MOTORIZED EXPERIENCE of the 9th INFANTRY DIVISION

FORT LEWIS, WASHINGTON
1980 - 1989

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1989

DEPARTMENT OF THE ARMY
HEADQUARTERS, 9th INFANTRY DIVISION (MOTORIZED)
FORT LEWIS, WASHINGTON 98433-6000

REPLY TO ATTENTION OF

AFVO-CS

9 June 1989

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: The Motorized Experience

1. This is a story about innovation, the development of a unique division capable of being rapidly deployed worldwide yet able to fight and sustain itself against armored and mechanized threat forces. It is a story of challenging and changing traditional concepts of force structure design, materiel development, and operations. It depicts the evolution of the 9th Infantry Division from an infantry division to the free world's only motorized division.

2. The focus of this book is the diverse experiences of soldiers and leaders of the 9th Infantry Division (Motorized). The intent is to capture that diversity--the triumphs and the failures, the good and the bad. Moreover, this account details the extensive dividends the motorized experience has given to the Total Army--organizational, tactical, and materiel innovations that have improved readiness.

3. The lessons learned in the Motorized Experience will prove invaluable to others who will undertake similar actions--operational, force development and materiel development--in the future. With luck, it will spark innovative ideas and individual initiative. That is the essence of motorized.

4. Motorized!

JOHN M. SHALIKASHVILI
Major General, USA
Commander

DISTRIBUTION:
Special

MOTORIZED EXPERIENCE
of the
9TH INFANTRY DIVISION

Fort Lewis, WA
1980-1989

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TABLE OF CONTENTS

PHASE I DISTRIBUTION

- GEN VUONO
- GEN RISCASSI
- GEN THURMAN
- GEN WAGNER
- GEN SCHWARZKOPF
- GEN POWELL
- GEN (RET) MEYER
- GEN (RET) WICKHAM
- GEN (RET) CAVAZOS
- GEN (RET) PALASTRA
- LTG WEINSTEIN
- LTG TUTTLE
- LTG FOSS
- LTG WOODMANSEE
- LTG PIHL
- LTG ONO
- LTG ROSS
- LTG WATTS
- LTG HARRISON
- LTG GRAVES
- LTG WISHART
- LTG STINER
- LTG (RET) STONE
- LTG (RET) ELTON
- MG WOODS
- MG PARKER
- MG TAIT
- MG HALLADA
- MG SPIGELMIRE
- MG BOICE
- BG (P) HARRISON
- BG STOFFT
- BG MCCAFFREY
- COL (P) BLACKWELL
- COL NOBLE
- COL (RET) ADAMS
- 9ID COMMANDERS
- 9ID STAFF PRINCIPALS
- MR. HUDDLESTON

PREFACE

In 1981 the Chief of Staff of the Army tasked the 9th Infantry Division to develop a high technology light division that could deploy rapidly and still engage heavy threat forces. Moreover, the division was to be fielded more rapidly than the traditional development cycle would support. To accomplish this demanding task would require new methods to determine and test concepts, doctrine, force structure and equipment. Building the new division required a process that had as its core the 9th Infantry Division working closely with the High Technology Test Bed to find and field quickly the technology needed to "leap ahead" of the normal evolution of combat forces. Thus, was born the motorized experience. During the following eight years, the division evolved from a straight infantry division to a testing center to an interim motorized division. Even today it continues to evolve as a motorized-heavy division. Because of affordability problems, the objective motorized division was never achieved.

This book has two purposes: to provide a historical record of the motorized experience and to provide lessons from that experience. As a historical record, the book is intended to give a framework to those in the future who may need to organize units in a similar manner or with a similar mission. At the same time, the motorized experience has generated specific concepts, tactics, techniques, and procedures that have application to the Army today. Many of the lessons are already part of the Army. This book is based on historical documentation located at Fort Lewis.

The book is organized in three major sections, the evolution of the motorized concept (Part I), the motorized experience (Parts II - V), and conclusions (Part VI). The evolution of the motorized concept details the history of the 9th Infantry Division-High Technology Test Bed (now Army Development and Employment Agency) linkage as a process to execute the Chief of Staff of the Army's mandate to the division. This section provides the context under which the division became motorized in October 1986.

The motorized experience articles contain the diverse perspectives of the brigade and battalion commanders and division staff officers who served during the two years the division was motorized. Their perspectives reflect the portion of the division's evolution they experienced. Many, assigned to the division in the early days, saw the promise of the future in the objective design. Others, focus on the frustrations of the present in the interim design with substitute equipment that fell far-short of the expected capabilities. All have relevant points to consider.

The conclusions present an assessment of successes, shortcomings and lessons learned within the framework of the seven battlefield operating systems. The conclusions also present the context of the evolving O&O and equipment and training programs from which they are derived. This is necessary because the history of the division spans a decade. The usefulness of any conclusions drawn from this ten year period depends greatly upon an appreciation for the environment, both internal and external to the division, for the particular period from which they are deduced.

The opinions expressed in the articles are solely those of the authors and not the Department of Defense or any agency thereof. The articles have been edited for grammar and flow, but individual style and substance remain. No attempt has been made to resolve conflicting opinions about events, outcomes, or decisions. Controversial personal opinions remain to provide a flavor of the experience at Fort Lewis, an experience where diversity and initiative were repaid by innovation and efficiency in envisioning and building a unique combat division.

The book is not intended to be the final chapter of the motorized division. Rather, it should be a catalyst for reflection, discussion, and study as to the merits of the experience and improved readiness from the application of relevant parts.

EXECUTIVE SUMMARY

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EVOLUTION OF MOTORIZED

Birth of the Concept

The Arab oil embargo of the mid-1970s exposed a significant weakness in the U.S. Army's capability to project combat power into the Middle East. The overthrow of the Shah of Iran and accompanying Islamic Revolution, quickly followed by the Soviet invasion of Afghanistan, reemphasized this weakness in 1979. General Edward "Shy" Meyer became Chief of Staff of the Army in June 1979, and, with the concurrence of Secretary of Defense Harold Brown, decided to field an infantry division that was light in terms of deployability, but, through an infusion of high technology, had many of the characteristics of the heavy divisions, especially mobility and significant armor killing firepower. GEN Meyer designated the 9th Infantry Division to become the High Technology Light Division (HTLD), with a tentative fielding date of 1985.

The Conceptual Period of the Motorized Division

There were some very unusual aspects of the HTLD. GEN Meyer gave the division the mission of designing its own structure, using the best technology available. He formed an organization at Fort Lewis to assist in the process, the High Technology Test Bed (HTTB). The initial concept was to form a "Quick Strike Division" consisting of small, agile--but potent--"Quick Kill Vehicles" and "Mobile Protected Guns." A committee, consisting of the division staff, brigade and battalion commanders and operations officers, began developing a "How-to-Fight" concept using the Army's emerging AirLand Battle doctrine as a model. In December 1981, the CSA approved the HTLD's mission: HTLD must rapidly deploy to a contingency area, establish or expand a lodgement and defeat enemy forces ranging from light infantry to tank and motorized forces; or be able to rapidly reinforce NATO. The division now had a mission around which to build itself.

Designing the HTLD

9th Infantry Division and HTTB began to structure the battalions that would make up the HTLD in accordance with the CSA's direction. This action, to take the division out of the normal force structure and materiel development cycle, was not without risk. TRADOC, which was responsible for the HTTB's budget, wanted to eliminate evaluations of concepts/systems which had previously been conducted as a means of saving money. The 9ID/HTTB personnel wanted the freedom to try any idea which might better equip the HTLD. The TRADOC commander gave guidance to minimize formal testing, which was expensive, time consuming and bureaucratic, and use either the results of previous testing or innovative testing--which could use qualitative judgement rather than hard data to arrive at conclusions. The TRADOC and DARCOM communities were pushing to modernize all divisions in the Army; the 9ID/HTTB was trying to develop the best possible HTLD in accordance with their charter from the CSA. Lines of responsibility were confusing, and interests were sometimes in competition, with each of the various organizations trying to accomplish the mission in the most professional way possible, but each with a different perspective.

In April 1982, the CSA approved an organization of five assault gun battalions, two light motorized infantry battalions, and two light attack battalions for the HTLD. He also approved the Organizational and Operational (O&O) Concept, the reorganization of CSS battalions into forward support battalions and the organization of the cavalry brigade (air attack) with a cavalry squadron, two attack helicopter battalions, and a combat support aviation battalion. Finally, he approved the lease of surrogate equipment for one test brigade, so that testing of the design could quickly get underway.

Implementing the Design for the HTLD

Even with strong guidance from General Meyer, the HTLD struggled to move forward. Personnel and equipment could not be requisitioned without Tables of Organization and Equipment (TO&Es), but there were no TO&Es for the HTLD. The schools and centers "crashed" to develop Modified Tables of Organization and Equipment (MTOE) which would allow the division to requisition. A similar lack existed for Army Training Evaluation Plans (ARTEPs) and How-to-Fight manuals.

In late 1982 and early 1983, the initial test brigade began to take shape, consisting of one assault gun battalion, one light motorized infantry battalion, and one light attack battalion. What kind of testing needed to be done? How much had to be fully instrumented? Could the National Training Center serve as part of the design process? All of these questions were asked, answered, re-asked and re-answered. In the meantime squads, platoons, and companies began to train using the new Organizational and Operational Concept. The division planned its first major field exercise, LASER MACE, a force-on-force scenario that concurrently tested eight pieces of the HTLD.

The results of FTX LASER MACE, not surprisingly, were mixed. Some parts of the O&O did not work well, either because of a lack of training or a need for additional equipment. On the whole, however, the FTX was a tremendous training opportunity that helped newly formed units to pull together as a team. In his last briefing on the HTLD as CSA, GEN Meyer approved the final goal for the HTLD as 16,000 soldiers transported in 1000 C141 sorties (a goal to be reached by 1990). The activation date for the division was slipped to 1986 because of delays in equipment delivery times.

The Road to Evaluation

When the new CSA, General John A. Wickham, Jr., visited the HTLD in September 1983, the new division commander recommended some proposed changes to the HTLD. The CSA approved the proposals for further down-sizing the division to 13,000 soldiers and for forming combined arms battalions (CABs) that were organized with assault gun companies and light motorized infantry companies in the same battalion, so that they would live and train as they would fight, as combined arms. During this same general time period, the new CSA added one more significant factor to the Army equation when he decided to form and test a new 10,000 soldier Light Infantry Division. Priority within the Army moved from GEN Meyer's HTLD to GEN Wickham's Light Infantry Division. The Light Infantry Division was developed based on the lessons learned from the 9th Infantry Division experience as the HTLD.

Equipment challenges during this period were especially significant. The lack of an Assault Gun System (AGS) was a critical problem. New High Mobility Multipurpose Wheeled Vehicles (HMMWVs) were not scheduled to arrive in time for sufficient train-up prior to the scheduled division certification exercise. Various surrogate systems were substituted to allow the division to continue to train in order to gain an accurate appraisal of the capabilities of the HTLD. In September 1983, the division's logistics structure was thoroughly tested on FTX CABER TOSS. The forward support battalion concept proved it could support the motorized O&O and gained the Army Logistic Center's enthusiastic support.

During this period the division was redesignated the High Technology Motorized Division--to distinguish it from the Light Infantry Division also being built at the time. The HTTB was also redesignated as the Army Development and Employment Agency (ADEA), a field operating agency of ODCSOPS, HQDA.

Evaluation and Certification

TRADOC conducted a full field evaluation of the division during FTX LASER STRIKE, the division certification exercise in August 1984. In addition, the largest medical exercise conducted since World War II--executed just prior to LASER STRIKE--had a great impact for field medical doctrine development for the total Army. Because of equipment delays (or, as in the armored gun system, a lack of equipment), the combat units of the HTMD were all equipped with surrogates for LASER STRIKE: surrogate Fast Attack Vehicles; Improved TOW Vehicles (ITVs) for the armored gun system; and M882 Dodge pickup trucks, modified, for HMMWV squad carriers. Despite these limitations, the exercise certified the division's O&O and indicated some significant strengths in the new division: superior real-time intelligence created opportunities for the test brigade to concentrate decisive combat power at the critical time and place; the mobility and agility of the motorized force allowed it to by-pass the OPFOR's terrain-oriented defenses and successfully concentrate forces to gain tactical success, even though attacking with an overall combat power ratio of only 1:1. The FTX also showed that motorized forces which lost the ability to maneuver and were forced to operate against a prepared enemy force were destroyed. Overall, the division showed that more efficient and mobile forces equipped with state-of-the-art equipment could achieve decisive results.

In December 1984, GEN Wickham approved the final design of the motorized division. The final report to the CSA gave high marks to the division's combined arms battalions, its integration of long range firepower, its superior maneuverability, its sustainability, and its command, control, communications and intelligence capabilities. The report pronounced the design of the objective division to be capable of accomplishing the missions GEN Meyer had given it.

Refining the Motorized Division

The motorized division now had an opportunity to hone its skills in Joint Readiness Exercise BORDER STAR 85. Conducted at Fort Bliss against the 3d Armored Cavalry Regiment, BORDER STAR gave the test brigade, 3d Brigade, the opportunity to use all of its high technology systems. Fighting a much heavier armored force, the motorized units used speed, agility and reduced visibility operations to offset the strengths of the opposing force. The motorized brigade showed it could fight on equal terms with a reinforced armor brigade. The new organizational concept, built on the tenets of AirLand Battle doctrine, had been thoroughly challenged. Yet even with surrogate equipment, the motorized force held its own against a highly trained armor force. The high technology systems used during BORDER STAR--Position Location Reporting System (PLRS), Maneuver Control System, extensive night vision devices, a surrogate RPV with direct down-link into the brigade TOC, and agile, fast hard-to-hit vehicles--paid great dividends.

A Combat Ready Motorized Division

While the 9th Infantry Division changed command in the early summer of 1985, TRADOC was conducting a major computer-assisted war gaming exercise to determine what weapons systems should be used in the motorized division until an Armored Gun System could be approved by the Under Secretary of the Army, developed and fielded. After three months of gaming and study, TRADOC recommended the TOW-equipped HMMWV for the interim division design. In September, the CSA approved the decision. In addition to the delays in the AGS, the motorized division received another blow when Congress refused to appropriate funds for a Light Forces Vehicle to replace the surrogate Fast Attack Vehicle. The remainder of the division completed its transition to the motorized configuration by drawing HMMWVs during the fall of 1986. On 1 October 1986, the 9ID became fully operational as a motorized division. A critical point here, however, is that it was an interim motorized division. There was no Armored Gun System and no Fast Attack Vehicle. The PLRS had been pulled out of the division, as had the surrogate RPV. Ground-launched HELLFIRE, successfully fired at BORDER STAR, was terminated, while the SEEs so critical to the engineer effort were transferred to the 7ID (L) at Fort Ord. The 9th Infantry Division was fully operational, but it was an interim division with the task of training to fight with interim systems, without using surrogates which "magically" had the qualities of the various objective systems for which the division so anxiously awaited. The good news was that the AGS had finally received approval from the Under Secretary of the Army, and actions to develop and procure the new system could begin.

