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**Agility Versus Endurance In AirLand
Battle-Future: A High-Risk Trade-Off**

**A Monograph
by
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Infantry**



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ABSTRACT

AGILITY VERSUS ENDURANCE IN AIRLAND BATTLE FUTURE:
A HIGH-RISK TRADE-OFF by Major Gary P. Petrole, USA,
67 pages.

As the Army transitions to the 21st century, it must confront two key issues. The first is how to fight effectively on future battlefields and the second concerns the tactical force structure required to provide the best chance for success in future conflicts. The AirLand Battle-Future operational concept is the Army's answer to the envisioned environment, threat, and the technological conditions likely to confront the Army in the next century.

The monograph examines the assumptions and conclusions of the ALB-F operational concept and its implications for a proposed tactical force structure. These conclusions are contrasted with alternative views of future war and battle conditions developed by other military analysts. The alternatives are used to gauge the possible range of conditions our future force structure must accommodate. A cardinal element in our future force design is a desire to increase agility through reduction in force size and complexity. The paper examines the nature of agility and the impact of proposed force structure modifications on a unit's combat power and endurance. The Wass de Czege combat Power Model is used to analyze the systemic impact of proposed changes to U.S. force structure by comparing and contrasting alternative potential unit structures.

Finally, the monograph concludes that our uncertain view of the future requires greater caution and flexibility in the force structure we select. It points out that our lack of understanding of the physical trait of agility has led to the flawed methodology used to develop the proposed ALB-F unit structures. The paper recommends a more systemic evaluation for the measurement of potential combat power, unit agility, and the contribution of logistics assets to these traits.

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I. Introduction

The only way to prevent ossification of the mind is to accept nothing as fixed, to realize that the circumstances of war are everchanging, and that consequently organization, administration, strategy and tactics must change also. . . . Adherence to dogmas has destroyed more armies and lost more battles and lives than any other cause in war.¹

J.F.C. Fuller

Still it is the task of military science in an age of peace to prevent the doctrines from being too badly wrong.²

Michael Howard

The introductory quotations frame the paradox faced by the developer of doctrines and organizations. As change forces a reevaluation of our warfighting doctrine, it is important that we balance our view of future war with the inherent uncertainty of our vision. Common sense and our national security demand a thorough reconciliation of our view of the future, the proposed doctrine and organizations we will field, and the reality of uncertainty.

This monograph will focus on one aspect of the reconciliation process. Throughout the eighties, the heavy force, in particular the heavy division, was the key element of American land power. The rapidly changing world environment, U.S. political, economic and social developments, and technological advances are pushing the Army toward new and innovative operational warfighting concepts. These concepts, in turn, have

led to a revision of current AirLand Battle doctrine as well as reconsideration of the tactical force structure required to execute that doctrine. The paper examines the viability of the proposed tactical maneuver force to execute AirLand Battle-Future (ALB-F) doctrine and its ability to deal with an uncertain future battlefield.

A crucial aspect of the proposed maneuver force is its greater demand for battlefield agility. This increase in agility is gained largely at the expense of its sustainment infrastructure. The monograph contrasts the proposed unit organization with some alternatives to find an appropriate balance of agility and endurance for the new tactical 'building block' in the Army force structure. Each alternative force structure is compared for its ability to satisfy three key ALB-F imperatives: first, it must be agile enough to gain the initiative; second, it must possess enough combat power to destroy the enemy's momentum; and third, it must facilitate the synergistic effect required between combat and combat service support elements to maintain adequate combat power.³

Perhaps the best place to begin is with the question, why change? As the diagram of the Concept-Based Requirements System⁴ (Figure 1) illustrates, we expect changes in technology, threat, world conditions

and guidance (from various sources) to serve as the basis for the development of new warfighting concepts. General Carl E. Vuono, the Army Chief of Staff, in a CSA White Paper, lists some of the key factors driving an evolution of our national military strategy and the doctrines and forces to execute it.

World conditions and the perceived threats have changed significantly for the United States. The world has shifted from the familiar bipolar political confrontation to a potentially more dangerous multipolar environment. General Vuono details a Soviet threat that has receded, yet remains a menace to U.S. security.⁵ He describes a third world where the growth of sophisticated weaponry in potentially hostile developing nations threatens regional democracies.⁶ He further states,

The proliferation of sophisticated weapons in the developing world vastly complicates US defense planning. At least a dozen developing countries have more than 1,000 main battle tanks, and several of these nations have more tanks than our Army has in Europe.⁷

Clearly this is a qualitatively different threat than the U.S. has traditionally faced. Coupled with the expanding technological base of developing nations, the result is an increase in the number of countries capable of engaging in sustained, mechanized land warfare.⁸

Our ability to maintain large, forward-deployed forces has diminished as the threat has changed. Guidance for the future imposes significant constraints on the size of the forces and the resources available to the Army. Our view of the future still demands an Army with broad capabilities to conduct land campaigns, and emphasizes the growing requirement for contingency forces in response to crises.⁹ These forces must be capable of executing a dynamic, progressive warfighting doctrine.¹⁰

Finally, technology continues to advance at a staggering pace. A wide range of technological developments may radically alter the face of the 21st century battlefield. These innovations and enhancements will be available to many nations and the U.S. might not be the first nation to develop or exploit some of these advances.¹¹ Regardless, this accelerated technological development must be carefully integrated into any future warfighting doctrine.

In total, this spectrum of rapidly changing conditions must lead us to reexamine our warfighting concept and tactical organization for the next century. The strategic stage set for the nation will demand an Army that is "versatile, deployable, and lethal."¹² It will still require heavy forces for mid- to high-intensity conflict against an increasing number of

threats. These heavy forces must be versatile, by balancing broad capabilities at a relatively small size; deployable, at an appropriate size with tailorable capabilities; and lethal, through the incorporation of modern technology with appropriate doctrine and an enabling force structure. As General Vuono stated, "The world is changing in a number of profound ways, and the US will have to adapt to those changes."¹³

Historically, our ability to deal with a perceived revolution in warfare is less than overwhelming. The lethality of atomic weapons was heralded as a huge technological advance, not unlike our view of 21st century conventional weapons. Army doctrine and the resulting Pentomic division represented our attempt to reshape the Army to our conception of the modern battlefield. The Pentomic division is widely regarded as a disaster.¹⁴

There are strong similarities between the operational concepts of the Pentomic organization and proposed ALB-F doctrine. The Pentomic force recognized the extreme peril of massing units in the face of nuclear fires.¹⁵ It emphasized the need for "dispersion, mobility and flexibility," along with force "deployability," much as ALB-F does today.¹⁶ It was also developed within a political environment

similar to ours, where a diminished perception of the Army's role, shrinking budgets, and a requirement for all-purpose units guided force development more than a careful consideration of the battlefield.¹⁷ Yet the extensive reforms of the 50's were remarkably impermanent and the conception of future war, which spawned them, was as "dead as the Dodo"¹⁸ by 1960.

The implications for today's Army are clear. We must avoid a one-sided view of potential future conflict or risk creating units as dysfunctional as the Pentomic division. The blind focus of the "fifties" on the nuclear battlefield deprived the Army of other important technological advances and squandered limited resources on less useful weapons and equipment. Fundamentally, we lost sight of the essential nature of the battlefield. We failed to reconcile the potential of the future with our historical knowledge of battlefield dynamics.

As A.J. Bacevich points out in The Pentomic Era,

Soldiers of the 1980s rightly will ask whether the Army's experience of three decades ago has any relevance to the questions they face today. The answer is yes, emphatically so. Once more, Service leaders talk about change that is transforming the character of warfare. Many items high on America's military agenda . . . are echoes of issues from 30 years ago. As a result, the Army's efforts to address the problems of that day provide fertile ground for identifying lessons with application in the 1980s.¹⁹

These lessons remain valid for the development of an Army to fight in the next century. With these cautions in mind, let us turn our analysis to ALB-F doctrine and its proposed tactical maneuver force.

