbons, "Bradley Equipped Echo Company White Paper," (Ft. Benning, GA.: Combined Arms Center Directorate - CACD, United States Army Infantry School, 15 July 1992), 3.

[24] Memorandum from Chief-of-Staff of the Army (GEN Carl Vuono) to LTG Reimer (Deputy Chief-of-Staff for Operations), "The Bradley Battalion Structure," (31 January 1991), 2; Gibbons, 1.

[25] Phone conversation with Colonel French L. MaClean, Chief, DAMO-FDD, dtd. 18 July, 1996, 1600hrs., ref. Echo companies in USAREUR force structure. Colonel MaClean was an S-3 in the 1st AD during *Operation Desert Storm*.

[26] Message Headquarters Department of the Army, DAMO-FDZ (Deputy Chief of Staff for Operations), "Elimination of Echo Companies," (DTG 251849Z October 1994), 1. This message stated that the elimination of Echo companies would standardize the force (in line with USAREUR) and allow for the reprogramming of the spaces to increase combat support and combat service support units.

[27] Macksey, 18-20.

[28] Gabel, 3.

[29] Ibid., 3.

[30] Lieutenant Colonel Emory A. Dunham, *Tank Destroyer History. Study No. 29* Historical Section -- Army Ground Forces (Washington, D.C.: Headquarters Army Ground Forces, 1946), 3. The 7.5 plus million dollar investment per copy for the M-1 tank would echo General McNair's sentiments today.

[31] Ibid., 4-5. Marshall envisioned a weapon system that would help the Allies transition into the offense by blunting the effectiveness of the German armor as employed in their "Blitzkrieg" style. The primary focus for anti-tank systems is offense according to Marshall's doctrine.

[32] Gabel, 15.

[33] Ibid., 65.

[34] U.S. Army, *FM 100-5, Operations* (Washington, D.C.: Department of the Army, 1941), 51, 160. For the importance that General Marshall placed on tank destroyer doctrine prior to publication of the 1941 Field Manual, only *two* paragraphs even discuss "anti-mechanized" doctrine.

[35] Macksey, 76.

[36] Gabel, 72.

[37] U.S. Army *FM 7-91 Tactical Employment Of Antiarmor Platoons, Companies, And Battalions* Washington, D.C.: Department of the Army, 1987), 1-2

[38] Stephen Badsey, *Campaign Series. Normandy 1944: Allied Landings and Breakout* (London: Osprey Publishing, Inc., 1990), 60.

[39] Ibid., 69.

[40] Barnett, 86.

[29] Ibid., 87. The development of light, highly maneuverable armored vehicles mirror the British development of Destroyers as oppose to Battleships to protect their Sea Lines of Communications. The premise because the Destroyers could sail faster due to their lighter weight and could defeat heavier warships due to this mobility. The light tanks employed initially to Africa contained these same parameters.

[42] Ibid., 87.

[43] Ibid., 88.

[44] W.G.F. Jackson, *The Battle for North Africa 1940-43* (New York: Mason/Charter Publishers, Inc., 1975), 165.

[45] Military Intelligence Study, *The Libyan Campaign. November 1941 to January 1942, Campaign Study* (Washington, D.C.: War Department, 25 August 1942), 29.

[46] Barnett, 127. British reporting of the campaign as success story because it achieved the ultimate victory blinded the leadership into making almost identical mistakes in *Operation Goodwood*, some 3 years after *Operation Crusader.*

[47] Jackson, 183.

[48] Ibid., 147.

[49] Military Intelligence Study, 29. See endnote 43. The anti-tank guns used by the Germans frustrated the British Commander, Cunningham, in his attempt to fight tank on tank and hope that the maneuverability and superiority in numbers would carry the day. This action never occurred.

[50] Jackson, 182.

[51] Center of Military History United States Army, *U.S. Army in World War II. European Theater of Operation: Breakout and Pursuit* (Washington, D.C.: U.S. Government Printing Office, 1961), 188-196.