A new division commander changed the emphasis to training in 1987. The motorized division had to learn to fight with what it had. Despite funding constraints, the motorized division was able to train extensively because of the relative low cost of training in a HMMWV-mounted force, as opposed to the high dollar mech and armored training costs. In April-May 1988, a motorized brigade completed a full rotation through the National Training Center, the Army's ultimate training ground. The NTC was a tough experience, but the evaluated brigade was able to demonstrate some significant advantages in firepower and mobility against the highly-skilled OPFOR Regiment.

Downsizing and Debate over Motorized

Just before the 9ID sent its first brigade rotation to the NTC, the Army announced its decision to inactivate one brigade of the 9ID in response to severe budget and manpower cuts. The 2d Brigade Combat Team--three CABs, one artillery battalion, and a forward support battalion--turned in their equipment and moved their personnel to other units. The 81st Separate Infantry Brigade (Washington National Guard), with two tank and two mechanized infantry battalions, became roundout to the division. An additional blow came when the Army Staff announced a decision to cease the development process for an Armored Gun System. Funds which earlier had been available for developing the AGS were now tightly constricted. The entire concept of a highly deployable anti-armor division was again up for debate.

THE MOTORIZED EXPERIENCE

Articles by battalion and brigade commanders and division staff principals serving in the summer of 1988 are the <u>heart</u> of the Motorized Experience. Most had been in the division since the interim design became operational in 1986; some had been with the division for as long as five years. They provide a rich and varied perspective based on their background and the phases of the motorized evolution they experienced.

Among the thirty-five authors, there is no unanimity of opinion on the final conclusions from motorized. The glass is half-full to those who see the promise of the future for a lethal, deployable middleweight division; it is half-empty to those who see a failure to recognize technical and fiscal realities.

Some consensus emerges in the articles, however, on the successes: a comprehensive TOW gunnery program that is the model for the Army, rapid testing and integration of non-developmental equipment well before the traditional development cycle could deliver, an innovative environment that tapped the ingenuity of the American soldier, and a demonstration that the vision for the middleweight division could quickly become reality. There is also a consensus on the shortcomings as well: the lack of a kinetic kill system so essential for success, too few infantrymen for staying power, and a disconnect in the tactical mobility of combat and combat support systems.

Having missed the moment when the required systems, such as the Armored Gun System, could have been procured during the nation's defense buildup of the early 1980s, the division settled on the TOW II system as its cornerstone in the interim. Massing the TOW II in a single division would have made sense in the mid-1970s in the aftermath of the 1973 Arab-Israeli War when the system was new, but by the mid-1980s its battlefield utility was on the decline. The authors recognize that fact. Their diversity of opinion on other issues, come contentious, is retained to be the catalyst to discussions by others as to the merits and pitfalls of motorized.

CONCLUSIONS

The conclusions are presented using the frame work of the seven battlefield operating systems. Many of the concepts and items of equipment may seen routine now to the modern-day reader. They were not so common in 1981 when the history of motorized began. In fact, one affirmation of the value of the motorized experiment is the very proliferation of these pioneer efforts throughout the Army.

Intelligence

Timely, accurate intelligence was the heart of the motorized concept. The passive intelligence collection systems, such as the UAS 11 and the LREO, worked well. Many are now being adopted Army-wide. Deception contributed to the success of maneuver operations and the survivability of the division. It worked best when under division rather than brigade control. The operational support detachment, a 19 man cell under the control of the G2, was instrumental in the effectiveness of deception operations. It is now being fielded in divisions throughout the Army and a slightly larger cell will go to all Army corps.

Maneuver

The division's combined arms training programs successfully produced battlefield synchronization. Innovative work was done on developing the engagement area as a tool to synchronize obstacles with direct and indirect fires. Leader training is always critical, but even more so with motorized because motorized operations were not taught in the Army school system and did not have supporting field manuals. Leader training had to inculcate a common approach to doctrine and junior leader initiative. Centralized management of TOW gunnery worked well. The program has been subsequently distributed Army-wide.

Motorized forces proved highly survivable. It was essential that they never became fixed. On the whole, they successfully achieved this. In fact, they generally experienced lower kill rates from artillery than heavy forces in all measured tests conducted. Attack helicopters survived better and killed more tanks when massed and used as a maneuver rather than support arm. The success of deep operations was restricted by poor survivability of the utility helicopters. In part this may stem from the difficulty in replicating the effects of SEAD in a training environment.

The LAB worked well for advance guard and deep attack missions. The light focus of its organizational design to execute these missions limited its ability to execute other traditional but necessary combat missions. In turn, this reduced the flexibility of the brigade combat teams. The CAB lacked the infantry to perform key tasks such as holding ground, attacking prepared positions and clearing obstacles. Cutting the PGATM platoon and the second attack helicopter battalion from the interim design division sharply blunted the division's ability to extend the fight to the full battlefield depth. The TOW HMMWV was an inadequate substitute for the armored gun system. It greatly limited the offensive capability of the division against a well-trained and equipped armored threat.

Fire Support

FOLTs were the key to the success of artillery in destroying armor and other high value targets. They had to be centrally trained and centrally controlled to reach their greatest effectiveness. The towed 155mm howitzers could not keep up with motorized combat units, particularly in cross country movement. Close integration of maneuver and fire support is always key. Because of the poor mobility of the M198, this became critical for motorized. Two DivArty programs improved combat capability: a movement matrix closely tying the repositioning of artillery to the maneuver scheme and collocating the DS artillery battalion TOC with its supported maneuver brigade to facilitate concurrent planning and real-time information sharing. Even with these improvements fire support with the M198 was always problematic. A self-propelled howitzer is essential to the effective execution of motorized operations.

Air Defense

The Pedestal-Mounted Stinger was a good short-range air defense missile system that is now being fielded Army-wide. The Vulcan Wheeled Carrier, as a surrogate short-range air defense gun, demonstrated the capabilities for a light, self-propelled system able to maintain the tempo of motorized operations. The towed Vulcan was unable to keep pace with motorized units.

Engineer

Engineer support was vital to effective motorized operations. Engineers contributed greatly to the division's successful NTC rotations in 1988 and 1989. GEMSS and SEE were the only items of equipment fielded that approached objective design capability; both worked very well. An assessment of the full mobility and survivability of the division is not possible because of this shortfall in fielding engineer objective design equipment.

Combat Service Support

The division was the pathfinder for the Army on innovative ways to support. Many systems and organizations tested by the division are now being fielded Army-wide--forward support battalion, aviation support battalion, palletized loading system and high mobility materiel handling equipment as examples. The night LOGPAK system of maneuver unit resupply was highly successful. It helped reduce signature, increase security and minimize the logistics planning workload for supported units. The division was troubled by insufficiently robust personnel strength. To meet imposed strength ceilings, crew strength was reduced for all combat systems crew. Because of the inability to sustain the force, the loss of one or two soldiers could deadline a weapon system.

Command and Control

MCS showed great promise as the keystone for a prototype division command and control system. Future generations must be improved to extend its capability and make it easier to operate. PLRS was a complete success and should be fielded now.

ASSESSMENT

The 9th Infantry Division undertook a unique challenge in 1980--to design, test and field the organizations, equipment and tactics, techniques, and procedures for the division of the future. The division developed from the tenets of AirLand Battle doctrine. Along the way, those who guided and executed the process created an environment focused on soldier innovation and initiative. The division proved that a middleweight division offered great combat capability at a minimum cost. The motorized soldiers proved the vision was correct, but fiscal reality precluded full realization.

PART I

EVOLUTION OF THE MOTORIZED CONCEPT

EVOLUTION OF THE MOTORIZED DIVISION

BIRTH OF THE CONCEPT

New ideas in military organizations are normally a part of evolutionary change within a conservative system. At times, such new ideas are a combination of evolutionary and revolutionary concepts, such as the Army's airmobile division of the early 1960s. However, the US Army's force structure changes have traditionally been evolutionary (today's H-series and J-series divisions, for example) or a direct response to a specific requirement (such as the pentomic division of the 1950s designed to operate on the nuclear battlefield).

In the late 1970s, the US Army began to develop the next generation of combat divisions, a program called Division 86, that were to be fielded in the mid-1980s and prepared to fight into the 21st century. Part of this effort was Infantry Division 86 (ID86), the U.S. Army Combined Arms Center's (CAC) plan for organizing the infantry division that was to be fielded in 1986. Begun in 1978, it was one of CAC's top priorities.

In 1979 the Army Staff directed the 9th Infantry Division at Fort Lewis, Washington, to transition from an H-series infantry division to a mechanized infantry division, capable of reinforcing the two forward deployed corps in Germany. In the post-Vietnam era, the Army had once again shifted its priorities to deterrence of possible Soviet aggression in Europe.

Events in the world collaborated to link ID86 and the 9th Infantry Division's conversion to a mechanized division. The Arab oil embargo of the mid-1970s exposed a significant weakness in the United States' ability to project power into the Middle East, an area of great sensitivity. In 1979 the overthrow of the Shah of Iran and the Islamic Revolution reemphasized the inability of the Army to project its land power. Airborne and infantry divisions could be rapidly deployed into critical areas, but they had neither the mobility nor firepower to defeat an enemy force strong in armor and mechanized infantry. U.S. armor and mechanized divisions had both mobility and firepower, but required an extended amount of time to be deployed by ship to the trouble spots of the world. The Army needed to develop a force that was readily deployable, but still capable of fighting Soviet-equipped surrogate armies in the Middle East or Southwest Asia.

In June 1979, General Edward "Shy" Meyer became Chief of Staff of the Army. With an extensive background of command and staff positions in Europe, he felt there was a need for additional infantry in order to have a more balanced force structure between straight infantry and mechanized infantry divisions, especially because it appeared neither the Navy nor Air Force would fund the sea or airlift to move heavy forces to contingency areas such as the Middle East. Faced with the problem of projecting land combat power to support the "Carter Doctrine" toward Southwest Asia, GEN Meyer devised an alternative to the problem.

While defending the 1980 Army Program to Secretary of Defense Harold Brown, GEN Meyer proposed that the 9th Infantry Division remain light infantry for deployability purposes, but assume many of the characteristics of the heavy division through an infusion of high or emerging technology. Brown agreed. The result was a new type of organization to be called the High Technology Light Division (HTLD). The force design personnel at CAC were given the requirement to design a division of 14,000 personnel, compatible with USAF C141 aircraft, and equipped with innovative weapons and equipment. By January 1980, an initial design was completed, but was too large at 18,000 personnel. GEN Meyer told CAC to redesign the division to make it smaller.

In May 1980, the Army Science Board started a study of the 9ID to see if technology was available to increase capabilities of the infantry division to meet the goals stated by GEN Meyer. In a related event, Major General Howard Stone, the 9ID commander, was directed to form a High Technology Test Bed (HTTB) at Fort Lewis in June 1980. The HTTB was intended to help find ways to shorten the traditional development cycle that had so frustrated GEN Meyer (and many others in the Army leadership) throughout his career. By adopting ideas directly from industry and placing the user in the development cycle, GEN Meyer hoped to break out of the terribly slow development process that the Army used. The concept caused some significant misgivings within the development community. The Army leadership also decided to link the 9ID with HTTB as the test unit which would develop this new type of lighter infantry division the Army needed. The Army Science Board supported this effort. In a meeting on 19 June 1980 attended by GEN Meyer, GEN Vessey (VCSA), LTG Otis (DCSOPS), LTG Keith (DCSRDA), GEN Shoemaker (FORSCOM), GEN Starry (TRADOC), and GEN Guthrie (DARCOM), the stated goal was to optimize the 9th Infantry Division to fight worldwide, with the approved results then applied to other divisions.

The 9ID, organized as an H series infantry division (see app C, fig 1), slowly reacted to the new challenge, initially planning to use one or two battalions to test items and concepts on an exception basis, while the remainder of the division maintained its combat readiness under its old structure. In June 1980, HQDA directed the division to establish and test an Air Cavalry Attack Brigade, a standard ID86 design. Some time later this test expanded into an organization unique to the emerging HTLD, the Cavalry Brigade (Air Attack). This innovative unit had two attack helicopter battalions, a cavalry squadron, and a combat support aviation battalion (lift battalion). The 9ID G6 (Force Modernization) office formed a cell of personnel to work test issues. They eventually moved to North Fort Lewis as the nucleus of the new High Technology Test Bed, which HQDA approved in March 1981. By May 1981, HTTB initiatives were already being tested in the 9ID's major training area at Yakima Firing Center, an area that looked a great deal like the terrain in Southwest Asia.

While TRADOC and CAC were still looking at 9ID as a test of ID86 in late July 1981, the Chief of Staff of the Army (CSA) and DA Staff were looking at fielding an improved light division, one that would permanently transition into a new configuration, not just for the duration of the test. The CSA directed HTTB to place more emphasis on force structure and concepts, not just equipment testing. The process GEN Meyer wanted HTTB to follow in designing the HTLD was to use a concept-based approach which envisioned the development of the Organizational and Operational (O&O) concept as the first step in the process. Equipment could then be developed which supported the O&O, either from equipment already in the Army system or through an abbreviated developmental cycle using close interface with industry to make use of off-the-shelf technology. This was not the traditional model of the Army developmental community, which focused on developing specific pieces of equipment and testing that equipment in a very structured fashion--with the results often being that technology drove the employment concepts, instead of the reverse. The HTLD's plan for "testing" surrogate equipment to validate the O&O concept caused great confusion and consternation on the part of some test evaluators. Because the surrogate equipment could not replicate the capabilities of the actual equipment envisioned by the HTTB/HTLD concept designers, the results of those tests sent a negative message to many officials of the Army's test community, who saw only the hard data of the tests conducted, not how valid the overall concept was. This problem was never really solved and was a "hidden agenda" in the results of much of the testing of the HTLD O&O. At this juncture there appeared to be a split--at least to some on the DA Staff and in the 9ID--between HTLD and ID86. The ID86 structure could not accomplish what the CSA wanted the HTLD to do. On 30 July 1981, GEN Meyer set the time for fielding the new division as FY 1985. By FY 1985, 9ID would field an interim division of 16,000 soldiers, capable of flying to combat in 1000 C141B sorties. The CSA recognized that this would not be the objective division, which would be fielded in the late 1980s or early 90s with new, more advanced equipment.

THE CONCEPTUAL PERIOD OF THE MOTORIZED DIVISION

When MG Robert Elton took command of the 9th Infantry Division on 11 August 1981, the HTLD was little more than a repository for good ideas. There was no mission, no O&O concept. At some action officer levels on the DA, FORSCOM, and DARCOM staffs, the attitude toward the 9ID effort to field a new type of force was patronizing; they were waiting for the storm of activity to blow over to once again do "business as usual." In the meantime, the HTTB began its design process to develop a contingency division that could fight Soviet equipped forces but contained no equipment that would require a C5A to fly into the forward deployed area.