II. AirLand Battle-Future: Concept, Doctrine and Organization

Current AirLand Battle doctrine has served the Army well since its inception in the 1982 edition of Field Manual 100-5. Much of AirLand Battle doctrine will continue to apply into the next century. Yet for the reasons elaborated upon in the introduction, a systematic review of our warfighting concept is necessary to insure its continuing relevance to future warfare. As the Evolution of the Army study points out:

AirLand Battle doctrine has been and will continue to be evolutionary and mature and adjust to a changing world. . . . The AirLand Battle Future Concept provides the means for reasoned, appropriate periodic evolution of AirLand Battle Doctrine and associated training, leader development, organization, materiel and programs.²⁰

The ALB-F concept performs several functions. It concentrates on the employment of the Army as the land component of American military power in the early part of the 21st century.²¹ This concept describes the resources, missions, and capabilities of the Army and identifies essential future force requirements based

upon projected national interests and strategies.²²

Besides articulating the Army's resource needs, it provides the framework for the development of doctrine, organizations, training, materiel, and leaders (DOTML).

The ALB-F Umbrella Concept identifies a number of significant trends with broad operational implications for the Army. These trends include the global strategic environment, the impact of technology on military forces, our enduring national interests and projected missions and roles for the Army. The interaction of "future global trends and our national interests requires a regionally based global military strategy."²³ The ALB-F operational concept is one possible means to achieve our strategic goals.

The concept recognizes that American strategic objectives remain fundamentally the same. However, these goals will compel the Army to realign its force structure from the strategic through the tactical level to meet the evolving conditions and challenges of the next century.²⁴ For this reason, we will field smaller forces with an emphasis on the deployability and tailorability of the force. We will also revise DOTML to insure current ALB doctrine and organizations evolve to deal effectively with future conflicts.

An examination of the trends identified by the ALB-F study reveals very different conceptions of

future war and battle in the next century. One of the key characteristics of future war will be the aspect of nonlinearity. In an interview for the Armed Forces Journal, General John W. Foss, the Commanding General, TRADOC, offered these observations:

. . . We are projecting that we will be moving into a nonlinear battlefield situation somewhere in the late '90s. We are also going to reach a point with the technology that we'll know where the enemy is almost all of the time and will be very close to being able to attack him very accurately at very long range.²⁵

In addition to nonlinearity and near-perfect intelligence, the increased lethality of fires portends a return to the primacy of the offense on future battlefields.²⁶ Offensive action, accurate intelligence, and lethal fires dictate a focus on the annihilation of enemy forces and avoidance of attrition warfare. They likewise require forces with greater agility to operate successfully in this environment.

The dynamics of projected battles and engagements are affected as much as the conditions of future war. Battles are expected to occur in cyclic as opposed to continuous engagements. These battles will follow a distinct cycle for the tactical maneuver force of "disperse, mass, fight, redisperse and recovery."²⁷

The actual close combat event is conceived as one of short duration, approximately two to six hours.²⁸ The tactical maneuver force executes a rapid movement

to contact to close with, and destroy the depleted enemy force. At the end of this intense period of combat, the tactical maneuver force must leave the battle area (or disengage from the enemy force) to conduct recovery operations during the reconstitution stage of the battle. Sustainment must now be pulsed forward to surge sufficient support to return the unit to a combat ready posture.²⁹ It is clear that the ALB-F concept does not envision fighting future wars or battles as "business as usual".

This revolution in warfighting brings two fundamental organizational characteristics into conflict. General Foss, when asked what the Army must do to reshape itself responded:

When we look at the implications of that, we see there's going to be a lot more movement on the battlefield. The forces we have now are generally defensive in character and not quite as agile as we would like them to be. They're built for endurance. . . . Future success on the battlefield will depend on how fast you can move and how fast you can build up combat power.³⁰

Accordingly, we must revisit the definitions of agility and endurance in order to make sense of this trade-off.

Field Manual 100-5 defines agility as "the ability of friendly forces to act faster than the enemy."³¹ AirLand Battle doctrine recognizes that agility has both a physical and a mental dimension. However, it emphasizes the mental component.³² In ALB-F the

emphasis shifts to the physical aspect, and seeks greater battlefield agility through increased mobility on the battlefield.³³

The equation of physical (organizational) agility to increased mobility appears too simplistic. Michael Howard emphasized the need for "adaptability and flexibility to absorb technological change."³⁴ These characteristics are also important facets of physical agility. In an organizational sense, adaptability defines an unit's ability to respond to unexpected conditions on the battlefield. Flexibility is a measure of its capacity to execute a broad range of tasks on the battlefield. Taken together, the attributes of mobility, adaptability, and flexibility should define an organizations physical agility.

In contrast, endurance refers to our capacity to "sustain or undergo without impairment or yielding."³⁵ It enables the force to fight effectively for an extended period of time. A force capable of significant endurance on the battlefield is considered to be 'robust'. The lack of an adequate endurance capability consequently leads to a 'brittle' organization; one easily consumed by the rigors of combat.

As modern technological armies require extensive logistic support to maintain endurance, they also need

large service and support units to provide required sustainment functions. It is this logistic 'tail' that is seen as the primary detractor to increased agility on the ALB-F battlefield.

The ALB-F concept proposes a new tactical maneuver organization to reconcile changing technology, projected missions, and the drive for increased agility. In ALB-F, we no longer see the division as the fundamental organization of the heavy force. As Richard Simpkin asserts, "we need to rid ourselves of a sacred cow--the division."³⁶ In its place, the brigade will become the key organizational structure.

The ALB-F brigade (Figure 2) will be smaller, more tailorable and more deployable than the current separate heavy brigade. General Foss visualizes a three battalion brigade where each battalion has three companies.³⁷ The Evolution of the Army study describes the brigade as:

. . . a combined arms package, complete with its habitually assigned combat, combat support, and combat service support units. This Brigade serves as both a tactical and logistical headquarters.³⁸

Brigade sustainment assets (Figure 3) remain organized as they are today, but are more modularized and tailorable based upon the tactical units they must support. They have absorbed most of the logistic assets of the battalions but at a reduced number of

systems. This produces the desired reduction in 'tail' at the lower level. It also affects the sustainment concept of focused logistics in which logistics assets are surged to support maneuver forces during the reconstitution phase.

The battalions (Figure 4) which comprise the ALB-F brigade are notably smaller than at present.

Battalions will be organized around single weapons systems and made more agile by moving combat service support elements to brigade.³⁹

These battalions are expected to execute engagements within the time limits identified by the ALB-F concept. They will carry only an emergency supply of Class III and V into battle.

In summary, the ALB-F brigade gains its agility by removing logistics assets from its subordinate units, and concentrating them at brigade. Its combined arms nature is a product of habitually assigned units and the task organization of maneuver units for missions. Battalions are not envisioned as fighting within a fixed organization.

The ALB-F warfighting concept recognizes the vast and dramatic changes we may face in the next century. It responds with new conceptions of war and battle and an evolutionary approach to solving the dilemmas posed by its view of the future. The concept advocates a basic restructuring of our fighting organizations and

an increased emphasis on the agility of the tactical maneuver force. It offers a path to guide the Army into the future.

Yet, we are reminded by Howard that

The great drawback in an age of peace is that the Armed Forces function professionally in a sort of void. You cannot verify your calculations.⁴⁰

The ALB-F concept provides one conclusion about the nature of future war and battle. Other prophets of the future exist and their views of war, battle, and the forces required offer some alternatives to the ALB-F version.

III. Alternative Conceptions of War, Battle and Organizations

Contemporary critics of the ALB-F concept have come to regard its conception as either collective 'group-think', or worse, a cynical pursuit of budget dollars, new technology, and increased force structure. Their analysis of many of the same trends identified here leads them to substantially different notions of future warfare. In an article in *Parameters*, General John R. Galvin warns

. . . when we think about the possibilities of conflict we tend to invent for ourselves a comfortable vision of war, a theater with battlefields we know, conflicts that fit our understanding of strategy and tactics, a combat environment that is consistent and predictable, fightable with the resources we have, one that fits our plans, our assumptions, our hopes, and our

preconceived ideas.⁴¹

At best, we face a confused and uncertain future. If we fail to consider dissenting views of future war, battle, and organizations, we do so to our own detriment.