[52] British Air Ministry, *The Second World War. 1939-1945 Royal Air Force: Air Support* (London: Air Historical Department, 1955), 155.

[53] Stephen Badsey, *Campaign Series. Normandy 1944: Allied Landings and Breakout* (London: Osprey Publishing Ltd., 1990), 59.

[54] Henry Maule, *CAEN: The Brutal Battle and Breakout From Normandy* (New York: Sterling Publishing Co., Inc., 1976), 87.

[55] Badsey, 65.

[56] Military Operational Research Unit, *Report No. 23: Battle Study, Operation Goodwood* (London: Department of the Scientific Adviser to the Army Council, October 1946), 21. These figures include attached elements of I (Br) Corps and the 3d (Cdn) Division operating in the Caen area. The German 88-mm anti-tank guns inflicted the majority of the British tank loses.

[57] Henry Maule, *Normandy Breakout* (New York: Quadrangle/The New York Times Book Co., Inc., 1977), 87-88.

[58] Jackson, 152.

[59] Martin van Creveld, *The Washington Papers. Military Lessons of the Yom Kippur War: Historical Perspectives,* The Center for Strategic and International Studies. (Beverly Hills, CA.: Sage Publications, 1975), 10.

[60] Ibid., 14.

[61] Peter Allen, *The Yom Kippur War* (New York: Charles Scribner's Sons, 1982), 11.

[62] Ibid., 15.

[63] Frank Aker, *October 1973: The Arab-Israeli War* (Connecticut: The Shoe String Press Inc., 1985), 42.

[64] The Military Balance 1995/96, 229-262. See endnote 9.

[65] David Eshel, "Latest Trends in Israeli Tank Development," *Military Technology MILTECH* (June 1996), 193.

[66] In the 1920s and 30s, J.F.C. Fuller proved false the theory that once tanks could be penetrated that it would become obsolescence, this author is also advocating a greater role for tanks once technology on-board the tank defeats the advantages of precision munitions.

[67] Ibid., 40.

[68] Ibid., 8.

[69] Major James M. Warford, "The Russian T-90/T-90S Tank: An Old Dog With Some Dangerous New Tricks," *Armor* (March-April 1995), 6-7.

[70] Ibid., 8-9.

[71] Christopher Foss, "First of Russia's T-90s delivered to the army," *Jane's Defence Weekly* (5 February 1994), 4.

[72] U.S. Army *FM 71-2 The Tank Mechanized Infantry Battalion Task Force* (Washington, D.C.: Department of the Army, 1988), 3-29.

[73] TAIT report, see endnote 7.

[74] U.S. Army *FM 71-1 The Tank Mechanized Infantry Company Team* (Washington, D.C.: Department of the Army, 1988), 6-21.

[75] FM 7-91, 1-2.

[76] TAIT report, see endnote 7.

[77] FM 100-5, 2-9.

[78] Eshel, 195. During the Israeli/Lebanon war, the Israeli-made MERKAVA tanks equipped with first generation Explosive Reactive Armor received several "hits" from all types of anti-tank weapons. Not one tank was lost to enemy fire. Remarkably, one MERKAVA was hit by over 20 rounds of anti-tank fire and was eventually returned to duty.

[79] Maule, 80.

[80] Badsey, 65.

[81] TAIT report, see endnote 7.

[82] Martin Van Creveld, *Command In War* (Cambridge, Mass.: Harvard University Press, 1985), 213.

[83] FM 100-5, v.

[84] First Lieutenant Adam Geibel, "Learning From Their Mistakes: Russia's ARENA Active Protective System," *Armor* (September - October, 1996), 10. The ARENA system is designed to defeat ATGMs and anti-tank grenades with "top-down" attack capabilities (such as the JAVLIN). This system detects incoming rounds and fires a round from a series of silos mounted around the turret and explodes the ATGM at a stand-off range protecting the armor vehicle.

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