The initial concept was for a "Quick Strike Division" whose mission was to attack deep into enemy lines. The key weapons systems envisioned were the "Quick Kill Vehicle", later to be called the Fast Attack Vehicle or FAV, and the Mobile Protected Gun, later called the Assault Gun System or AGS. The Quick Kill vehicle was to be small and fast, but potent. The Mobile Protected Gun was to give light armor protection to a mobile, quick-firing kinetic gun, or possibly missile, capable of defeating enemy armor. A committee consisting of the division staff, brigade and battalion commanders and operations officers began to develop a "How to Fight" project, which was closely interwoven with the Army's emerging AirLand Battle doctrine and oriented on Southwest Asia.

In October 1981 MG Elton decided to procure a piece of equipment that became synonymous with the HTLD, the dune buggy Fast Attack Vehicle. This particular model dune buggy, manufactured by the Chenoweth Corporation, was initially procured by the Navy and used at the Navy's ordnance testing site in California. The Navy was having difficulties because the Chenoweth was too quick and too hard to hit, even under ideal test conditions. Somehow this information got to HTTB, which borrowed eight vehicles from the Navy for initial testing. After testing the original eight borrowed vehicles, MG Elton decided to lease an additional 80, then another 40, for a total of 120 vehicles. They were then "ruggedized" at Fort Lewis facilities and used until late 1986. It is interesting to note that one of the great questions about the Chenoweth FAV, at least outside of Fort Lewis, was its survivability. Yet the reason the vehicle was initially procured was because the Naval Ordnance Bureau could not kill it!

MG Elton briefed the CSA on the "Strike Division," as the initial design was called, on 13 November 1981. The organization called for two maneuver brigades, a fire support brigade, an air attack brigade, a combat support brigade, and a division support command, plus division troops (see app C, fig. 2). This was a rough first cut, calling for a division of less than 15,000 total troops. It had some unusual aspects, for example, an airborne infantry battalion, a heavy mortar battalion, forward support battalions instead of specialized CSS battalions, and no separate engineer battalion. It was a start, however, and the next iterations of the design modified and corrected inconsistencies in the first "straw man" division structure.

The HTLD still had neither a mission statement nor an Organizational and Operational concept. This was partially overcome on 13 November 1981 in an IPR for the CSA. At that time GEN Meyer approved the HTLD's mission: HTLD must rapidly deploy to a contingency area, establish or expand a lodgement and defeat enemy forces ranging from light infantry to tank and motorized forces; or be able to rapidly reinforce NATO. The phrase concerning reinforcing NATO was an addition to the original mission statement because of the perception the Army could not afford, both from a dollar and a force structure standpoint, a single purpose division. At this IPR, GEN Meyer also approved the proposal to form a Quick Kill Battalion and the divisional recon unit.

As November moved into December, the division proposed another organizational structure: the Strike Battalion. The unit was to consist of motorized infantry riding in light wheeled vehicles. The HTLD's basic organizations were being fleshed out into a design.

DESIGNING THE HTLD

In January 1982, force design for the HTLD began in earnest. 9ID and HTTB acted together to form work groups to design completely the new battalions that would make up the HTLD. Existing battalions were identified to convert to the various types of HTLD battalions, and the commander and operations officer became part of the work group. The pace was increasing significantly as the work groups developed their own structure.

Not everyone in the Army agreed with this method of independent development. During this period, CAC was responsible for the HTTB budget and tried to eliminate evaluations of concepts/systems that had previously been conducted. The 9ID/HTTB personnel, on the other hand, wanted to try any idea that might better equip the HTLD. The TRADOC community was trying to modernize all infantry divisions in the force as part of ID86; the 9ID/HTTB was trying to develop the best possible HTLD in accordance with their charter. The interests were competing, with personnel in each organization trying to do the job the most professional way possible.

MG Elton took key staff and commanders to an off-site conference on the shore of Hood Canal, WA, in March of 1982 to make some critical decisions concerning HTLD. At the Alderbrook Conference, the Quick Kill Battalion became the Fast Attack (later Light Attack) Battalion. The Strike Battalion was combined with a new motorized infantry battalion and called the Light Motorized Infantry Battalion (LMIB). The Mobile Protected Gun Battalion became the Assault Gun Battalion (AGB). The HTLD was organized with five LMIBs,two LABs, and two AGBs. Division strength was scrubbed down to 15,977 personnel and 1347 C141 sorties (see app C, fig. 3). MG Elton decided to make the 3d Brigade responsible for fielding and testing the HTLD concepts. He also directed that a provisional 3d Forward Support Battalion (FSB) be activated to support 3d Brigade. Before the conference ended, the O&O Concept was briefed, debated, modified, and agreed upon. The HTLD was in business.

The division built the O&O around nine basic tenets derived from the new AirLand Battle doctrine which had been developed at Fort Leavenworth but not yet published as the new FM 100-5, Operations. The tenets were: (1) expand to fight to limit of area of influence; (2) contain enemy strength; (3) attack high value targets from flank/rear/air; (4) organize to fight in rear areas (enemy and friendly); (5) deceive the enemy to gain surprise; (6) organize responsive support elements; (7)

complement heavy forces; (8) exploit superior Command, Control, Communications, and Intelligence (C3I); and (9) synchronize all Army and Air Force assets throughout the battle area.

The first tenet of the O&O described a major aspect of the extended battlefield concept inherent in AirLand Battle: hit the enemy at the longest possible range, force his early deployment to delay or disrupt his follow-on echelons' ability to influence the close battle and, therefore, degrade his effectiveness. For the second tenet, the HTLD had to contain the enemy, using the minimum combat force combined with obstacles to reinforce terrain, avoiding position defense because mobility was key to survivability when fighting against mechanized or armored forces. The third tenet was to attack high value targets located behind forward forces. Improved command control, communications, and intelligence permitted real time identification and attack of enemy critical command and control nodes, ammunition and logistics storage, and refueling points. Enemy forward lines were penetrated through ground infiltration, helicopter insertion, or stay behind forces. Much of the 9th Infantry Division's fighting would occur during night and adverse weather.

The fourth tenet of the O&O helped make the HTLD a unique organization. The HTLD was structured to support deep attacks into the enemy's rear area, disrupt and confuse enemy operations, and force the enemy to fight in more than one direction. The division was also organized to fight the rear battle in the friendly rear area. The distributed command, control, communications and intelligence system allowed the DISCOM to keep fully informed of battle situations and control lower level rear combat threats. Additionally, the division structure included highly mobile combat and support forces able to react quickly to rear area threats.

Tenet five, tactical deception, was implicit in the way the division fought, containing the enemy main strength and attacking vulnerable, high value targets from unexpected locations. It was a key element in the division's O&O. The division planned and executed deception as part of its tactical scheme. Operational security efforts added to the deception plan.

The division's tactics supported the sixth tenet by using combined arms throughout an extended battlefield that allowed mobility and agility. Therefore, support units had to be capable of providing responsive combat support and combat service support for wide-ranging brigade or division operations.

With its tactical mobility and firepower, the HTLD was a valuable complement to heavy forces, the seventh tenet. On offense, the division's capabilities suited it to economy of force or security roles or as a pursuit or exploitation force for a corps offensive. On defense, security, RACO, or economy of force were appropriate roles which complemented heavy forces. Exercises verified the interoperability of objective design motorized forces with heavy forces, including those equipped with Abrams tanks and Bradley fighting vehicles.

The eighth tenet was accomplished through the distributed command, control, communications and intelligence system, which was used throughout the division in order to make more rapid and accurate assessments and render quick, correct decisions in order to turn inside the enemy's decision cycle. This superior C3I system allowed the division to then synchronize all Army and Air Force combat, combat support, and combat service support assets--tenet nine--throughout the entire depth of the battle area. This synchronization of combat power allowed the HTLD to defeat enemy armored forces.

Having approved this O&O Concept, MG Elton embarked on a series of briefings to the Army leadership. On 7 April he briefed LTG Stone, CAC commander and previous 9ID commander, on the design parameters and the O&O Concept. Because of a bureaucratic error, the message from CAC announcing the briefing gave the other TRADOC schools and centers only one day to react, so they did not attend this base-level briefing. LTG Stone concurred on the five LMIB - two LAB - two AGB organization and gave guidance to design the HTLD for an end strength of 15,000 personnel and 1000 sorties.

On 14 April MG Elton briefed GEN Otis, the TRADOC commander. GEN Otis concurred with the O&O and with the plan to use one test brigade. He also gave specific guidance to keep formal testing (which was expensive, time consuming, and bureaucratic) to an absolute minimum. The HTLD was to maximize the use of previous test results and use innovative testing which could result in qualitative judgement. That guidance was significant.

The briefing for the CSA was on 29 April 1982. These periodic IPRs for the CSA were extremely important, because many action officers in both the force and equipment development structure became active participants only because of the CSA's personal involvement. At this IPR, GEN Meyer approved the O&O Concept, the reorganization of a test brigade, the organization of a deception detachment, the reorganization of the CSS battalions into Forward Support Battalions (to include a separate aviation support battalion for the CBAA), the lease of surrogate equipment to allow testing of the design to begin, and the infusion of additional funds to support the entire activity. The CSA's decision at this IPR emphasized to all the priorities given to the HTLD and caused the Army Staff and Major Commands to begin to implement the decisions. DA DCSOPS-FD opened a special office with the sole mission of handling HTLD issues.

Even while these decisions were being made, the soldiers of the 9ID were starting to put concepts and designs into practice. In FTXs at Yakima Firing Center in April (Golden Bow) and May (Golden Blade), parts of the new division underwent initial testing. Concepts tested included: tactical employment of the fast attack vehicle; infantry maneuver; anti-armor testing; air defense battery testing; and the dispersed command post. Units that accomplished initial shake-out were the CBAA, the MI battalion, the MP company, and the Forward Support Battalion. Equipment tested included the Position Location Reporting System (PLRS), the Long Range Electro Optics device (LREO), the 120mm heavy mortar, NBC equipment, and new command post equipment.

During the summer of 1982, the CSA tasked TRADOC to evaluate the HTLD and brief him on their findings. Since the HTLD did not fit any standard TRADOC models, the proponent schools were told to break out of their mold and do the best job they could in evaluating the HTLD. The CAC commander, LTG Stone, specifically asked the TRADOC schools to evaluate with the goal of suggesting modifications to make the structure better, rather than resisting this new way of doing business. The HTLD was to be evaluated in four scenarios: Middle East, NATO, jungle, and urban. The CSA's intent appeared to be to get everyone working together on this project in order to make it the best possible design in the shortest possible time.

The 9ID began running into problems during the same period. The Army's database, which triggered equipment procurement on long lead-time items, contained nothing on HTLD. Instead it was loaded with the 9ID's standard MTOE. In order to procure the correct equipment for the HTLD, a unique database had to be created through the coordinated efforts of 9ID, TRADOC, FORSCOM, DARCOM, and the DA Staff. In May 1983, DA finally published its plan for meeting the needs of the HTLD. A major problem throughout this period was ensuring the TAADS data base reflected the latest version of the HTLD. This was one of the cases where the Army "system" had to be used, regardless of the expedited procedures desired by the HTLD.

On 1 July 1982, the test brigade began to form. The three combat battalions which were to transition initially into the LAB, LMIB, and AGB were identified and ordered to initiate the process. Shortly thereafter, the division support command also began its transition to forward support battalions, a main support battalion and the CBAA support battalion. Transitioning caused immediate problems, however, because of the "soft" structure that resulted from the "crash" to complete the TOE/MTOE process. The 9ID units needed to requisition items that did not exist in the Army inventory. TRADOC and FORSCOM had to help solve the quandary.

IMPLEMENTING THE DESIGN FOR THE HTLD

MG Elton briefed the design for the HTLD to GEN Meyer in an IPR on 5 August 1982. Because of new organizations creeping into the structure without commensurate cuts elsewhere, the strength had risen to 17,742 personnel and 1356 sorties. Giving guidance to get the strength back down, GEN Meyer approved the designed organizations to activate and begin transition. The CSA also dropped one more bombshell in this IPR. He stated that the test brigade and its slice would go to the National Training Center, Fort Irwin, CA, in October 1983 for testing of the full brigade and slice under combat conditions.

While a great training opportunity, going to the NTC had some drawbacks. Although training and testing of tactical concepts and equipment had been a continuous process, it had been piecemeal at best. There was a serious lack of personnel and equipment in units which had not yet even begun transitioning to their HTLD structure. These units had to be manned, equipped with surrogate equipment which did not adequately replicate the conceptual design or the O&O, and then extensively trained using the HTLD O&O prior to going to the NTC in October 1983.

The 9ID staff and HTTB quickly sought assistance. Because the HTLD units were unique, there were no Army Training Evaluation Plans (ARTEPs) or How-to-Fight manuals. The division asked CAC to prepare these quickly, in order to develop standards against which to train. At the same time, TRADOC and FORSCOM had to redouble their special efforts to produce MTOEs so that 9ID could requisition personnel and equipment. This effort resulted in nine HTLD MTOEs being delivered to 9ID in October 82: HHC, 3d Bde; division scout company; 3d FSB; cavalry squadron; LMIB; AGB; and LAB. Field commanders implemented those organizations, with the mission of experimenting with the structure to make changes during the next semi-annual Management of Change (MOC) window, coming up January - March 83. The division and ODCSOPS kept the pressure on TRADOC and FORSCOM to push out the remaining MTOEs. Force structure personnel in both TRADOC and FORSCOM were uncomfortable with the extremely fast pace in turning out the MTOEs, but with the emphasis coming from the highest levels of the Army leadership, continued to work the issues.

During this time period, October 1982, the DA Staff inquired into expanding the HTLD concept to another active division and reserve division. When queried on the feasibility, FORSCOM recommended that the testing of the concept in 9ID be completed prior to beginning the conversion of any other divisions. A major concern for FORSCOM was the amount of training space required for the HTLD. Only the largest Army installations had sufficient space to allow maneuver as envisioned in the O&O concept.

As fielding of the various units became reality, new efforts were made to downsize the division. Cooks were greatly reduced by consolidating food service activities and feeding new types of field rations. Religious, legal, postal, personnel, and band personnel were reduced. Direct support artillery units, transitioning to the M198 155mm towed howitzer, reduced the crew size to 10 from the 11 that was standard in other divisions. The Soldier Support Center raised strong objections to the reductions, and the Logistics Center complained the combat service support units had been cut to dangerous levels. Still, the CSA wanted the division reduced--cuts had to be made somewhere.

Command arrangements for the HTLD Test Brigade called for each maneuver brigade to transition one battalion: 1st Bde would have the LAB; 2d Bde would transition the AGB; 3d Bde would configure the LMIB. The plan was to have each brigade responsible for transitioning its own battalion. The test brigade would then be organized in April 1983 under control of the 3d Bde, conduct a major exercise in May, then go to NTC in October for the major test. After completion of the test the battalions would return to their respective brigades, so that each brigade would have an experienced battalion around which to build. This also ensured that all the brigades had a stake in the HTLD transition.

Because required equipment was not available to the division, the test battalions were to be issued surrogate equipment. At least the units could then start training to fight using the HTLD O&O. The non-test battalions would not transition until the objective design equipment arrived; they would remain pure infantry battalions.

Throughout the autumn of 1982, actions continued to assign personnel of the proper MOS and grade, to arrange a proper alignment of barracks and motorpool spaces, to reduce the size of the division, and to have How-to-Fight manuals and ARTEPs published. The environmental impact statement for the HTLD was drafted and submitted. The HTLD was starting to fall into place.