The ALB-F concept envisions future mid- to high-intensity war as a clash of smaller, high technology armies operating on a nonlinear battlefield with wide dispersion between their subunits. These mobile units, armed with extremely lethal weapon systems and near-perfect intelligence rapidly concentrate and execute decisive offensive battles to annihilate enemy forces. Several military analysts have inferred other conclusions from current trends.

Chris Bellamy, in The Future of Land Warfare, offers one such view. While Bellamy concedes nonlinearity may exist on a tactical level, he believes that "dispersion at the lowest level has led, paradoxically, to clogging of the battlefield at the higher."⁴² In essence, nonlinearity is a characteristic of the tactical and, perhaps, the operational but not the strategic level of warfare.

Writing about nonlinearity in The Technology Trap, Timothy Garden takes the opposite view. Although he envisions nonlinearity on the strategic level, he "finds it impossible to imagine a major land war where

the contact battle (with a well-defined line) will not play an essential part."⁴³ Even the ALB-F concept concedes that "nonlinear conditions may not exist" and "units must still be capable of conducting linear operations."⁴⁴

The viewpoints held by these two authors illustrate the wide divergence possible in extrapolating present and potential capabilities to future conflicts. Similar disputes exist over each of the central elements of the ALB-F concept. Most authors agree that conventional weapon systems will achieve devastating lethality in the next century. They are much less sanguine about the near-perfect intelligence Army leaders expect to have. Skeptics point out that although sensors may provide locations of enemy forces, this type of intelligence reveals little of the enemy's intentions. Even advocates of ALB-F doctrine such as retired General William E. DePuy, the former TRADOC commander, caution that "the Army will be wary of overreliance on intelligence and surveillance simply because failure could be catastrophic."⁴⁵

Our new warfighting concept anticipates the use of increased mobility to execute decisive offensive actions. In fact, it challenges the theoretical primacy Clausewitz postulated of the defense over the

offense.⁴⁶ These assertions are countered on several points. Writing about The Automated Battlefield, Frank Barnaby maintains that "the new technologies make defence much more cost-effective than offence."⁴⁷

Indeed, the increased lethality of conventional weapon systems is as likely to improve the primacy of the defense as it is to enhance the offense. Avraham Adan, reflecting on the lessons learned from the '73 Arab-Israeli War, asked

But what of the future? Do new technological developments point to the neutralization of mobility through firepower, hence to the strengthening of defense vis-a-vis offense?⁴⁸

He points out that the First World War was the last major conflict where similar circumstances developed.⁴⁹

Although Adan rejects that conclusion, other authors do not. Kenneth Macksey, envisions war "slowed to a shuffle" due to the lethality of fires.⁵⁰ He projects that armies will engage in attrition warfare in its most devastating form. This war will eventually result in a battlefield stalemate where the use of negotiation or decisive nuclear fires will be required to resolve the conflict.

As we can see, there are wide divergences between the ALB-F conception of 21st century warfare and the alternatives. Similar differences exist concerning the

dynamics of the future battlefield.

The ALB-F concept projects cyclic battles composed of short duration close combat events of approximately two hours. After which, the tactical maneuver force withdraws from the battle area to reconstitute his combat power. This reconstitution is supported by a centralized logistics structure which surges the required sustainment to the unit.

There are opposing viewpoints on each of these issues. Barnaby forecasts that modern battlefields will be characterized by fast and unrelieved action.⁵¹ Karl Weick, in analyzing stress on future battlefields, projects one where continuous fighting leaves personnel constantly exposed to its unrestrained intensity and violent effects.⁵² In each case, technology is expected to deprive the unit of the required safe-haven needed to cycle into and out of combat. It also will reduce the former physical limitations of weather, smoke, dust, and night which frequently suspended action on the battlefield.

Current literature on future war presents a wide spectrum of opinion on the likely duration of close combat actions. Frank Kitson predicts a battle of increased intensity with a duration of about 24 hours.⁵³ Chris Bellamy, citing the experience of the Yom Kippur War, suggests "local engagements lasting 120

hours without a lull."⁵⁴ He believes that the battles will continue until "participants inevitably collapse from physical, mental, and logistic exhaustion and some suspension ensues."⁵⁵ In either case, wide variations from projected ALB-F estimates at all levels merit our careful consideration as we devise our own view of future warfare.

If we accept the proposition that other analysts have some of their forecasts right, then the character of future war and battle may vary widely from our ALB-F projections. All of the analysts mentioned have supported their conclusions by drawing upon the same trends identified in the ALB-F study. Clearly, their assertions define a broad range for the potential nature of future wars and battles in the mid to high intensity environment.

Given such a range, several alternative tactical organizations exist which might be used to successfully confront an uncertain future. Three such alternatives are considered in this monograph. The current separate heavy brigade is the base case. This organization reveals the extent of planned changes in the ALB-F brigade.

The Soviet brigade equivalent, the motorized rifle regiment is the second alternative. The variants considered reflect current Soviet plans for force

reorganization in the next century. Finally, a German brigade represents the third option. It strikes a middle ground between the Soviet and U.S. organizational types.

The current U.S. heavy separate brigade organization (Figure 5) is capable of conducting limited independent operations to destroy enemy forces or control terrain. It also has a sustainment structure (Figure 6) able to provide logistic support for up to five battalions on a continuous basis. Its combined arms nature lies in its organic artillery, engineer, military intelligence, and reconnaissance elements and other arms as attached from Corps. These elements may be further tasked organized with its mechanized and armored units into battalion task forces.

Each brigade is usually composed of three battalions. Under the J-series TOE, (Figure 7), these battalions have four maneuver companies. An antiarmor company is also present in the mechanized infantry battalion. The battalions contain a mix of weapon systems, for example, infantry fighting vehicles, improved TOW vehicles, and mortars. They have a relatively robust sustainment structure which permits limited maintenance, refueling, and resupply with their organic assets. These logistics assets are located in

the large HHC organic to the battalion.

The heavy separate brigade is a highly robust organization. It gains its logistic depth through the layering of sustainment assets at the brigade and the battalion level. Its combined arms nature is a product of task organizing its organic and attached assets. The brigade is capable of a wide range of missions and does not fight with a fixed organizational structure.

The Soviets take a markedly different approach. They accept many of the same conclusions presented in the ALB-F study, and they have opted for an evolution of their present organizational structure. "The Soviet vision of future battle sees a need for battalions capable of functioning independently on a fragmented battlefield."⁵⁶ These revamped battalions will operate in the framework of the Soviet motorized rifle regiment.

The motorized rifle regiment (Figure 8) retains much of its present day structure. It remains a highly integrated, combined arms formation capable of rapid movement on the mid to high intensity battlefield. The principle change in its organization is the combination of the motorized rifle battalions, the tank battalion, the reconnaissance company and the chemical protection platoon into reorganized Combined Arms Battalions. This is consistent with past Soviet modifications where

. . . weapons systems, logistic elements, subunits and personnel have been periodically added, deleted, and modified to match evolving tactical doctrine and to provide the optimum mix in maneuverability, indirect fire support, direct fire support, control, survivability, and sustainability.⁵⁷

Logistically, the motorized rifle regiment functions as it has in the past. Centralized planning is utilized to tailor logistic support to subordinate units. The logistic structure within the regiment pushes required fuel, ammunition, and supplies forward to its battalions based on its established priorities. Battalion, in turn, is responsible for the distribution to its subunits.

Unlike the U.S., the Soviets intend to retain the logistic assets currently available in the motorized rifle division. This creates a broad, multi-layered sustainment infrastructure in support of their combat formations. Future developments will concentrate on increasing the mobility and efficiency of these logistic units to ensure effective support on future battlefields.

The new combined arms battalion (Figure 9) reflects the Soviet's continuing belief in the combined arms nature of modern war. It also formalizes "a decision to do in peacetime what the Soviets have routinely done in exercise and war through attachment."⁵⁸ In its most mature form, this

combined arms battalion integrates considerable direct fire resources with an increased reconnaissance capability, upgraded indirect fire assets, and an expanded logistics capacity. This organization "permits units and subunits to habitually train in all circumstances"⁵⁹ and will form the core unit of future motorized rifle regiments.

As the Soviets enter the next century, they will continue to rely on their established tactical hierarchy with modifications to their present unit structure. Battalions will receive an increased logistics capability. They will be reorganized to increase their ability to conduct a high-tempo, meeting engagement type of battle, yet still retain the capability to execute the full range of combat missions. This unit is structured to fight with a fixed, combined arms organization.

The German brigade structure (Figure 10) lies in the middle ground between freely task-organized American units and the fully structured Soviet combined arms formation. General Henning von Ondarza, the Chief of Staff of the German Army, sees the current brigade structure as "a viable and proven structure" that "will continue to provide a nucleus for the armoured forces."⁶⁰ The current brigade, with slight additions to its reconnaissance assets, will be the key

formation in the German Army by the year 2000.

The German heavy brigade (either *Panzer* or *Panzer*) is capable of independent operations on the battlefield. It is expected to rapidly mass and execute successful attacks against enemy forces on a fluid battlefield. The brigade contains four battalions with one unique difference. The fourth battalion is a combined arms unit that reflects the predominant arm in the brigade, either armored or mechanized. The brigade also includes reconnaissance, engineer, artillery, antiarmor, and sustainment assets.

It fights within its organization but can task organize if required by the mission.

Sustainment capabilities are layered at the brigade and the battalion levels. Maintenance, service and medical assets are present at brigade in independent companies and within the HHC at battalion. Logistic support is generally pushed from higher to lower with each echelon responsible for distribution to its subordinates.

The battalion (Figure 11) is composed of three maneuver companies, a mortar company and the HHC. The battalion generally fights within its organization but can receive additional antiarmor, engineer, or logistic assets from brigade. The combined arms battalion has a similar organization but includes one

company of either armor or mechanized forces in lieu of its basic type company.

In summary, the Germans, like their Soviet counterparts, will rely on an evolution of their current force structure. Their brigade is a balanced, robust unit that fights utilizing its established organization. It has a limited sustainment capability that is layered at both battalion and brigade levels and operates on a push system. The principle mission for the brigade is the meeting engagement or counterattack, but the brigade remains capable of undertaking a broad range of offensive or defensive tasks.

Clearly, several alternative methods are available to meet the challenges of combat in the next century. Selecting the most viable organization for the ALB-F scenario is only part of the problem. The organization we select must also be flexible enough to provide a hedge against the inherent uncertainty of potential future war and battle environments. Some instrument must be used to analyze these organizations and evaluate their relative strengths and weaknesses. The Wass de Czege Combat Power Model provides the tools required for such an analysis.

IV. The Wass de Czege Combat Power Model

The Combat Power Model, developed by then Colonel Huba Wass de Czege, attempts to provide a guide to "how to think" about the conduct of war.⁶¹ It represents a break with past methods of assessing combat power because it avoids "simplistic and fatalistic thinking based on judgements about only the quantifiable aspects of the battlefield."⁶² In fact, it distinctly avoids the issue of counting things in favor of a more encompassing analytical approach that deals with the added complexity of the battlefield.⁶³

Wass de Czege identifies a key weakness of the quantitative methods when he states

. . . these simplistic methods of analysis cause unrealistic distinctions to be made between force elements which contribute directly to combat power and those which do not. Most discussions of tooth-to-tail ratios hinge on such arbitrary distinctions. Since units contribute to combat power in different ways there is no clear theoretical line of demarcation between "tooth" and "tail".⁶⁴

Instead, he concentrates on the interdependence of Army functions. In doing so, Wass de Czege outlines a method of analysis which examines systems and the contributions they make to potential combat power on the battlefield. The contributions made by logistic systems can be deduced through the relationships identified within the combat power model.

The combat power model, expressed by the equation

$$L_f(F_f+M_f+P_f-D_o) - L_o(F_o+M_o+P_o-D_f) = \text{The Battle Outcome}$$

links the outcome of the battle to the resolution of a subtle relationship between a number of complex variables.⁶⁵ (See Figure 12 for the model and a definition of the variables.) These variables include the "effect of firepower placed on each force, the effect of maneuver, the effect of protection of forces, the effect of combat leadership and the attempts of each side to degrade these effects."⁶⁶ Wass de Czege recognized that "the four basic variables constitute the first level of abstraction of the model."⁶⁷ Depending on the level of resolution required, subsequent levels of abstraction define more specific variables which in turn determine the qualitative value assigned for the basic variable in the equation.

We can see from his analysis that maneuver, firepower, protection, and leadership effects all have sustainment variables at lower levels of abstraction which contribute to their ultimate value in generating combat power. For example, maneuver effects do not equate solely to mobility but are also contingent upon the management of resources.⁶⁸ Firepower, protection, and leadership effects are similarly influenced. In general, an enlarged sustainment capability increases rather than decreases any particular effect's contribution to the unit's total

combat power. This is not an absolute, however, because the increase will usually counterbalance some other variable, such as mobility. Beyond some point, the increase of sustainment capacity will hinder rather than help the organization.

The model predicts that the battle outcome "is determined by the relative combat power of the antagonists."⁶⁹ This difference of combat power is arrived at by the comparison of two adversaries "at the time and place where battle outcomes are determined. Prior to battle there exists only capability."⁷⁰ It is this potential combat power that must be assessed when evaluating possible future organizations. Because the number and type of potential adversaries is large and varied, their contribution to the equation, along with the leadership effect, is considered fixed for each alternative organization.

Another important aspect of the equation is its dependence on time. "The value of variables may also fluctuate with time as the enemy takes unforeseen action to affect them or other environmental factors intrude."⁷¹ In fact, the effect of time is more pervasive than Wass de Czege's analysis indicates. The relationship defined by the model is a differential equation where both the value of friendly and enemy variables change as a function of time.

The implication for this analysis is that if we fix the value of the enemy variables and the leadership contribution, an observable decline in the value of the firepower, maneuver, and protection variables would be noticed as the unit is consumed in battle. How rapidly these variables decline depends largely on the sustainment structure which converts combat potential to power for the unit in battle. This analysis provides a measure of the 'brittleness' of the organization.

With these points in mind, the model can assist in evaluating the alternative organizations on a qualitative as opposed to a quantitative level.

It is designed to assist the leader in asking the right questions about what to do to win. It helps to portray the relationship between actions and the ends of those actions in the maximizing of relative combat power.⁷²

The model can also identify the organization with the comparatively greater potential combat power and can provide a measure of the comparative 'robustness' of each alternative. It can also yield some assessment of the units ability to generate combat power under battlefield conditions for which it was not specifically designed.

The analytical framework developed here can be used to supplement and enrich the results of purely quantitative analysis by providing the broader context and thus it can enhance the analytical rigor of military

judgement.⁷³

The Wass de Czege combat power model supplies a valuable analytical tool to evaluate the contending force structure alternatives.

V. Analysis of Alternatives

A number of previously mentioned points merit a brief summary as we begin our examination of the alternative organizations. Combat power, or in this case potential combat power, is a complex phenomenon. It is the product of the interaction of many variables. Simply increasing a units mobility, or sustainment capability will not increase or decrease its combat power. The changes made to the organization must be evaluated in aggregate to assess the net effect on that units combat power.

Agility is another complex factor. It has both a physical and mental component. While its cybernetic element is not the issue here, its physical aspect is also more than simple speed on the battlefield. To be truly agile, in the physical sense, an organization must have the appropriate balance of mobility, adaptability, and flexibility.

The combat power model equips us with an analytical framework to assess the qualitative aspects of each competing organization. Their quantitative

differences are noted, but the application of the model delves into the systemic effects of variations between these force structures. Finally, by recognizing the relationship of the model to time, the 'brittleness' or endurance capacity can be estimated for each organization.

Some assumptions are required to adjust Wass de Czege's relative combat power model to the needs of this analysis. Each organization is assumed to be outfitted with appropriate U.S. equipment and personnel. This is not a comparison between the materiel of each nation, but a contrast between the concepts represented by the unit structures. Due to the many potential threats, the enemy's contribution to the model is held to be equal (of no consequence) for this comparison. Finally, the skill of the leaders is a constant and the tactics employed are consistent with the design of the organization.