As 1982 flowed into 1983, 9ID kept pushing forward, always with the goal of the final test at NTC in mind. As the plan for conducting the test evolved, with CAC as the primary evaluator, assisted by HTTB and 9ID, some significant issues arose. How was this test to be instrumented? The Combat Developments Experimentation Center (CDEC) could not run an instrumented test on anything larger than a company. The decision was then made to use the Multiple Integrated Laser Engagement System (MILES) for the brigade test. But were enough systems available? How would the testers capture air-to-ground engagements? How was the MK-19 40mm grenade machine gun, one of the critical weapons systems in the brigade, to be captured--there was no MILES system to replicate it? In the midst of all these crises, the NTC came on line and announced they did not want the evaluation to be accomplished there. The NTC charter specifically stated that it was to be used for training, not testing. The testers would have to find their own site. In the meantime, CAC completed the Evaluation Plan and tasked the Infantry School to head the evaluation. Searching for another training area comparable to NTC, 9ID requested to FORSCOM that the test be moved to Fort Bliss, using the 3d Armored Cavalry Regiment as OPFOR. The FORSCOM commander concurred with the use of Fort Bliss, stating that a suitable OPFOR would be provided.

In November 1982, 9ID announced a major division-level exercise, LASER MACE, an internally run FTX to be executed in April/May 1983 and designed as the first step in the evaluation process. The test unit, 3d Brigade, would conduct a force-on-force scenario against the 1st Brigade. Concurrently, eight separate tests on pieces of the HTLD would be run as part of the continuing evaluation process. Units to be tested were: the LAB, the LMIB, the AGB, the light air cavalry troop, the military intelligence forward support company, the military police company, and the NBC company. In addition the 9ID G1/Adjutant General section would be tested on the personnel system.

General Meyer visited Fort Lewis for the last time as CSA on 6-7 January 1983. He was satisfied with the progress of the test brigade thus far and approved the plan for LASER MACE. He also stated he would clarify the role of 9ID in the Army force structure after the HTLD evaluation period was completed. To help ensure that work on the HTLD continued with priority after his departure as CSA, GEN Meyer requested the Department of Defense Science Board look into the applications of high technology on ground operations. The Board's report, published in February 1983, was a corroborating check on the value of what was going on in the HTLD for the rest of the Army. One thing GEN Meyer did not do, however, was to resolve the key issue of funding for the HTLD/HTTB lash-up. Concept and equipment development depended on the ability to get developmental dollars from other agencies, all of whom had their own projects for which their funds were earmarked.

Planning continued for the exercise at Fort Bliss, named ORBIT EAGLE. To make the 3d Armored Cavalry Regiment available as OPFOR, the exercise had to be moved to the November/December 1983 time frame. With more time available to 9ID, a follow-on exercise to LASER MACE was planned for August 1983 in Yakima Firing Center. This package required significant funding. The bill for the TRADOC test community was $4.3 million for LASER MACE and $3.4 million for the August FTX. FORSCOM costs were $2.8 million for LASER MACE and $2.2 million for the August exercise. ORBIT EAGLE costs were $15.0 million for transportation and $5.0 million for exercise costs. TRADOC test costs had not even been calculated yet. Funding loomed as a major problem.

Even as all the major exercise planning continued, day-to-day training within the test units and the non-test units moved at a rapid pace--readiness standards had to be maintained. In addition, normal support details for the division and post were continuous and painful, but necessary, requirements such as: post guard and detail, ROTC summer support, school support, and retirement parades. Heaped on top of this already full plate was the requirement to support a three day AUSA Industry Interface Symposium in January 1983. More than 370 representatives from 83 corporations and companies attended a series of classified work sessions to determine how the Army and industry could interface to speed the HTLD process.

At a March 1983 planning conference, Alderbrook II, the division force structure absorbed ten relatively minor design changes, which brought the design strength to 16,142 soldiers. It was also at this conference that commanders and staff planners realized that the division would not be ready for full evaluation by the November/December 1983 time scheduled for ORBIT EAGLE. With the associated high costs of that exercise in mind, MG Elton directed the staff to look at tying into an already-programmed Joint Readiness Exercise (JRX) called BORDER STAR, to be held at Fort Bliss in 1985.

Another significant issue surfaced at Alderbrook II was the difficulty each brigade had in transitioning, equipping, and training its test battalion and still giving 3d Brigade enough time to train the new test brigade together before LASER MACE. MG Elton decided to complete the 3d Brigade realignment by 4 April, not start it then as originally planned. 3d Brigade would then have the month of April to conduct company-level ARTEP training in preparation for LASER MACE. Personnel and equipment poured into the new units as they prepared for their first big exercise.

LASER MACE consisted of six phases: Phase I was movement to the area via a strategic deployment. The brigade would fly out of McChord Air Force Base on C-141s to Moses Lake, Washington, about fifty miles northeast of YFC. From there they would make a tactical lodgement on YFC via C-130s. Phase II was a movement to link-up with friendly Special Operation Forces elements to gain information on the OPFOR and to prepare for an attack. This would be over rugged mountainous terrain, and would take one day. Phase III would be a deliberate attack to seize and secure an enemy-held airfield. Phase IV was the arrival of fresh OPFOR forces, causing the 3d Brigade to fight a delaying operation. Phase V would be the defense of an extended front, followed by Phase VI, a night counterattack. This final attack would combine ground attacks with C-130 and helicopter assaults.

LASER MACE was the first large scale field training exercise for the HTLD. It tested the concepts of the division design, primarily the close combat units, in a field environment. The results of LASER MACE were, not surprisingly, mixed. The three new battalions appeared to be viable combat organizations whose great maneuverability and firepower, capable of being massed rapidly on the battlefield, added a new dimension to the force structure. The exercise confirmed the need for land navigation aids, better long-range radios, and night vision devices, equipment built into the HTLD's design documents and O&O, but not available for a variety of reasons. It also reemphasized the vulnerability of utility helicopters used in deep attack roles. There were training deficiencies and a lack of understanding of the operational concepts noted in the newly organized units. A major problem observed by the Assistant Commandant of the Infantry School, BG K.C. Leuer, was a need for better instrumentation to determine what was and was not successful during tactical maneuvers. Self analysis by the forward support battalion indicated it was too large and cumbersome as configured to provide needed logistical support. It took two days for a single displacement of the FSB with the amount of equipment and limited number of vehicles available. Additional design changes were needed. Overall, however, the 9ID considered the FTX a great success, providing near real-world combat conditions, and offering a tremendous training opportunity for the newly formed units. What was not confirmed or denied, however, was how valid these tests were, given the surrogates' inability to replicate the objective systems in the test units.

Two days after the end of LASER MACE, GEN Meyer received his last briefing on the HTLD as CSA at an IPR held at Fort Leavenworth. He was updated on the newly transitioned division artillery structure, consisting of a headquarters and headquarters battery, a target acquisition battery, three direct support 155mm towed battalions, each with three batteries of six guns, and one general support battalion which had two 105mm howitzer batteries, six guns each, and a Multiple Launch Rocket System (MLRS) battery with nine MLRS systems. The CSA approved the final goal for the HTLD as 16,000 soldiers on 1000 sorties (planned for 1990) and an interim organization of 16,000 troops on 1250 sorties, to be implemented by 1986. The activation date for the HTLD was changed from 1985 to 1986 because of slippages in equipment delivery times. One other significant question that was debated but not decided was the status of the CH-47 medium lift helicopter company. The question was whether it should be part of the division or a corps plug to the division. While the division wanted the helicopters, there was a price to pay in additional sorties. More studies of the problem were required.

In the meantime, MG Elton made the recommendation to cancel FTX ORBIT EAGLE. The price ($20m) was too high, and the division was not prepared for a full evaluation in late 1983. More economical actions would result from detailed testing of individual units and an extensive simulation program which had been developed. Planning began for the major evaluation to be part of JRX BORDER STAR at Fort Bliss in the first quarter of fiscal year 1985.

Steps were also being taken in the personnel area at this time. Because of shortages of cooks, legal personnel, chaplains assistants, and PAO staff in the MTOE to cover garrison, peacetime requirements, the garrison Tables of Distribution and Allowances (TDA) were increased so that the division's soldiers could be properly cared for in day-to-day garrison operations.

As MG Elton turned command of 9ID over to MG Robert W. RisCassi on 27 May 1983, the basic design for the division was nearing completion. MG RisCassi's task would be to refine the design as experience evolved and to carry the HTLD through its evaluation and into the fielding process. MG RisCassi assumed command with an equally focused intent to sustain near-term readiness throughout the evolution and fielding process.

THE ROAD TO EVALUATION

The new commander assumed his position with an open mind about the HTLD. He spent the summer observing the division and being brought up to date on what was happening. He decided to field common headquarters and headquarters companies and combat support companies for all the infantry battalions. He approved the testing of a Precision Guided Anti-Tank Missile (PGATM) platoon in the LAB in lieu of the standard anti-tank platoon. The PGATM platoon would be built around a ground-launched version of the HELLFIRE missile, which was a laser guided weapon with a range in excess of eight kilometers. If the concept proved viable, the PGATM platoon would be added to all combat battalions.

In September 1983, the new Chief of Staff of the Army, General Wickham, visited Fort Lewis. MG RisCassi briefed him on recommended changes to the HTLD design. MG RisCassi's first major request was to establish combined arms battalions in place of the "pure" battalions currently in the design. The combined arms battalion (CAB) is organized by MTOE in the manner it is expected to fight, e.g., light motorized infantry companies and assault gun companies are organized in the same battalion. The combined arms battalion lives, works, trains, and plays in the organization in which it will fight. MG RisCassi opted for two types of CABs. The CAB-Heavy was organized with two assault gun companies and one light motorized infantry company. Its employment was intended to be primarily as an anti-armor unit. The CAB-Light was organized with one assault gun company and two light motorized infantry companies. It was envisioned to accomplish infantry-oriented missions while still maintaining an anti-armor capability. The LAB remained unchanged in its organization. It was built around mobility, agility, and firepower and was designed for deep attack raids, covering force, RACO, and other economy of force missions (see app C, figures 4,5,6). MG RisCassi also advised the CSA on several options to down-size the division and recommended the Army replace ID86 with the HTLD as the standard infantry division for the future. The intent was to advantage fire power and mobility as a trade-off to save spaces. This meant a decision by the Army to reduce infantry strength and thus the HTLD ground-holding capability. The CSA was open to the division commander's recommendations, giving him guidance to move ahead with the CAB concept and to reduce the division incrementally to a goal of approximately 13,000 soldiers (see app C, fig. 7).

The CSA brought a new factor into the equation when he announced that a separate program would begin--to field a 10,000 man Light Infantry Division. After some initial confusion on how this would impact on the High Technology Light Division, GEN Wickham expressed his desire for 9ID and the newly named Army Development and Employment Agency (ADEA), which took the place of HTTB, to continue to develop the HTLD, but offer insights learned while going through the process of designing the HTLD to TRADOC, which would develop the Light Infantry Division. Among the insights learned from the HTLD/HTTB design experience that could be passed on to TRADOC: were the retention of short cuts to the developmental process; the continuance of testing the system as a whole--in one location as opposed to testing pieces spread throughout the Army; improving on the HTLD design concept by having TRADOC take the lead in developing and testing the design, rather than make the division responsible for its own design; and the use of more external testing for the design in order to give higher credibility throughout the Army.

While GEN Meyer had made the HTLD his pet project, GEN Wickham had his own agenda. The 10,000 man light infantry division was now the priority project for the CSA; the HTLD accordingly lost some of its priority and resources at HQDA, TRADOC, and FORSCOM. The special 9ID office in ODCSOPS, DA was subsumed into the Doctrine and Concepts Office in late 1984, giving less visibility and responsiveness to the HTLD.

In the HTLD, equipment problems were especially challenging to MG RisCassi. Looking toward full scale evaluation at BORDER STAR in late 1984, he saw that the projected delivery dates for the new High Mobility Multipurpose Wheeled Vehicle (HMMWV) and the Light Armored Vehicle (LAV) were too late for adequate train-up prior to the exercise. While a heavy variant of the HMMWV was considered a viable vehicle for the objective infantry squad carrier, the LAV was merely a vehicle for the proposed Assault Gun.

The lack of an Assault Gun was one of the absolutely key problems in the development of the division. Originally conceived to be a wheeled light armored vehicle armed with a hyper-velocity missile (HVM) as its major tank-killing system, the Assault Gun got little support from the Armor School, which was heavily into the M1 tank procurement process, or from the Missile Command, which was developing the Fiber Optic Guided Missile (FOGM) and resisted moving into the hypervelocity missile development. (It is interesting to note that the HVM is being considered in the early 1990's as a means to defeat reactive armor. It is unfortunate that the development was downplayed in 1983.) In 1983 the Armor School decided to support an Assault Gun. Instead of wheeled, it would be a tracked, lightweight, highly agile kinetic energy gun capable of killing enemy tanks and shielded by sufficient armor to give the crew protection from artillery and small caliber weapons. If strategic mobility was to remain a pacer, the system had to be light enough to fly in a C-130 aircraft. In order to test the HTLD concept while waiting for the materiel developers to come up with an AGS, the 9ID wanted to use the LAV-25 with a TOW added. Congress, however, had directed that all production go to the Marine Corps, as the Army had previously dropped out of the program. The Infantry School took the position that the LAV was unsuitable, even as a surrogate. The Infantry School solution was to use the M551 Sheridan, a lightly armored reconnaissance vehicle which had slowly been removed from service until only the 82d Airborne Division and the OPFOR Regiment at the

NTC used them. The production line had been long shut down. The debate over the key Assault Gun System was to continue for years and was never resolved.

New MTOEs for the various units of the HTLD continued to be implemented through the summer of 1983. MG RisCassi pushed to accelerate the loading of MTOEs of remaining units months earlier than currently scheduled. The pace in the division picked up significantly. By the end of September 1983, a new design for the division, with a strength of slightly more than 14,000 troops and organized into combined arms battalions, had been developed. While all of this was occurring, a steady series of tests, studies, and simulations continued throughout the division.

In September 1983, the second major field exercise for the HTLD took place in Yakima Firing Center, FTX CABER TOSS. It used the same general scenario as LASER MACE, but the emphasis shifted from a maneuver orientation to a detailed look at the vertical and horizontal combat service support structure. CABER TOSS was one of the most extensive logistics exercises ever held. The Logistics Center sent an evaluation team to observe. The major events of CABER TOSS tested the Class I (Subsistence), III (POL), V (Ammunition), VIII (Medical Supplies), an IX (Repair Parts) systems of the division and included a mass casualty evacuation and doctrinal replacement processing phase. A new field feeding system using a different type of field ration was tested, to determine if soldiers could be adequately fed with the reduced number of cooks in the division. A Palletized Loading System was tested to increase the capability of the CSS units to throughput supplies. High Mobility Materiel Handling Equipment (HMMHE) was tested in transloading the huge amounts of ammunition required to support the firepower-heavy force.