To assess potential combat power, the supporting firepower, maneuver, and protection effects models are used.⁷⁴ These derivative models, developed by Wass de Czege, depict some of the underlying levels of abstraction that support the basic combat power model. They provide greater detail about the specific factors which contribute to firepower, maneuver, and protection effects. These factors are not related as a

mathematical abstraction, but must be subjectively evaluated to determine the cumulative consequences of their interaction.

Based on a qualitative analysis, force structure options are listed and discussed from greatest to least potential combat power relative to each other. This order does not imply the organizations suitability for future warfare as defined by ALB-F or the competing alternatives.

The current U.S. separate brigade has the greatest potential combat power for several reasons. Its firepower effects depend upon the volume of fire, the lethality of munitions, the accuracy of fires, target acquisition, and flexibility of employment.⁷⁵ Its superior volume of fire results from its larger numbers and types of available delivery means and its considerable supply capability compared to other organizations.

Target acquisition and accuracy of fires benefit from its organic reconnaissance assets. Lethality of munitions is not affected by the force structure. These advantages are somewhat offset by the difficulties inherent in employing a large and complex organization.

Maneuver effects are a function of unit mobility, tactical and operational analysis, management of

resources, and command, control, and communications (C³).⁷⁶ The separate brigade's capacity for fuel supply and equipment maintenance, both preventive and corrective, contributes to a high level of unit mobility. Its extensive logistics structure at brigade and battalion levels also gives it an edge in the management of resources. Tactical and operational analysis is again enhanced by its organic reconnaissance capability. However, the large span of control due to the number of subordinate, supporting, and attached units detracts from its C³.

Concealment, exposure limitation, and damage limitation are the three major variables which constitute the protection effect.⁷⁷ The most immediate difficulty of the separate brigade is the concealment and dispersion of the organization due to its size and logistic tail. Its size also detracts from its ability to maneuver and avoid an enemy force.

Yet these faults are mitigated by the brigade's capacity for exposure and damage limitation. Both factors depend heavily on a robust sustainment structure to limit equipment and personnel attrition. The brigade's layered arrangement of maintenance, medical, supply, and service assets provides the best hedge against enemy action. Its sustainment infrastructure is the key element of its significant

protection effects.

Next in potential combat power is the German brigade structure. Its firepower effect results from an adequate volume of fire based upon the number of available systems and its well designed sustainment infrastructure. Although accuracy of fires is hindered by an insufficient reconnaissance force, it gains great flexibility of employment through the prudent organization of its battalions. The Germans achieve this size differential without completely gutting the battalion of its sustainment infrastructure.

Again the sustainment structure contributes to unit mobility and the management of resources. Likewise, the size of its subordinate elements favorably influences the C^3 variable. Unit mobility is strengthened by the German's reliance on fixed tactical elements as opposed to an *ad hoc* task organization. This fixed, core unit enhances group cohesiveness by training and fighting as a team. The cohesiveness in, in turn, improves the units mobility and amplifies the overall maneuver effect.

The protection effect is positively influenced by the sustainment capacity and the overall smaller size of the German brigade. This aspect of size permits more rapid dispersion and easier concealment of the brigade. It also increases its ability to maneuver and

avoid an enemy force.

The evolving Soviet motorized rifle regiment structure is a close third to the German brigade. Its high density of systems, particularly artillery, contribute to a massive firepower effect. This is further strengthened by a robust, if somewhat cumbersome, logistics system. It does provide an effective, 'push' supply system with a large transport capacity. The major detractor has been the size and complexity of the regimental and battalion organizations which hindered the execution of combined arms operations in Afghanistan.⁷⁸ The move to combined arms battalions is an attempt to rectify this problem.

Maneuver effects are improving due to the increased cohesiveness of the combined arms battalions, integrated reconnaissance elements at regimental and battalion levels, and increased sustainment capacity within the new combined arms battalions. The key weakness here is C³. The large size of the organization and the extended span of control may ultimately prove too unwieldy for effective control on the mid- to high-intensity battlefield.⁷⁹

The protection effect remains a tradeoff between the organization's huge size and its large sustainment 'tail'. Concealment and dispersion are difficult to

achieve. While capable of considerable tactical mobility, the regiment as a whole would find it difficult to maneuver its logistics assets in order to avoid an enemy force. Still, these assets contribute to the regiments capacity to limit damage and exposure, mitigating somewhat their lack of mobility on the battlefield.

Compared to the preceding organizations, the proposed ALB-F brigade appears to have a more modest ability to generate combat power. The reduction of the brigade and its subordinate battalions has decreased the types and numbers of delivery systems within the brigade. Likewise, the removal of the sustainment echelon at battalion has diminished its supply capacity and limited its systems to their basic load with only emergency class III and V available.

The removal of a reconnaissance unit at the battalion level further hinders target acquisition and the accuracy of fires. These losses are only marginally offset by the flexibility of employment gained through the smaller size and reduced complexity of the organization. The net effect is the production of a lower firepower effect than the other force structures.

The redesign of the heavy brigade has a mixed impact on its potential maneuver effect. The reduction

in size and organizational complexity should result in an increase in unit mobility. In addition, it should facilitate the management of resources by lessening the assortment of personnel skills required and by cutting the logistics demand due to fewer systems. The major gain should be in C^3 . In this area, the brigade's smaller size should greatly improve the span of control of the commander.

However, several potential problems may prevent any real gain in the maneuver effect. Removal of a logistics echelon reduces the unit mobility of the brigade by cutting its general capacity for maneuver. This results from a diminished maintenance posture and a reduction in refuel capability.

The loss of sustainment infrastructure is not without adverse implications for the management of resources as well. Tactical and operational analysis can be expected to suffer from the lack of reconnaissance assets at battalion. Finally, the reliance on an *ad hoc* task organization to form combined arms teams often degrades unit cohesiveness and hinders an improvement in the maneuver effect.

Similar tradeoffs affect the protection effect. The reduction in force size should allow the brigade to disperse and conceal itself more effectively. This smaller force should be able to maneuver and avoid an

enemy as well. Still exposure and damage limitation are largely sustainment activities and the downsized support structures will be less able to regenerate the force.

Besides combat power, another fundamental concern is which organization possesses the greatest battlefield agility. Perhaps the best place to begin is with the issue of mobility. As seen from the previous analysis, increased unit size, complexity, and span of control act to reduce the physical mobility of a force in war. The ALB-F brigade probably is the most mobile of the alternatives, followed by the German, Soviet and separate brigade models.

However, speed of movement does not guarantee the ability to act faster than the enemy. This action may also depend on a more rapid assessment of battlefield conditions and adapting appropriately. It may involve executing missions and tasks for which the organization was not specifically designed. The combat power model demonstrates that the sustainment infrastructure of an organization is an essential element in either case.

If we examine a force's combat power as it is consumed over time, we can draw some additional conclusions about these organizations. An effective sustainment structure is vital to the regeneration of a force and to its protection. It retards the rate at

which the force loses combat power and shortens the time required to regenerate it. If, for example, the close combat event tends toward Blainey's 120 hours as opposed to 2 to 6 hours, the force would exhaust itself and become combat ineffective.

By design, the ALB-F brigade is the most brittle of the organizations; the current separate brigade is the least. A serious misjudgment of future battle conditions could result in a dangerously flawed unit structure. The net effect would be attrition warfare at its most destructive as U.S. units are sequentially decimated. The expansion of agility's definition to include mobility, adaptability, and flexibility appears crucial to getting this issue right.

Overall, it appears that the ALB-F brigade structure represents a step backward in unit agility. If future war is conducted under linear conditions, with less than perfect intelligence, and mobility is not the essential element for victory, then the ALB-F brigade will be significantly less capable than its opponents on the battlefield. Likewise, a continuous battle which denies the organization a sanctuary, or which conducts close combat until an adversary is exhausted, also favor our opponents. Clearly, the German and Soviet models have a degree of adaptability for potential future conditions which the ALB-F brigade

lacks.

The criteria to evaluate an organization were simply, is it agile enough, does it have enough combat power, and can it maintain its combat power. These questions cannot be answered without a comparison against a specific threat. However, the analysis does demonstrate potential agility, combat power, and sustainment issues which may make the current version of the ALB-F brigade untenable. In contrast, the German and Soviet models may offer some possible modifications to improve the proposed brigade structure.

Clearly, neither combat power nor agility alone is the issue. We seek an organization that develops appropriate combat power for the missions expected of it. This force must be versatile, deployable and lethal. The separate brigade and the motorized rifle regiments are highly lethal and versatile but have deployability problems. The ALB-F brigade may be more deployable and possess acceptable lethality but lacks versatility. The German structure appears to have a better balance of all three.

The intent here is not to identify the "right" structure but to analyze alternatives. These alternatives should provide a foundation to critique our force design efforts. It should also identify

opportunities and options that must be considered as we design our tactical forces for the next century.

VI. Conclusions and Implications

The concept of agility remains the central issue in this monograph. To select the appropriate organization for the next century, we must clearly comprehend the nature of the traits which it must possess. We need a more comprehensive understanding of the physical aspect of agility. Howard's definition provides the required clarity. Without it, we are apt to confuse contributing factors, such as mobility, with the fundamental trait we seek.

Our imperfect view of the future contributes to our dilemma. We have no assurance that the future espoused by the ALB-F concept will come to pass. Other analysts offer a wide range of competing potential future battlefields. The inherent risk we face is that the selection of an inappropriate force structure may result in a dysfunctional organization. This unit may be incapable of fighting effectively under some of the alternative conditions identified. Clearly, we cannot exclude other alternatives without assessing this risk.

A systemic approach is crucial to accurately evaluate the potential combat power of alternative force structures. Without this approach, we can have

little confidence that the proposed organization changes will increase the unit's combat power. By also considering a broader definition of agility, we see that modifications to the unit's structure affect its capabilities in an interrelated and complex fashion. Increasing 'tooth' and decreasing 'tail' is a meaningless drill if we fail to gauge the net effect on the system's ability to generate combat power.

In that regard, sustainment capability makes an integral contribution to a unit's endurance. Less obvious, however, is its contribution to the systemic production of combat power. Each of the critical variables in the model are influenced by the level of logistic capacity within the organization. It is also apparent that endurance plays a crucial role in generating physical agility within an organization.

By using the Combat Power Model as a framework for analysis, we can examine the likely consequences of each proposed force structure. The ALB-F heavy brigade, when contrasted with the alternatives, lacks both the agility it seeks and generates less combat power than the other options. It has one key attribute, increased mobility, which it gains at the expense of its endurance and its overall agility. This might be an appropriate tradeoff if the ALB-F view of war comes to pass. More likely, it will require

modification based on an uncertain and debatable future.

The international military community has examined the same trends in current conflicts and technological developments, yet it has deduced different potential outcomes for the nature of 21st century conflict. For the most part, they view the impact of accelerating technological change as evolutionary, as opposed to revolutionary, in its effect on warfare. The comparison between organizations does indicate some points of agreement on the nature of future war. The three principle items are the need for an effective push system of logistics, the brigade, or its equivalent, as the appropriate tactical organization, and the continuing combined arms nature of modern warfare.

These conclusions suggest several possible modifications for U.S. tactical force structure in the next century. First, the separate brigade is the right level unit on which our evolving force structure should be based. As previously mentioned, the current division focus is largely historic. It ignores both the trends of increasing lethality on the battlefield and the decreasing size of armies committed to mid- to high-intensity modern warfare. Shifting our organizational focus to the brigade recognizes its

increased lethality and provides greater flexibility in the deployment and employment of forces. It creates a unit base which can meet our growing requirement for contingency operations, yet still provide an adequate core for the conduct of larger, conventional conflicts.

Second, the combined arms nature of modern warfare is one of its most enduring characteristics. Our current force evaluation methodology, which equates smaller, single-system units with faster, better, and less expensive units, is fatally flawed. While the increased lethality of modern weapons, coupled with the growing complexity of warfare suggests a smaller tactical organization, it is the overall need for combined arms balance which must ultimately determine the unit's size and composition. Our force design efforts should focus on achieving greater integration in our tactical force structure.

To this end, both the brigade and its component battalions should be combined arms units by organizational design. The integration of expanded reconnaissance, fire support, and combat support arms at appropriate levels into these units increases their potential combat power and makes a systemic contribution to their agility. The expansible nature of the brigade permits the tailoring required by uncertain situations, but still fosters the habitual

relationships required for effective action on the battlefield. A fixed, combined arms battalion would provide the basic building block for the brigade. It attempts to gain increased agility through a cohesive organization of trained, integrated teams as opposed to *ad hoc* units.

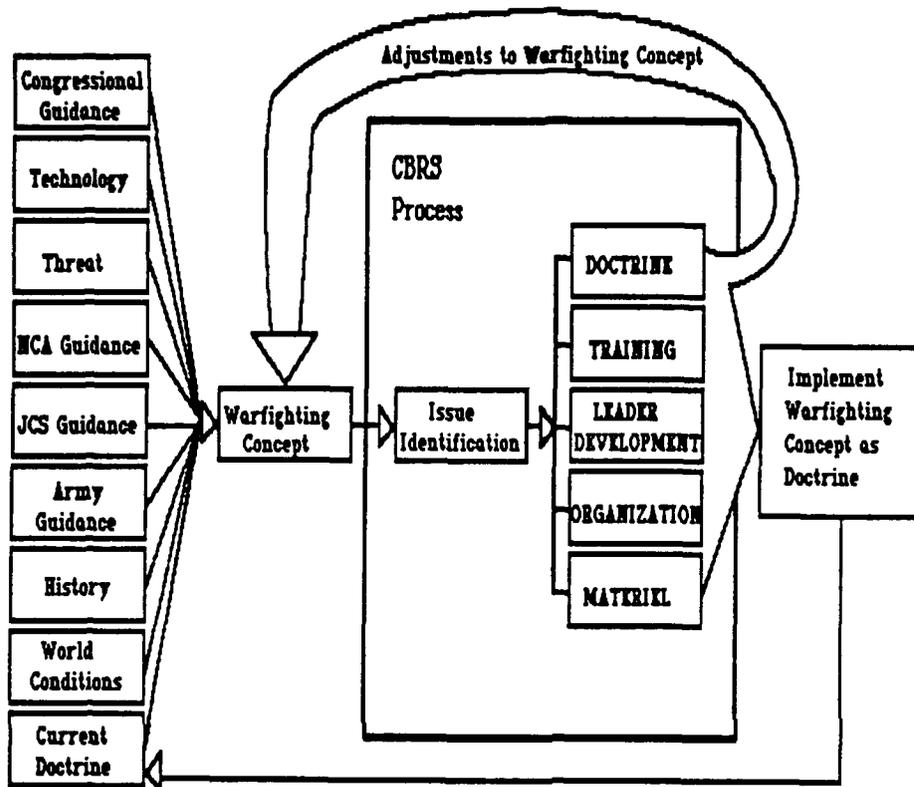
Finally, a robust sustainment capability, based on a push system of logistics, must be present at the brigade and the battalion level. This sustainment capability is required to increase the organization's agility and to reduce the threat of wholesale attrition due to a continuous battle environment and longer than anticipated close combat events.

Regardless of the doctrine and organization we adopt, it is important to keep Howard's admonition in mind

I am tempted to declare dogmatically that whatever doctrine the Armed Forces are working on now, they have got it wrong. I am also tempted to declare that it does not matter that they have got it wrong. What does matter is their capacity to get it right quickly when the moment arrives.⁸⁰

As we move into the next century, we would do well to insure that our force structure possesses the agility to meet an uncertain future.