The results of CABER TOSS were significant. The 3d Forward Support Battalion proved it could support under the motorized O&O. The Logistics Center gave enthusiastic support to the forward support battalion concept, with far-reaching impact on the Army. On the lessons learned side, CABER TOSS showed that the CSS units needed equal mobility with the units they supported; that medical evacuation facilities were quickly overwhelmed with heavy casualties; that better communication links were needed in the CSS units; and that, while the ammunition supply concept worked, preconfigured loads needed to be refined to support the combat units adequately.

In late 1983 two events occurred which would have profound impact on the future of the 9th Infantry Division. First, the High Technology Test Bed was officially redesignated as the US Army Development and Employment Agency and was made a field operating agency of ODCSOPS, DA. GEN Meyer had pushed this very hard as a means of ensuring that the HTTB, and all its good work, would not simply be absorbed into some MACOM staff agency after his departure as CSA. ADEA's mission was to use revolutionary approaches to develop a new, highly mobile division which emphasized maneuver warfare within the context of the AirLand battlefield. Liaison elements were permanently collocated at Fort Lewis with ADEA from TRADOC, Army Materiel Command (AMC) and CDEC to facilitate the process with 9ID. The second event was the redesignation of the HTLD as the High Technology Motorized Division (HTMD), both to reflect the actual design of the division and to avoid confusion with the new Light Infantry Division. In line with the Army of Excellence structure, the interim personnel end strength was reduced to 14,500 and a final design end strength goal of 13,000 soldiers was announced. The other design parameters of the HTMD were to be the same as with the original HTLD. The change in name was symbolic, however, as the orientation shifted from a 16,000 soldier light infantry force to a smaller mobile force with emphasis on firepower and mobility.

In November 1983, TRADOC, as part of the overall evaluation process, initiated the preparatory phase of an External Subjective Assessment (ESA) for the HTMD. TRADOC agreed to provide an independent perspective on the evolving operational concept and organizational structure of the motorized division. Part of this assessment would be an evaluation as to whether the experiments undertaken by the 9ID were suitable for adoption by the Army. The results of this "outside look" were generally favorable. Among strengths identified by the TRADOC assessment was the motorized division Organizational and Operational Concept. It should be noted, however, that it was the objective design O&O that was evaluated, assuming the development of an AGS and other key components. TRADOC determined that the 9ID O&O was indeed compatible with the AirLand Battle concept and would be effective in open, desert terrain. In short, this new type of division would be a credible deployment alternative to a more conventionally equipped light division. Other strengths were highly tactical mobility, a significant anti-armor capability, and a sophisticated Command, Control, Communications and Intelligence (C3I) structure. Only one significant weakness was identified--the lack of a kinetic energy (KE) anti-armor system. The motorized division was predicated on the existence of a tank killing capability, and the major unresolved issue was: what would be the division's assault gun?

TRADOC agreed to complete the full evaluation of the HTMD by providing experts from all the schools and centers to evaluate the division during its second large division FTX, scheduled for August 1984. This exercise would also serve as the certification exercise for the motorized division.

MG RisCassi briefed the Vice Chief of Staff of the Army on the revised design in December, 1983. That structure (see app C, fig 8) was to be the design used through the division certification exercise in August 1984, although minor refinements were made throughout the period to reduce the division strength as much as possible.

Before the division could be evaluated, surrogate equipment had to be procured, issued, and train-up conducted. It is important to understand exactly what surrogate equipment was, and how it differed from interim equipment. Surrogate equipment was issued to the HTMD to represent the objective equipment that was to be developed and fielded. The Improved TOW Vehicle (ITV), for example (discussed below), was a substitute for the Assault Gun System. Training with the ITV employed the capabilities of the AGS, not the more limited real capabilities of the ITV. Interim equipment, introduced into the division after the completion of testing of the O&O, was equipment fielded in the division until such time as the objective piece of equipment was available. Interim equipment caused the divisional units to modify the O&O for training purposes, because they had to train with the actual capabilities of the interim pieces of equipment.

The combat units were equipped almost entirely with surrogate equipment. Improved TOW Vehicles, M113s modified to fire TOW missiles, were substituted for the nebulous Assault Gun System. M882 Dodge pickup trucks were modified with strengthened suspensions, roll cages and seat belts and substituted for HMMWV squad carriers. Other M882's and Commercial Utility Cargo Vehicles (CUCVs), essentially diesel-powered Chevy Blazers painted in camouflage pattern, were substituted for the various HMMWV cargo carriers. The Surrogate Fast Attack Vehicle, the modified Chenoweth dune buggy, substituted for the Fast Attack Vehicle. The engineer battalion had surrogates for every piece of heavy equipment in the objective design. Only the artillery units had most of their objective weapons, M198 towed 155mm howitzers and M102 105mm howitzers, lacking only the Multiple Launched Rocket System and using additional M198's as surrogates. In all, 18 of 24 major pieces of equipment/weapons systems were surrogates, awaiting fielding of the objective design equipment.

Much of the equipment designated for fielding in the HTMD was the result of an ADEA concept called the Quick Reaction Program, or QRP. The QRP took advantage of smart ideas and evolving technology by buying equipment off-the-shelf, as-is, or with minor modification to "militarize" it. Some of these items were just entering into the Army's materiel acquisition cycle but had not been approved for testing and procurement. The QRP was designed to take short cuts around the seven to nine year Army procurement cycle by getting the equipment into the users' (that is, soldiers') hands quickly. If the equipment worked well, the QRP would plug back into the materiel acquisition cycle--but much further down the road, thus cutting three to five years off the cycle.

There was a problem with QRPs, however, and the problem was funding. ADEA/9ID wanted to buy these items immediately and start user testing. However, there were no funds set aside in the Army's budget cycle for such actions. Such funds are normally programmed five years out and integrated into the overall Army budget. Since there were no funds already in the Program Objective Memorandum (POM) document, the only source was to take the money from other programs that did have funds. The 9ID and

ADEA action officers had to work within this fiscal reality. At the same time, the Army bureaucracy did not understand that GEN Meyer had given the 9ID the mission of designing its own structure using the best of new high technology equipment. The result was great frustration all around. In 1984, program lines to support the HTMD and ADEA projects were finally being established, but were not yet in place to be able to buy the amounts of new technology needed.

The FAV is a prime example of the problem 9ID faced. That particular piece of equipment was more closely identified with the HTMD than any other. The division wanted to buy enough FAVs to equip two LABs, plus additional numbers which were to go into other units, such as the the CABs' scout platoons. The 9ID believed the FAV to be a critical piece of equipment in the division, allowing great ground mobility and speed, air mobility (a UH60 Blackhawk could sling load two at a time), and survivability (from the users' view point--it was extremely difficult to hit). The 9ID leadership saw an Army-wide role for such a vehicle. To buy large numbers of these vehicles, however, something else would have to fall out of the budget. The Infantry School did not attach the same importance to the FAV as 9ID. The Infantry School did not support the FAV because it could not carry a three man crew--a minimum requirement for continuous operations. Within TRADOC and AMC the FAV was considered unique, expensive and unacceptable to the bulk of the Army--an additive training and support burden. While the 9ID saw the FAV as a critical component for the HTMD, most of the Army saw it as a piece of equipment with limited utility for the total Army. The 9ID's mission was to build the best HTMD it could; TRADOC and AMC, on the other hand, had a mission of building the best total Army, which required some otherwise excellent ideas to be compromised for the good of the whole. When Army Staff personnel went to Congress to try to obtain funding for the FAV, Congress refused to support it. 9ID, ADEA, and the Army Staff were told to go back and start over, or there would be no FAV for the HTMD or the Army. All this occurred despite the fact that the soldiers training on FAVs day after day had complete confidence in their ability to fight and win using the vehicle.

In March of 1984 the problem of TRADOC proponency for the combined arms battalion arose. As originally envisioned, the CAB (H) would be predominantly an "assault gun" unit, and therefore the Armor School would be the proponent. Conversely, the CAB (L) was designed to be infantry heavy, and the Infantry School was its proponent. The interim structure for the CABs had ITV's in lieu of the assault gun. ITVs were manned by trained infantry TOW gunners. Who then was the proponent for the interim CAB (H)? The decision was that the Infantry School would retain proponency until such time as the assault gun was fielded, at which time the Armor School became proponent. For the design process, the Armor School retained proponency for the objective design CAB (H), while the Infantry School had proponency over the interim design process. In order to provide a proper O&O base as a point of departure for TRADOC, MG RisCassi coordinated for a four volume document on the organizational and operational concept to be produced by four members of the Army War College who were former 9ID battalion commanders. These completed documents were forwarded to Fort Leavenworth in July 1985.

A debate arose during this same time over equipping only two brigades of the HTMD and leaving one to function solely as a test bed unit. Although this proposal saved money, the readiness implications for the 9ID were extreme. The division could hardly be considered combat ready and allocated against Army contingency plans worldwide when one of its brigades was not manned or trained as an operational combat unit. To ensure near-term readiness, the decision was made that the entire division would convert and necessary tests would be apportioned across the divisional units.

Another problem arose with two of the 1st Brigade battalions. Both 2-23 IN and 4-23 IN were COHORT (Cohesion, Operational Readiness, and Training) units. These units operated under the concept of stabilizing soldiers and leaders in a company for a three year period. The first two years were spent in basic and advanced individual training and unit training. In the third year, the company deployed to Korea--to the 1-23 IN--as a unit replacement. The 1-23 IN in Korea was a standard TO&E infantry unit. How could 2-23 IN and 4-23 IN convert to CABs, but still send infantry COHORT companies to Korea. The answer in 1984 was to delay transitioning those two battalions until the very last, in late 1986, and continue trying to work out the solution.

Along with these various minor crises, a perception of uncertain support for 9ID because of HQDA emphasis on the emerging Light Infantry Division, ended when GEN Wickham decided to field a full-up, 14,500 man High Tech Motorized Division by 1986. The CSA agreed to develop a readily deployable, highly mobile anti-armor force, primarily oriented on the Southwest Asian theater. The division was to continue toward a strength goal of 13,000 soldiers in the years beyond 1986. The mission and concept design parameters were to remain the same.

EVALUATION AND CERTIFICATION

As part of the on-going assessment of the parts of the HTMD, the 2d Battalion, 1st Infantry (LAB) underwent a large-scale evaluation during FTX LASER SHARP at the National Training Center in June 1984. This FTX came after an extensive and highly instrumented test at Fort Hunter Liggett, CA, conducted by the CDEC Board. For FTX LASER SHARP, the LAB operated against 2d Brigade, 2d Armored Division. As part of the exercise, the LAB also worked as a cross-attached unit with the armor and mech infantry companies. The overall results of the TRADOC assessment showed that the LAB was capable of executing its missions in accordance with the O&O concept. The FAV, especially, was cited for its ability to fight in the NTC scenario. Shortcomings of the exercise included: an inability on the part of the evaluators to assess with statistical accuracy the ability of the LAB in an offensive role; an identified logistical problem for the LAB to support an attached mech infantry team; and a lack of conclusive data on the adequacy of firepower within the LAB, especially concerning the MK-19 GMG (because of a lack of MILES equipment to replicate). The overall tone of the TRADOC report was totally positive on the ability of the LAB to accomplish its missions under the HTMD O&O.

The 3d Brigade deployed to YFC in early July 1984 to conduct an intensive train up for FTX LASER STRIKE, a grueling training exercise designed to train the brigade on the O&O and how to fight with their surrogate weapons systems. This type of training was called the OCTOFOIL FOCUS training density. This was a program MG RisCassi implemented which allowed commanders to tailor their training program from where their training currently stood to where it needed to be--integrating individual skills with collective skills. The emphasis was on building a robust company team. With that as a strong underpinning, battalion, brigade, and even division operations could be successfully accomplished. Soldiers became confident in their training, in their equipment, and in themselves.

During LASER SHARP and the divisional certification exercise, LASER STRIKE, which took place in August, TRADOC, the CDEC Board and ADEA executed external assessments or tests on ten areas in the HTMD. Areas evaluated were: the external assessment of the 9ID (MTZ); the chemical company; the MI general support company; the FSB modular medical support concept; MI airborne surveillance; the Palletized Loading System; NBC warning and reporting system; class V supportability; lightweight early warning radars; and the HMMWV-mounted STINGER. In addition, the largest medical exercise (MEDEX) since World War II was conducted from 3-7 August, just prior to LASER STRIKE. The results of the MEDEX impacted heavily on how field medical doctrine developed within the total Army.

FTX LASER STRIKE was conducted at Yakima Firing Center 18-23 August 1984. Nearly 20,000 soldiers, Marines, USAF and US Navy aviators, Army Reserves and National Guardsmen took part in the largest and most important tactical exercise yet conducted. The 3d Brigade--the motorized test brigade--and its habitual combat support and combat service support units represented the 9ID maneuver units. The division headquarters, division artillery, the air defense battalion, 9th MP Company, and 9th Chemical Company supported 3d Brigade as the Blue Force. The three battalions of 2d Brigade, two infantry and one armored, and its habitual CS and CSS units were augmented with 1st Marine Tank Battalion and 1-249 TOW Light Anti-Tank (TLAT) Battalion (-) as the Red Force. The 1st Brigade and its habitual slice acted as the controllers. CBAA, DISCOM, the engineer battalion, the MI battalion, and the signal battalion supported both Blue and Red units.

FTX LASER STRIKE was a semi-free play, force-on-force exercise based on a Southwest Asia scenario. Certain required events were programmed into the exercise to ensure that the HTMD O&O concepts and requirements were properly exercised under tactical conditions. In order to use all of Yakima Firing Center for maneuver purposes and to exercise command, control, communications and logistics over extended distances, divisional units supported from up to 40 kilometers off the military reservation of YFC. Helicopter support came from realistic distances and tactical air strikes originated from Whidby Island Naval Air Station, WA, and Mountain Home AFB, Montana. A small army of TRADOC evaluators and observers was present for the tactical assessment. The scenario developed around five phases consisting of a passage of lines, attack, delay, defense, and night attack/cross FLOT (Forward Line of Troops) attack.

In 100 degree-plus heat the combatants initiated operations. The Red Force fought a "traditional" battle focused on retaining key terrain and defeating the Blue Force by attriting combat power. The motorized 3d Brigade fought a battle in which survivability did not necessarily depend on increased armor and weaponry; rather, the deciding factors would be better command control and communications, more timely intelligence, tactical mobility, and firepower massed at critical points and times. The 3d Brigade probed for assailable flanks and took advantage of greatly improved night vision devices and navigational aids. Deception and enhanced tactical intelligence further supported the motorized operations. After six days of intense round-the-clock operations, the certification of the motorized O&O was complete.

Of the myriad of lessons learned from the exercise, three came out as the most significant during the after action review process. The first was that superior real-time intelligence, using advanced command, control, and communications equipment and concepts, created opportunities that allowed the 3d Brigade to concentrate decisive combat power at the critical time and place. The second was that the fluid mobility of the motorized force, using ground and air mobility, allowed the Blue Force to bypass the OPFOR's terrain-oriented forces. Motorized units successfully out-maneuvered the OPFOR and attacked with an overall combat power ratio of approximately 1:1. This deviation from standard accepted doctrine underscored the importance of maneuver warfare. The third key lesson was that the motorized forces would be destroyed by massed artillery fires if they lost the ability to maneuver and were forced to "slug it out" with an enemy in prepared positions on key terrain.