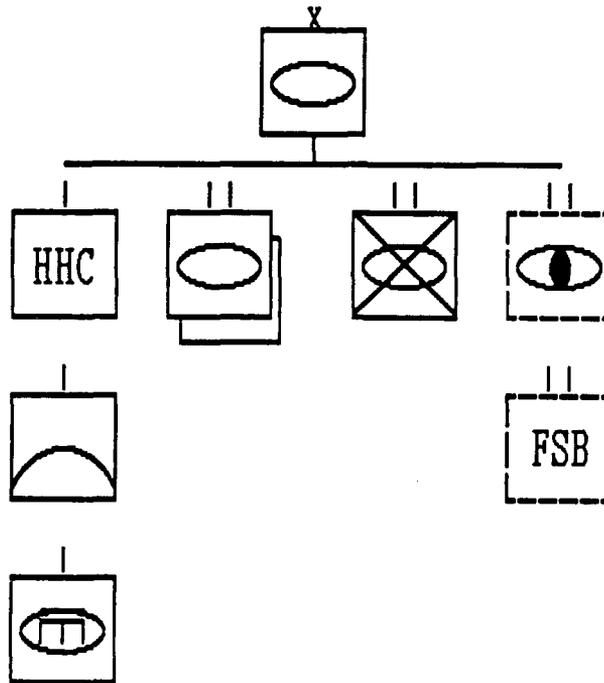
The Concepts-Based Requirements System



Source: School of Advanced Military Studies slide and TRADOC Regulation 11-15.

Figure 1.

The ALB-F Heavy Brigade

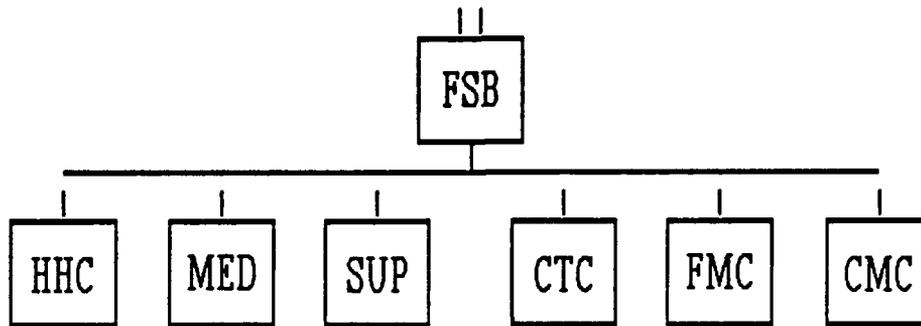


The heavy brigades have been downsized by elimination of the brigade MI company and the downsizing of the maneuver battalions. Mobility is enhanced by retention of the engineer company at brigade level. The artillery battalion and the forward support battalion are not organic to the brigade, but are essentially attached.

Source: USACACDA, Force Development Division, ALB-F proposed organizational structure.

Figure 2.

The ALB-F Forward Support Battalion

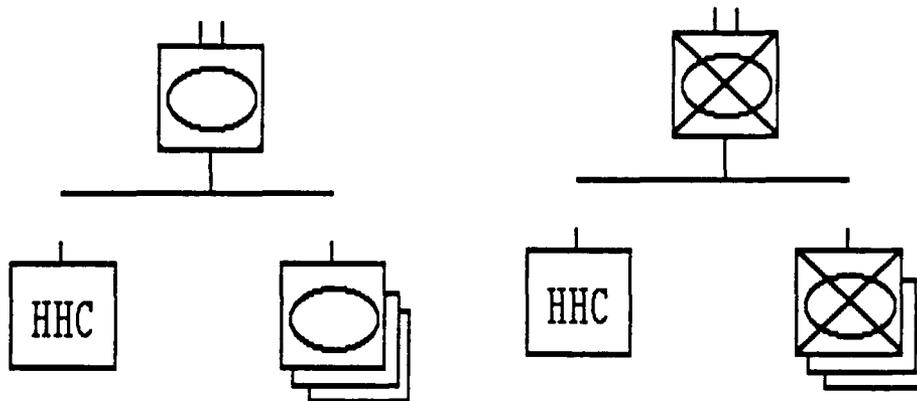


The forward support battalion is organized to include a headquarters platoon, a forward support maintenance company, a combat transportation company, a combat supply company, a medical support company, and a combat maintenance company. Its mission is to provide supply, maintenance, and medical support to the maneuver brigade to which it is assigned. The battalion also provides area support to units in and passing through the brigade area. The battalion headquarters and staff is organized to provide continuous command and coordination for the logistics battle.

Source: USACACDA, Force Development Division, ALB-F proposed organizational structure.

Figure 3.

The ALB-F Heavy Battalion



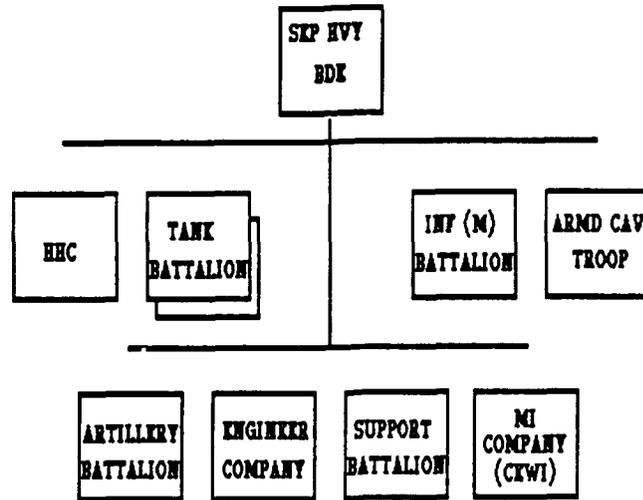
Armor Battalion: In order to enhance agility and simplify command and control, the armor battalion has been reduced to three maneuver companies. A six system AT platoon has been added to the battalion HHC. Mortars and emergency Class III/V have been retained.

Mechanized Infantry Battalion: In order to enhance agility and simplify command and control, the mechanized infantry battalion has been reduced to three maneuver companies. An AT platoon of six systems has been retained in the battalion HHC to in part compensate for the loss of the AT company. The battalion retains 4, 120mm mortars in the HHC along with emergency Class III/V.

Source: USACACDA, Force Development Division, ALB-F proposed organizational structure.

Figure 4.

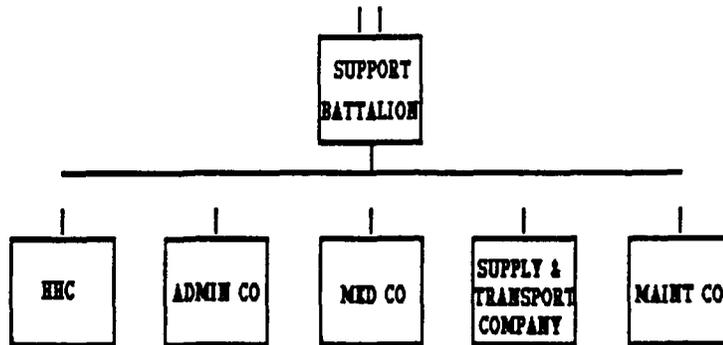
The U.S. Separate Heavy Brigade



Source: FM 101-10-1/1, Staff Officers' Field Manual Organizational, Technical, and Logistical Data, Volume 1.

Figure 5.

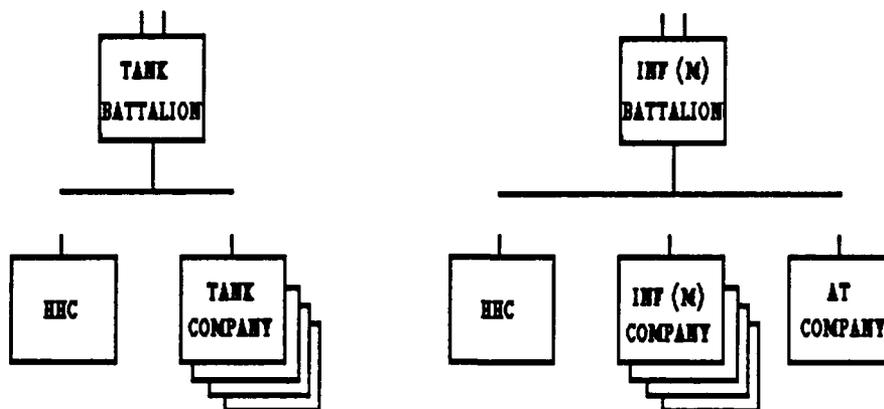
The U.S. Separate Brigade, Support Battalion



Source: FM 101-10-1/1, Staff Officers' Field Manual Organizational, Technical, and Logistical Data, Volume 1.

Figure 6.

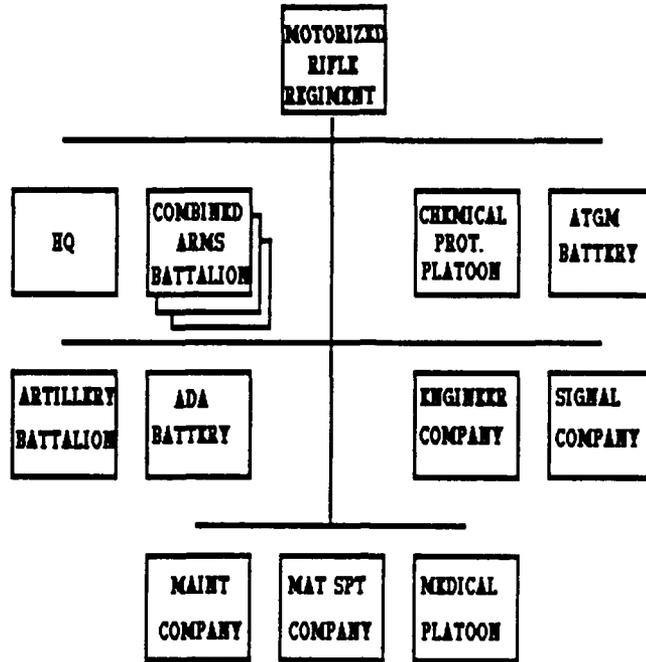
The U.S. Heavy Battalion



Source: FM 101-10-1/1, Staff Officers' Field Manual Organizational, Technical, and Logistical Data, Volume 1.

Figure 7.

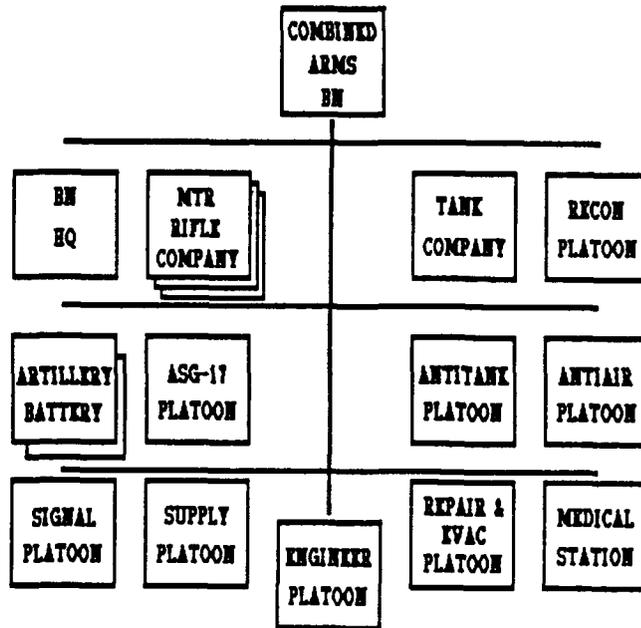
The Soviet Motorized Rifle Regiment



Source: USACGSC, Soviet Tactical Planning Factors, May 1989.

Figure 8.

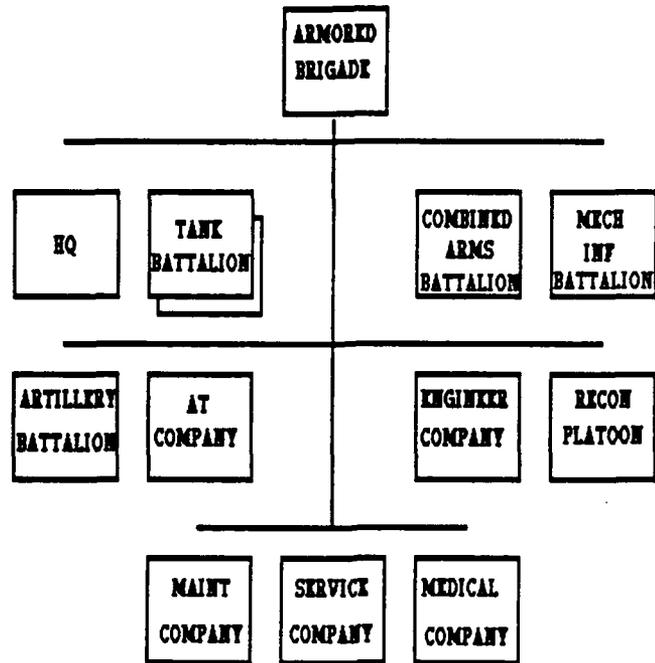
The Soviet Combined Arms Battalion



Source: LTC Lester W. Grau, "Reorganizing for Battalion-Level Combat," Military Review (December 1989).

Figure 9.

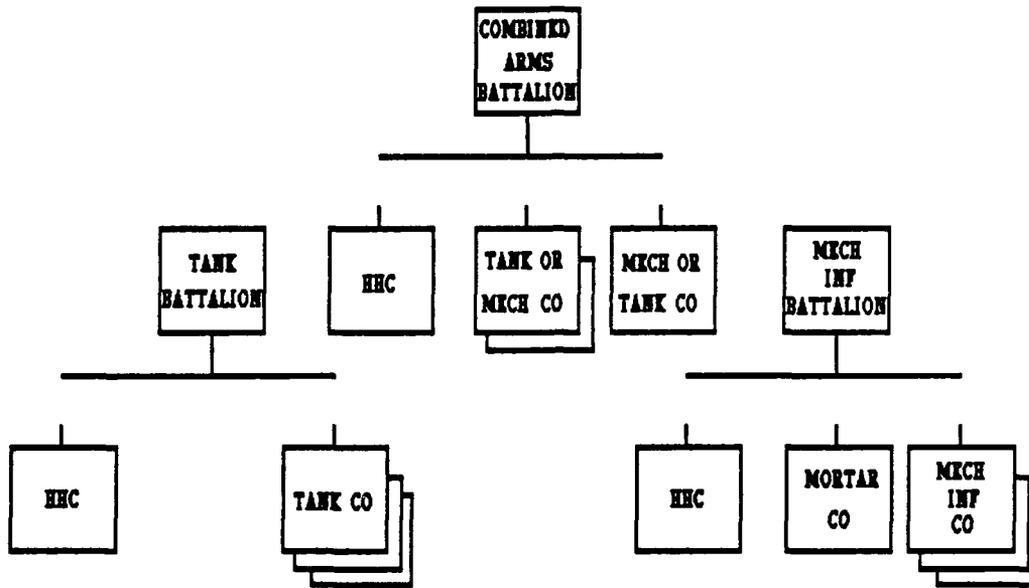
The German Heavy Brigade



Source: David C. Isby and Charles Kamps Jr., Armies of NATO's Central Front, Jane's Publishing Company, 1985.

Figure 10.

The German Heavy Battalion



Source: David C. Isby and Charles Kamps Jr., Armies of NATO's Central Front, Jane's Publishing Company, 1985.

Figure 11.

The Wass de Czege combat Power Model

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

L_f = the friendly leadership effect

F_f = the friendly firepower effect

M_f = the friendly maneuver effect

P_f = the friendly protection effect

D_e = the enemy's degradation of friendly firepower,
maneuver and protection effects

L_e = the enemy leadership effect

F_e = the enemy firepower effect

M_e = the enemy maneuver effect

P_e = the enemy protection effect

D_f = friendly force's degradation of enemy firepower,
maneuver and protection effects

Source: U.S. Army Command and General Staff College,
AMSP Course 2, Tactical Dynamics, Book 1,
"Understanding and Developing Combat Power,"
by COL Huba Wass de Czege, (Ft. Leavenworth,
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Figure 12.

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