LASER STRIKE certified the division's Organizational and Operational concept and demonstrated the 9ID's near-term combat readiness. The organization was not perfected; there was much more work to do, but, in the words of MG RisCassi, "...it was clear that even with surrogate equipment, the Division concept and organizations were sound; hence [it] must be equally clear that with objective systems fullest operations capability would be forthcoming." The objectives of LASER STRIKE were achieved. The combined arms battalions were validated. The division showed that more efficient and mobile organizations equipped with state-of-the-art equipment could achieve decisive results, even when outnumbered. The combined arms battalions and LAB showed that the whole could be greater than the sum of the parts.

After completion of the major field evaluation, the HTMD got one last hard look, in November 1984, from the Final Design Review team. The Motorized Division Final Design Review was a joint committee effort by representatives of TRADOC, AMC, FORSCOM, ADEA and 9ID. This committee was tasked to make a final decision on the developing motorized force structure. It was also to determine whether the HTMD complemented the Army of Excellence force structure, whether the objective end strength of 14.5 K and ultimately 13K soldiers was realistic, and whether the HTMD operational concept met field command employment requirements. Incidental to all this, it was also tasked to identify key equipment delivery schedules, so that the motorized division could become reality.

The Final Design Review team briefed the Chief of Staff of the Army on 20 December 1984. The evaluation's summary report was favorable in all regards. In the area of firepower, the HTMD's ability to integrate the long-range firepower of its combined arms battalions, coupled with its superior maneuverability, enabled the motorized force to dominate the enemy over an extended area. It embodied the principles of maneuver warfare. Tactical mobility also received high marks. Of special note was the conclusion that the motorized division's combat service support units had compatible mobility with those of the highly mobile maneuver units. Survivability was also rated satisfactory. The summary report also stated that the flexible operational concept, superior tactical mobility, and the fact that the motorized division would fight with robust combined arms teams meant that it was inherently more survivable than conventional units. Although it lacked armor-protected fighting vehicles, it would rely on dodging enemy thrusts and rapid displacement to survive. The motorized division's enhanced air defense artillery capability (materiel and C3I initiatives), engineer and NBC capabilities designed to support dispersed, highly mobile combat operations were cited as further contributors to a survivable force on the AirLand battlefield. In the area of sustainability, motorized division initiatives were found to be very effective. Predictive supply management and the Palletized Loading System (PLS) greatly streamlined logistical movement. Large, highly mobile materiel handling equipment complemented a logistical support concept which emphasized pre-packaged unit throughput from support base directly to the user. For example, pre-configured Disease/Non-Battle Injuries and Trauma Treatment medical supplies were pushed to the maneuver battalions daily through the Class I ration breakdown point. The forward support battalion concept of "one stop shopping" was rated extremely effective in support of the fluid operations of a non-linear battlefield. As for deployability, the downsized motorized division (objective) would require 1200 sorties of USAF C-141B aircraft (see app C, fig 9). Planning for 100 sorties per day, the entire motorized division could reach its deployment destination in 12 days, well within acceptable parameters. In miscellaneous comments, the report also highlighted the strength of the motorized division's C3I capabilities. The use of integrated command post (ICP) vehicles and tactical command, control and communications vehicles (TC3V) developed jointly by the 9ID and ADEA, and the division and brigade commanders' ability to control their forces on the battlefield were rated excellent and survivable. The multi-dimensional intelligence effort embodied in the MI battalion with its HUMINT, COMINT, ELINT, advanced target acquisition, Remotely Piloted Vehicle (RPV), and PLRS capabilities was considered outstanding.

GEN Wickham listened to the Final Design Review team's report and accepted their recommendations. He approved the HTMD O&O as designed. He also agreed to continue ADEA's charter to search for initiatives to refine the HTMD design and take advantage of advancing technology. The 9th Infantry Division (Motorized) was reality. It was to be operational by October 1986.

Some fine-tuning of the division structure occurred after LASER STRIKE to refine capabilities. Additional transitions of units and force modernization gave the division some additional robustness. With additional training on the new equipment and concepts, the motorized division continued to expand on its capabilities.

REFINING THE MOTORIZED DIVISION

If LASER STRIKE was graduation, Joint Readiness Exercise BORDER STAR 85 was a graduate-level exercise. From 18 March to 6 April 1985, the 3d Brigade Combat Team moved to Fort Bliss, Texas, a sprawling mesquite desert area encompassing chunks of Texas and New Mexico. There the new motorized organization, built on the concepts of AirLand Battle doctrine and maneuver warfare, was pitted against a highly maneuverable, aggressive and hard-hitting heavy force, the 3d Armored Cavalry Regiment. During a gruelling seven day force-on-force free play exercise over an immense maneuver area, the motorized brigade showed its capabilities.

The initial phase of the operation consisted of a five day CPX using computer-assisted war gaming to portray a realistic scenario. The entire 9th Infantry Division (MTZ) participated in the CPX, with battalion, brigade, and divisional cells operating 24 hours a day. During the CPX period, the 3d Brigade Combat Team conducted tactical maneuver and live fire training. The Brigade's Precision Guided Anti-Tank Missile (PGATM) platoon fired three live HELLFIRE missiles using the organic Forward Observation and Lasing Teams (FOLT) to achieve hits at a range of 8000 meters.

The direct support artillery battalion successfully fired three COPPERHEAD projectiles at a range of 16,000 meters using their organic FOLT teams and gun crews. The ADA battery conducted day and night Vulcan live fires and the engineer company conducted extensive live demolition training. In addition, all 27 maneuver platoons and three scout platoons conducted live-fire exercises with small arms, MK19 40mm Grenade Machine Guns, and TOW missiles.

The FTX portion of BORDER STAR gave the 3rd Brigade the opportunity to use all of its high technology systems. Covert teams from the MI company were inserted to provide continuous signal relay, electronic warfare jamming, intercept and visual electro-optical scanning of the battlefield. The surrogate RPV with night Forward Looking Infrared Radar (FLIR) capability and direct down-link into the brigade Tactical Operations Center (TOC) helped to identify enemy tactical unit operations. Six division scout company teams were also inserted in depth to continuously update the division G2, using high tech observation devices and communications equipment. This Intelligence Preparation of the Battlefield demonstrated a real-world existing intelligence capability to closely monitor enemy actions as they developed.

Although a free play exercise, the scenario was similar to LASER STRIKE, and 3d Brigade expected to conduct similar operations (passage of lines, attack, delay, defend, night attack). The maneuver concepts of the 3d Brigade called for the motorized units to attack enemy flanks and rear by fighting a non-linear battle; to conduct continuous operations, night and day; to seize the initiative and rupture the cohesion of enemy command, control, and morale; to create combat power by massing fires from direct, indirect, and aviation systems on identified enemy forces; to use economy of force operations to obtain mass by relying heavily on security forces, deception, electronic warfare, smoke, and use of Army aviation assets; to use tactical surprise and speed to confuse the enemy and gain or maintain the initiative; to focus combat power on high value enemy targets such as command/control and logistical elements, rather than "slugging it out" with superior enemy combat units; to avoid enemy strengths and attack identified weaknesses; and to utilize Engagement Areas--large killing zones--to execute coordinated engineer obstacles, Army attack helicopters, USAF close air support, artillery and direct fire weapons against the enemy force. In order to execute these operations, the unarmored 3d Brigade had to accept great risk in synchronizing its combat power.

One of the keys that allowed 3d Brigade to do this was its ability to operate at night. All of the combat vehicles--and some key support vehicles--were equipped with AN-PVS-5 Night Vision Goggles (NVGs), state-of-the-art passive light intensifying devices that turned the night into daylight. Critical vehicles, scouts, platoon leaders/platoon sergeants, and company commanders were also equipped with the Position Location Reporting System (PLRS), a navigational system that gave continuously updated eight digit grid coordinates. Upgraded communications equipment allowed the 3d Brigade Combat Team to communicate throughout the battlefield. The RPV gave near real-time intelligence from its FLIR that was fed directly into the brigade TOC. Using this equipment, night became the preferred battle environment for the 3d Brigade, negating much of the ACR's advantage in firepower and armor protection. Even when forces intermingled in the confusion of night combat, the PLRS system allowed the motorized forces to know exactly where they were and where they needed to go. Night operations became 3d Brigade's greatest combat multiplier.

The results of the motorized brigade's operations against the well-trained and professionally-led Armored Cavalry Regiment clearly reflected the motorized brigade's potential. Operating on unfamiliar terrain (on the "home turf" of the ACR), the agility and mobility of the LAB and the firepower and maneuverability of the combined arms battalions were synchronized with obstacles, artillery, and aerial firepower to inflict heavy losses on the armored force. The motorized brigade showed it could fight on equal terms against a reinforced armor brigade. The new organizational concept, built on the tenets of AirLand Battle doctrine and maneuver warfare, was superbly wrung out and challenged. BORDER STAR 85 ratified what LASER STRIKE certified. Motorized had come of age.

Several key lessons came out of the after action review from BORDER STAR. On the positive side of the ledger, the motorized units proved to be extremely difficult to acquire or target. Night operations allowed nearly unrestricted offensive action against the enemy forces. The LAB, operating with attack helicopters and USAF aircraft--plus artillery when in range--was able to move deep into the enemy rear to attack enemy CPs, logistics, and artillery. Attack helicopters (AH-1S Cobras) were able to carry out day and night attacks on enemy forces and were seldom observed or reported. The HELLFIRE antitank missile appeared to be a major killer on the armored battlefield. The automated command and control system (burst FM transmissions for digital data, the GRID computer linked into FM radios, new frequency-hopping radios, and the PLRS) proved itself. Innovative use of deception and economy of force operations created additional combat power for the motorized force. Initiative, Leadership, and soldier morale overcame equipment and training limitations and environmental factors for the motorized force.

Problem areas that arose during BORDER STAR offered more significant concerns. The major vulnerability of the motorized force was its lack of a kinetic energy gun capable of delivering high rates of fire to destroy armor at ranges of 2000 meters and less. That shortcoming left the motorized units dangerously weak during meeting engagements or surprise armored attacks at close ranges. In order for the O&O to work correctly, some units must contain the enemy force while others bring their combat power to bear. Without a high velocity, rapid fire KE weapons system with mobility and light armor, the motorized firepower equation was out of balance.

Other problems noted included a need for improved battalion and brigade tactical command posts, preferably fully tracked for unrestricted mobility. An over-dependence on Army attack helicopters as primary anti-armor systems was evident. At BORDER STAR Army aviation assets were frequently grounded by high gusting winds, hot weather, and high altitudes. Ground maneuver units depending on attack helicopters were destroyed when the helicopters could not fly.

New technology was a combat multiplier only if troops had been adequately trained. There was still much work to be done to fine tune the motorized division--but BORDER STAR proved the division was ready to fight on the modern battlefield.

A COMBAT READY MOTORIZED DIVISION

With the successful execution of JRX BORDER STAR 85, the 9ID pursued MG RisCassi's twin goals of near term readiness and transition of the entire division to its motorized configuration by October 1986. The division commander re-doubled his emphasis on OCTOFOIL FOCUS training densities for all the combat brigades, 21-day field training densities in which the entire brigade combat team operated totally in a field environment, with emphasis at company level and below. Battalion, brigade, and division staffs were exercised during regular (at least quarterly) RELIABLE LEADER CPXs, with the entire division training as a motorized unit.

It was a certified 9th Infantry Division that MG RisCassi turned over to MG Donald Pihl on 30 May 1985, as General RisCassi received his third star and orders to take command of the Combined Arms Center at Fort Leavenworth. MG Pihl's instructions from the Chief of Staff of the Army were to take the motorized division and make it a fully transitioned operational division. He was tasked with breathing life into the motorized division. As an experienced combat developer, MG Pihl was the right man in the right place. He took on the task of fielding a HMMWV-equipped interim motorized division that had to learn to fight without FAVs, AGSs, MK19s, etc. The motorized division took shape and was written back into the Department of the Army contingency war plans and began to execute Emergency Readiness Deployment Exercises (EDREs) in preparation. MG Pihl continued the previous commander's emphasis on OCTOFOIL FOCUS training densities.

During the summer of 1985, ADEA conducted a major exercise for TRADOC called the Interim Motorized Infantry Division Capabilities Analysis (IMIDCA). This was a multi-month intense effort to war game the motorized division using various weapon systems as an interim assault gun. The M551 Sheridan was dropped as the primary candidate because of supportability problems and the need for an upgraded turret. Among the systems evaluated were the M3 Bradley with TOW, the M901 ITV, the HMMWV equipped with TOW/25mm mix, and the M60A3 tank. Through extensive computer war gaming and analysis (over two months), the optimum interim system was determined to be the TOW-equipped HMMWV. On 26 September 1985, the CSA approved the decision to equip the interim motorized division with the HMMWV-TOW, while efforts were stepped up to procure what was now called the Armored Gun System (see app C, fig. 10, 11, 12 for interim maneuver battalion structure). The Armored Gun became the center of great debate, as the decision to up-gun M1 tanks with a 120mm gun had recently been approved. Did this mean that the AGS required a 120mm? The action to move forward with the development of the AGS stopped in the office of the Undersecretary of the Army, pending additional review. The debate raged through 1985.

An air of uncertainty about the overall capabilities of the motorized division became evident from DA and TRADOC. Before additional resources were committed, the decision was made to conduct an instrumented evaluation of a combined arms battalion to: (1) develop data of statistical validity to prove the viability of the O&O and the ability to attain flank and rear shots, and (2) determine if the CAB design had Army-wide application. For about two months there was a flurry of activity. Coordination meetings were held at the general officer level to develop plans. The final recommendation to the Army leadership was to send a CAB(H) to Ft Hood, TX, to oppose a regimental-sized force from one of the III Corps' armor divisions. The evaluation would be fully instrumented in order to get statistically solid data on the capabilities to win against armor using the motorized O&O. This evaluation would then be followed by a full rotation through NTC to confirm data. The decision from HQDA, however, was that such an undertaking was too expensive, and the motorized division lost an opportunity to prove its capabilities beyond a doubt.

During the summer of 1985, the motorized division received another set-back when Congress refused to appropriate additional funds for a Fast Attack Vehicle. Congress had serious concerns about the survivability of the FAV under artillery fire as well as the long-term reliability of the vehicle. Congress was also concerned about the future of the motorized division in light of GEN Wickham's emphasis on the Light Infantry Division. The division commander decided to keep 2-1 LAB equipped with the surrogate FAV and equip the second LAB, 3-60 IN, with HMMWVs. Later in the year, the expense of maintaining the surrogate FAVs became so great that the decision was modified so that both LABs would be equipped with HMMWVs. The FAV passed into memory, and a part of the division's mobility--the capability of transporting two FAVs with a single UH-60--was lost.

Starting in August 1985, the 3d Battalion 1st Infantry was provisionally organized as the ninth combat battalion in the division. The 2d Battalion 77th Armor would be transferred from the division to I Corps when the motorized division became fully operational. The 3d Brigade turned in its surrogate vehicles and began to draw HMMWVs, to be completed by December 1985. At the same time the infantry battalions in the 2d Brigade began downsizing and drawing equipment in order to become operational CABs by March 1986. The divisional air defense artillery also reorganized in November 1985, as the division continued to draw down into its motorized configuration.

In September 1985, the 3d Brigade demonstrated the massive firepower and mobility of the motorized concept when it conducted the most extensive firepower exercise in recent 9ID history. This combined arms live fire exercise was given to the NATO Military Committee, escorted by the Chairman of the Joint Chiefs of Staff and the Chief of Staff of the Army. The exercise gave an awesome demonstration of the firepower available to the motorized infantry division--artillery, attack helicopters, TOWs, MK19s, mortars, and small arms.

A great deal of activity was occurring as 1985 ran into 1986. One battalion (reinforced) from 1st Brigade departed for the six month peacekeeping mission in the Sinai, beginning in November. In addition to more than 800 soldiers, a composite aviation company from CBAA accompanied the force. Other actions continued to refine the command, control communications, and intelligence in the division through improvements to the MCS 2.0 system. In November, the division conducted a MAPEX and then took part in a major Corps CPX. In January the division conducted yet another MAPEX to train the division's leadership and exercise its C3I system. In February, part of CBAA moved to Fort Hunter-Liggett to conduct an Air-to-Air Combat Test. This was a concerted effort by the Army aviation community to develop doctrine concerning the use of helicopters in air-to-air combat using Stinger air defense missiles. During March, 3-1 Infantry, a CAB(H), activated and began the process of drawing all available equipment. In April, 2-77 Armor (still organic to 9ID until October 1986, when it became an I Corps unit--but attached back to 9ID for administration and training) converted to a J-series MTOE with M60A3 tanks. In May, 2d Brigade culminated its fielding of HMMWVs and transition to motorized MTOEs with a demanding FTX at Yakima Firing Center. Also in May, the 9ID's second attack helicopter battalion, as authorized under the motorized division MTOE, was sent to Fort Polk, LA, as the divisional attack helicopter battalion for 5ID (Mech). Although attack helicopters played an absolutely critical role in the motorized O&O, budget constraints dictated the loss of the 214th Attack Helicopter Battalion from the division.

One of the most significant activities for 9ID in early 1986 was the deployment of part of 3d Brigade Combat Team, 2-1 LAB, augmented with one motorized infantry company, part of the divisional cavalry squadron, and normal combat support and combat service support elements, to Korea for TEAM SPIRIT 86. Although supposedly operating in terrain not optimized for the motorized force, the motorized units were able to confuse and disrupt the "enemy" because of their speed, agility, and mobility. The maneuverability of the motorized units contributed far more combat power than simply what its number of weapons system represented.

August and September of 1986 found more than 5000 members of the division at Fort Hunter-Liggett, CA. Here, as both Observer-Controllers and OPFOR for the 7th Infantry Division (Light) certification exercise, the motorized soldiers were able to see first-hand some of the tremendous tactical advantages the motorized O&O had over the light infantry division in conducting maneuver warfare. The 9ID personnel returned to Fort Lewis with a reinforced belief in the capabilities of the motorized division.

In September 1986 the final combat brigade, 1st Brigade, reorganized into its motorized configuration. This, as with all other units, was an intensive process which required the preparation of vehicles for turn-in prior to drawing new vehicles needed for the new MTOEs. 1st Brigade's COHORT companies were a real problem, because they were recruited and trained as infantry companies, not motorized infantry. The difference in structure and training was significant. Although company-sized rotations ceased, 1st Brigade continued to send smaller packets of COHORT soldiers to Korea until January 1989.

On 1 October 1986, as decreed by GEN Wickham in December 1984, the interim motorized division became fully operational. Only bits and pieces of the division had not completed their transition in terms of personnel. Equipment was quite another issue, as most of the division was using surrogate or interim equipment of some kind, while waiting for full fielding of objective equipment. Repeated delays in fielding such systems as the MK19 Mod III Grenade Machine Gun, the Squad Automatic Weapon, the 120mm mortar, the Remotely Piloted Vehicle, night vision goggles, new radios, the SEE, and--most importantly--an Armored Gun System, impacted on the overall capabilities of the division. Nonetheless, the 9th Infantry Division (Motorized) was operational and capable of deploying to any contingency world-wide.

The 2d Battalion 47th Infantry (CAB-H) was transferred to the CBAA in October 1986, thus adding a ground combat battalion and reinforcing the CBAA's role as the division's fourth maneuver brigade. This also added new horizons in tactical mobility and agility as the CAB(H) developed new training initiatives using CBAA's airmobility.

Throughout the remainder of 1986 and the first half of 1987, the division continued to turn in old equipment, receive new equipment, and train using the motorized O&O. This was the major focus of the period as the division transitioned from a "test" unit to a fully operational division. OCTOFOIL FOCUS training densities continually kept one brigade-sized combat team in the field for three week training periods. In December 1986, parts of two motorized battalions were sent to Yakima Firing Center on an Emergency Deployment Readiness Exercise to act as an opposing force for a light infantry brigade that was EDRE'd from Fort Ord. The advantage the motorized units had in mobility, command and control, firepower, and combat service support reinforced tremendously the capabilities of the motorized force and greatly enhanced the confidence the motorized soldiers had in their ability to fight and win.

Division Command Post Exercises were run once per quarter, in December 1986, January, May, and August 1987, to train leaders and fully exercise the continued improvements in the hardware and software used in the MCS 2.0 system. MG Pihl accomplished the mission, fielding an operational division.

On 10 June 1987 MG Pihl received his third star and was assigned as Military Deputy to the Assistant Secretary of the Army, Research, Development and Acquisition. The 9th Infantry Division (Motorized) now had a new commander, MG John M. Shalikashvili. The new commander's mission was to take the recently operational motorized division and train it to a fine edge in order to support contingencies worldwide. No longer was equipping the new division the primary activity. Practical, functional, intensive training was the new goal. This was especially tough because there was no doctrinal literature anywhere but at Fort Lewis. The various service schools did not teach motorized operations, meaning incoming officers and NCOs had to be trained in the division. The new commander implemented regular Motorized Tactics Seminars for major subordinate commanders, separate battalion commanders, and the division staff. Through these seminars, the missions, tactics, and operational concepts were refined. OCTOFOIL FOCUS densities continued, with renewed emphasis on tactical realities, as each maneuver brigade (the three infantry brigades and CBAA) were scheduled for three 21 day training periods per year in Yakima Firing Center. Major emphasis was also placed on maximizing training using Fort Lewis training areas. Near-term readiness and warfighting were the focus. The 9ID was no longer a test bed. It was written in to more war plan contingencies than any other division in the Army.

Some limits on training resulted from Congressionally-imposed funding constraints on the Army. Training did not slow down, but efficiencies were required.

Budget constraints also impacted upon new equipment development and purchases. Equipment the motorized division expected to field to bring it closer to its objective design was slipped further into the future as a result. Another equipment delay impacted upon the fielding of the critical MK19 Mod III 40mm Grenade Machine Gun. Although total fielding for the division was to occur in FY87, the manufacturer was unable to produce a fully functional weapon. More modifications and resultant testing were necessary. Left without one of its major weapons systems, the 9ID (MTZ) began to field M2 .50 caliber machine guns as an interim weapon to ensure some measure of firepower to the maneuver units. Even the MK19 Mod I GMGs, which had been in the inventory since Vietnam and which had been used and fired for more than four years by the 3d Brigade's units, were pulled out of the division's inventory because they had not been adequately safety tested by the Army's Test and Evaluation Command for mounted firing.

There was some good news concerning new equipment. The Armored Gun System concept finally received approval from the Under Secretary of the Army in July 1987, after languishing for nearly two years. A Required Operational Capability (ROC) and O&O Plan were developed by the Armor School. At least there appeared to be some positive action on the motorized division's most critical piece of equipment.

Likewise, another key piece of equipment, the long-range anti-tank Ground Launched HELLFIRE system again came into play. The Army's Missile Command began working with the division to develop the system. Necessary documentation and testing plans were developed, and Congress approved funding specifically for the continued testing of the GLH.

Another bright spot for the division was the scheduling of a full brigade rotation through the Army's ultimate training ground, the National Training Center. Scheduled training events and requirements dictated that the 3d Brigade Combat Team, augmented by CBAA, would be given the opportunity to be first through the NTC. Units trained throughout the fall, and in January-February 1988, conducted a major FTX to train at the level of intensity found at the NTC. Much of the division's resources were committed to ensuring the quality of the training.

DOWNSIZING AND DEBATE OVER MOTORIZED

In October and November 1987 Congress directed defense budget cuts. In implementing this policy, the Secretary of Defense ordered the Army to cut end strength, despite strong objections by the Army leadership. On 12 January 1988, HQDA gave 9ID a warning order to inactivate a brigade combat team (2532 authorized spaces).

MG Shalikashvili notified the 2d Brigade, which was in Yakima for an OCTOFOIL FOCUS training density, of his decision to nominate the 2d Brigade Combat Team for inactivation. The severe constraints of the Army's budget and manpower requirements drove the decision, which was announced in April 1988. The 81st Brigade of the Washington Army National Guard was selected to become the 9ID's designated round-out unit. The 81st Bde's structure of two tank battalions and two mech infantry battalions also signified a change for the motorized division. The Army decision makers began an on-going debate on the future of the motorized division. As an interim structure, the 9ID, with the addition of 81st Brigade, would be a combination of motorized and heavy forces. (See app C, fig 13 for the current structure.)

The 2d Brigade Combat Team began the painful process of transferring or turning in all equipment, transferring all physical facilities, and moving all personnel to other units on Fort Lewis. On 26 August 1988, all of the units of the 2d Brigade

Combat Team were inactivated in a division ceremony. During the same period, the 1st Battalion 33d Armor (redesignated from 2-77 AR) was transferred from I Corps and again made part of the 9ID.

An additional nail in the motorized coffin was the result of a 16 February 1989 decision by the Army leadership to cease the development process for an Armored Gun System. The competition for scarce dollars and the lack of nondevelopmental systems capable of filling the role of AGS forced the hard decision to cancel the project. This key weapon system, around which the motorized O&O was designed and developed, would not be procured for the Army. The whole concept of a highly deployable anti-armor division was again up for debate.

In December 1988, the Department of the Army sent a warning order to be prepared to convert one of the CABs in the division to a mechanized infantry battalion. As a possible interim structure, the division should consider one active heavy brigade, 1st Brigade; one active motorized brigade, 3d Brigade; and one reserve component heavy brigade, the 81st Brigade, Washington National Guard.

The future of the motorized concept is unknown. A brigade rotation to the NTC in March 1989 will consist of a brigade headquarters, a tank battalion, a motorized CAB(H), an aviation task force from CBAA, and the CS and CSS slice from the brigade. This motorized/heavy combination will be closely evaluated to see if this structure maximizes the advantage of each type of unit. What will happen in the future remains to be seen. However, the spirit of innovation and desire to conduct true maneuver warfare operations will carry over into any organization to which the 9th Infantry Division (Motorized) evolves. The spirit of Motorized will live on.

PART II

MOTORIZED EXPERIENCE OF COMBAT UNITS

MANEUVER HEADQUARTERS
COMBINED ARMS BATTALION (HEAVY)
COMBINED ARMS BATTALION (LIGHT)
LIGHT ATTACK BATTALION
ATTACK HELICOPTER BATTALION
CAVALRY SQUADRON

MANEUVER HEADQUARTERS

1ST BRIGADE
2D BRIGADE
3D BRIGADE
CAVALRY BRIGADE (AIR ATTACK)

THE MOTORIZED BRIGADE - FROM CONCEPT TO REALITY

This article will focus on the motorized brigade, but not solely on the 1st Brigade. The discussion will center on the brigades that I watched evolve with the motorized idea. Up front I must state that writing about the motorized force is akin to asking a preacher to write about the Bible. For five years I watched the struggles, the defeats, the victories associated with the user development of a Tables of Organization and Equipment (TOE) unit from scratch. This article will cover the period from May 1983 to July 1988. During this period, I served successively as the Division G-3 (June 1983 - March 1985), Division Chief of Staff (April 1985 - July 1986) and the 1st Brigade Commander (July 1986 - July 1988).

THE BEGINNING

The idea for a motorized division originated in 1981 when the Chief of Staff of the Army (then General E. C. Meyer) directed the initiation of an effort to form a unit that "advantaged the mobility, firepower and survivability of a heavy division and the sustainability and strategic mobility of an infantry division." The division commander was charged with developing revolutionary approaches in tactics and equipment that could evolve into a new kind of division. Additionally, this organization would be optimized for Southwest Asia, but would retain utility for employment in NATO.

The 9th Infantry Division, then a standard H series infantry division with a mechanized battalion, a tank battalion and seven infantry battalions, plus normal combat support and combat service support, was to be the source unit of the new organization. The High Technology Test Bed (HTTB) was to consist of combat developers, force development experts, TOE writers and experienced field soldiers to assist in identifying, evaluating and recommending to Department of the Army operational concepts, doctrine, organizations, materiel requirements, technology and training developments.

From October 1981 until May 1983, the division and the HTTB had conducted a series of "How to Fight" seminars to determine the organizational and operational concepts required to achieve the mission as directed by the Chief of Staff of the Army (CSA). These seminars took the current 9th Infantry Division organization as a baseline and incorporated those mandates from the CSA. The "How to Fight" seminars included two iterations on Southwest Asia, one on Korea and one on Europe. The lessons learned from these seminars provided an operational and organizational point of departure.

In May 1983, I joined the 9th Infantry Division at Yakima Firing Center for the conduct of Exercise LASER MACE (7 - 15 May 1983). This was to be the first brigade-size evaluation of a high technology light division (HTLD). The HTLD Brigade (3d Brigade) at Yakima in May 1983 had evolved to an organization consisting of an assault gun battalion (2-60 Infantry), a light motorized infantry battalion (3-47 Infantry), and a light attack battalion (2-1 Infantry). This was the first time that these newly organized elements were fielded as an integral unit. This exercise was preparation for the formal TRADOC evaluation to be conducted in conjunction with Joint Readiness Exercise BORDER STAR in March 1985. It was also the formal "testing" of the combat battalions. Other objectives included exercising the division's logistical procedures, identifying daily consumption figures and refining the intelligence system.

It is critical to understand that the operational concepts were based on organizations manned with equipment that did not exist. I was about to come to a full understanding of the term surrogate--a very common term for the next five years and one of the greatest problems associated with an earnest effort to achieve the CSA mission. The assault gun was defined as a light assault vehicle (LAV 25) with a strap-on TOW, but to this day no one ever described that animal. Soldiers were equipped with the M901, improved TOW vehicle as a surrogate vehicle. The training, however, focused on fighting the vehicle as an assault gun. This was a great challenge to the leadership and despite the best efforts, was a source of confusion for soldiers. However, it was essential to demonstrate the capability of the organization. The light motorized infantry battalion was equipped with a modified CUCV truck with roll cage, seats, seat belts and a mixture of gun mounts. This was the surrogate for the HMMWV squad carrier--yet to be designed. The light attack battalion was equipped with a surrogate fast attack vehicle (FAV) which was a Baja-type commercial dune buggy that had been modified to accept a gun mount for a .50 caliber or M60 machine gun which served as a surrogate for the Mark 19 40mm grenade machine gun. Other FAVs had been modified to accept the TOW missile system. Each FAV had a crew of two for the mission. This conglomeration of equipment gave rise to the affectionate term--"Toys-R-Us" division.

The arrival of the 3d Brigade at Yakima was accomplished through a very intricate and detailed operation known as a lodgement. A lodgement is defined as "an offensive airland operation into a designated, secure area, which, when seized and held, ensures the uninterrupted landing by air of troops and equipment and provides maneuver space for subsequent operations." Basically, a lodgement was a take-off on the airborne/airhead operation and allowed the United States the means to project a heavy anti-armor force rapidly. If an assault entry was required, the HTLD could be augmented with an airborne battalion. In this scenario, the landing site was secure and the initial entry forces arrived by helicopter under the cover of darkness to ensure the uninterrupted landing of subsequent forces. This was demonstrated on Selah Airstrip at Yakima and impressed me as a very powerful capability.

After observing the HTLD brigade perform a diversity of tactical missions, largely at night, over relatively vast distances, I started to believe that those participants in the "How to Fight" had hit on a potential winner. Give these magnificent soldiers the needed equipment, and they will demonstrate a new, evolutionary idea in mobile warfare. Most impressive was the ability of these forces to conduct a "deep attack" well behind enemy lines by vertical envelopment with ground linkup. This was actually executed at night by a vertical envelopment from Yakima to the Tri-Cities area over 75 miles away. Equally impressive was the enhanced divisional level communications capabilities, intelligence collection assets and the first glimmers of an automated command and control system.

As a follow-on evaluation, the 3d Brigade returned to Yakima Firing Center in September 1983 for FTX CABER TOSS, which was designed to evaluate the logistics supportability concept of the brigade combat team including the combat support slice and the forward support battalion. This was the most extensive logistical evaluation in my experience. The division had previously participated in a command post exercise (CPX) to derive the scenario-based logistical data required for the FTX. There was no opposing force during the FTX, but rather it was a skillfully scripted logistical exercise that required the movement of every item of supply in exact weight, location, and distance to that derived from the CPX. Medical emergency care and evacuation were fully integrated with no short cuts. This was truly a novel exercise and was fully documented as the most intense logistical exercise ever conducted. TRADOC collected every conceivable type of data during the exercise. As a spin-off, the division provided Fort Leavenworth a detailed lay-down on the concept for use by other units.

THE REFINEMENT

Shortly after the division returned from LASER MACE in May 1983, a division-level change of command took place. The previous commander had put the CSA guidance in motion and had demonstrated the potential of a high technology light force using surrogate equipment. The new commander had the awesome task of refining the capability based on equipment constraints, new emphasis on reductions in end strength, potential "competition" with a new CSA initiative called the "10,000-man light division," and training the division to be a combat ready force with present manning and equipment while retaining readiness during the transition.

It is important to recognize the organization of the brigades of the division at this time. The 3d Brigade was still organized as stated above (but not for long), the 1st Brigade was organized with three standard infantry battalions and the 2d Brigade was organized with two standard infantry battalions and a tank battalion. The division base was a one-third/two-third split in a transition state. The one third had been modified in an evolutionary fashion to support the emerging HTLD concept. Thus, the training challenges of the new commander were simply unbelievable. However, the new commander soon provided divisional Annual Training Guidance that became a standard for other divisions. Suffice it to say that it was a major source document for the Army publication of the initial version of FM 25-100, Training the Force. This training plan made routine both combined arms training and brigade training densities; this was unmatched in my experience. This concept was masterfully built upon by the next two division commanders under whom I served.

On 19 September 1983, the CSA visited Fort Lewis and was briefed on the results of FTX LASER MACE, the plans for the ongoing FTX CABER TOSS and the subsequent plans for validation of the HTLD. It was pointed out to the CSA that modeling and wargaming to determine if the organization of combined arms battalions was theoretically feasible was on-going. On 14 October 1983, both the Vice Chief of Staff, Army and CSA were briefed on the design changes. From these briefs came the approval to form combined arms battalions. The combined arms battalion-light (CAB-L) was organized with two motorized infantry companies and an assault gun company. The combined arms battalion-heavy (CAB-H) consisted of two assault gun companies and one motorized infantry company. During briefs to the CSA, the name of "HTLD" was also discussed, and the CSA directed that the division call itself the 9th Infantry Division (Motorized) HTLD, or the High Technology Motorized Division. Thus, in early 1984, the 9ID officially became the 9ID High Technology Motorized Division (HTMD). Previously, HTTB had become the Army Development and Employment Agency (ADEA).

Recognizing the tremendous impact that the extended testing and evaluation had on the soldiers and the combat readiness potential of the HTMD, the division commander provided the TRADOC and DA communities with a new proposal for validation in January 1984. Rather than wait until Exercise BORDER STAR in March 1985 to validate the division organizational and operational (O&O) concepts, it should be done in August 1984 as part of FTX LASER STRIKE at Yakima Firing Center. And so was rapidly born the HTMD External Subjective Assessment (ESA). In truth, the key player in validation was the division commander. He was the one charged to produce a high technology unit. He was the one who also served as the commander of ADEA and was the one in the best position to evaluate truthfully the efforts of the past three plus years. All external evaluations were certainly welcomed. Thus, in late 1984, the commander of the division and ADEA would provide a decision briefing to the CSA concerning fielding of the HTMD.

FTX LASER STRIKE was conducted at Yakima Firing Center and local maneuver rights areas during the period 18 to 23 August 1984. This was a brigade force-on-force exercise closely evaluated, vertically and horizontally, by TRADOC test activities and proponent schools. This exercise was a five phase event, with a lodgement having been conducted in May 1984 as a tactical exercise without troops (TEWT) because of insufficient transport assets. The evaluated phases were: I - movement to contact; II - attack; III - defend; IV - delay; and V - deep attack. For five days, I observed the maturing of motorized forces. It became clearly evident to me that the motorized concept of containing the enemy's strength while seeking to attack his weaknesses and at the same time advantaging maneuver was absolutely correct. The motorized forces operated dispersed over wide distances, picked the place to meet the enemy and rapidly concentrated overwhelming combat power to execute engagement areas.

I became convinced that there is some geometrical formula that equates mobility on the battlefield to armor protection. The motorized forces were able to avoid being fixed and thus to avoid destruction. To be fixed meant sudden death. It all made sense, motorized forces are fully capable of advantaging the firepower, survivability and mobility of a heavy force, by operational techniques. Motorized forces could not achieve the lean support base or equal strategic deployability of a standard infantry division. However, they could come relatively close and offered a marked advantage in armor-killing capability that was unknown in standard infantry forces.

After all the ESA analysis was completed and the point and counterpoint made, the facts were clear--at least to those of us who had watched the HTLD/HTMD process. Motorized was real, but came with a relatively expensive price tag. In December 1984, results of the ESA were briefed to a number of senior Army leaders culminating with a brief to the CSA. The division commander declared the HTMD concept viable, but restated the critical need for equipment to make the concept a reality. This need for objective equipment remained the pivotal issue.

THE PROOF

Exercise BORDER STAR still loomed as a great challenge for the HTMD--the world of skeptics would be looking. In February and March 1985, the 3d Brigade and division headquarters along with the appropriate slice from the division base deployed to Fort Bliss, Texas. During the period of 11 March to 5 April 1985, the motorized concept stood tall, proud and real. Unquestionably, the enhanced command and control system of the division was the highlight of the CPX phase. Though still in its infancy, the potential caught the eyes of key Army leaders. Then came the FTX that placed the motorized squarely against a skilled armored cavalry regiment (ACR). The motorized brigade, equally skillfully commanded, never faced the ACR squarely. It did all those things I had come to expect at LASER STRIKE--operate at night, contain the enemy with minimal forces, attack his flanks and rear by executing engagement areas, stay dispersed but concentrate rapidly, and orient on the enemy not the terrain. All this required a high state of training and gifted commanders. Such was the state of the 3d Brigade and its subordinate units. Allow me to grandstand and state that the division stole the spotlight at Fort Bliss. The nay-sayers who took time to look--saw.

DECISION TIME

Shortly after Exercise BORDER STAR, the division experienced another change of command. The departing commander, unquestionably, had carried the concept to reality. He had demonstrated in two major field exercises, numerous CPXs, TEWTs, and seminars that the motorized concept was real. He had fully documented the facts. The ESA was a matter of record. He had also set in motion the publication of a four volume set of doctrinal manuals to provide legitimacy to the precepts of motorized concepts. The draft of these documents were forwarded to Fort Leavenworth with the understanding that the doctrine writers there would publish an initial field circular, then field manual, for motorized operations. It is important to note that these documents were shelved and, as of this writing, remain dormant. This was a great blow to documenting motorized and spreading the work throughout the Army.

The new division commander had a great challenge. If he accepted the premise that motorized doctrine offered a viable capability, then it was time to get real decisions on the fielding of the equipment necessary to breathe life into motorized. There was much to be decided. The tab for a motorized force had been articulated: an assault gun system, a true squad carrier, a fast attack vehicle, the Mark 19 grenade machine gun, more TOWs and a vast amount of other combat, combat support and combat service support equipment. The price was by no means cheap. However, the Army had the right leader in the right place once again. The new commander was an experienced combat developer. He would get the truth whether good or bad. Shortly after his arrival, the 9th HTMD became the first unit equipped with the HMMWV. Numerous variants were necessary to provide for the diverse needs of the HTMD, but at least a commitment seemed evident. There was a plan to equip the motorized infantry squads with a HMMWV-derived squad carrier which was not yet defined. In the meantime, the division got permission to modify 135 utility HMMWVs for squad carrier purposes.

The division commander retained his role as the commander of ADEA. In fact, part of the guidance from the CSA for the new commander was to make ADEA fit the whole Army. This took on an expanded responsibility for the commander. In the fall of 1985, the commander briefed the CSA on the status of the HTMD. Out of this came a clear understanding that an assault gun system was not a near-term item. The alternatives discussed included the M551 Sheridan, ITV, HMMWV TOW, M3 Bradley, and M60A3. It also became clear to the commander that the FAV would not be fielded, and many other items of equipment were unlikely in the near-term. Another decision from this brief was that the new name of the division would be 9th Infantry Division (Motorized).

Over the next year, the division came to grips with a concept known as the "interim design." Since the motorized force that had clearly demonstrated its capability was not affordable in the near-term, we were to document that force for the long-term "objective design"--but field an interim motorized force in the near-term. And so, the interim motorized force fielding was initiated, to include expansion to the other brigades. My old nemesis called surrogate was now replaced by interim. The interim organization of the Third Brigade would consist of a light attack battalion centered around the HMMWV TOW and HMMWV with MK 19 GMG or surrogate .50 caliber; a CAB(H) consisting of two HMMWV TOW companies (20 TOWs each) and a motorized infantry company (with the interim HMMWV squad carrier); and the CAB(L) with two motorized infantry companies and one HMMWV TOW company. The 1st Brigade would be the same type organization. Now the challenge was to determine how to best fight this interim organization. The frequent expression was that the execution of motorized tactics was done at risk--and so it was. This simply meant that we were generally able to execute the operational concepts of motorized warfare, but at much greater risk than was envisioned with the objective equipment.

As the interim design was accepted by the Army and actions initiated to gather the equipment needed for the interim organization, I moved from the Division Chief of Staff position to assume command of the 1st Brigade. The 1st Brigade at that time was still a standard infantry brigade. Over the next year, we reorganized to the interim design, which meant turning in old equipment at -10/20 standards and drawing the "new" interim equipment. The subordinate battalions performed superbly. I was truly amazed at the flexibility of the young soldier to adjust, to learn, and to accept challenges.

REALITY--EVEN IF INTERIM

As the interim design was coming to life in the 9th Infantry Division (Motorized), the normal rotation of division commanders came again. As had been my belief for the three previous commanders, once again the right general appeared at the right time. The division's interim design impacted on every unit. There were numerous changes in all the combat, combat support and combat service support units. There were numerous battalion and brigade changes of command. The focus of ADEA was now largely external to the division. Clearly, there was a great challenge to fix the design, to establish a common base of understanding, to build competent leaders and soldiers with the confidence in their organization and equipment to fight and win. There was the need to achieve a high state of readiness and to ensure the Army knew that the division was a competent combat ready force. These challenges were exactly the focus of the new commander.

Through a number of solid initiatives, he imbued a commonality of purpose and understanding. Through frequent "War Fighter" seminars, the senior leadership developed a singular focus, a togetherness, a bond that permeated the leadership of the division. The training pace quickened, but with a specific focus. As new leaders experienced the interim design for the first time, they asked questions, challenged the "old timers" and helped the division grow and mature. The division was the first to participate in the new training initiative called Battle Command Training Program. The outstanding performance during that experience attested to the wisdom and sound guidance of the commander. With a solid team and a solid training program, the division achieved a high state of preparedness and was unquestionably ready to fight in the interim design as the world's first truly motorized force.

Then came the decision to reduce the 9th Infantry Division (Motorized) by one active duty brigade and to reorganize to a motorized-heavy division as another "interim" step to new design--several alternatives are now under consideration.

THOUGHTS ABOUT 1ST BRIGADE

The motorized force is a high spirited team trained to fight with the initiative at the lowest levels and possessing battlefield capabilities not found in any other force. The entire force revolves around the aggressive use of terrain to capitalize on weapon system stand-off distances across very wide frontages, as well as the ability to relocate quickly and reacquire new targets at the TOW section level and above. Conversely, the motorized force focuses on the enemy rather than the terrain. The most successful motorized forces are those possessing the well known "cav" spirit of aggressive operations, initiative, speed, and surprise. All the necessary systems for a division to execute successfully a battle concept based on these characteristics are present in the objective design. With the interim design, motorized operations can be executed with an acceptable degree of risk.

Expanded distances in motorized operations challenge command and control to the limit. The 9th Infantry Division's (Motorized) automated command and control systems are designed to complement operations over the normal division frontage. Usually cumbersome and untimely reports and situation updates are sent instead as secure burst transmissions to the appropriate headquarters. This provides current information to influence the commander's decision cycle. Naturally to be completely successful, the unit must sustain its automated C3 capability with soldiers not trained by

MOS in these modern systems. Nevertheless, automated command and control has proved it has a future and is a reliable battlefield operating system if the commander chooses to let it be so.

An additional C3 capability is that of modifying various automated command and control systems to accommodate forces task-organized to the division. Battle rostered automated C3 sections have been able to deploy with forces not equipped with automated C3. When done, this motorized C3 capability can turn a 3 MPH unit into a fast, flexible and forward-thinking outfit able to keep pace with this division's rapid planning and decision cycle.

The most pronounced advantage of automated C3, though, is the timeliness of information it provides, making the force better able to influence the battle quickly and decisively. Specifically, during two OCTOFOIL FOCUS densities and TEAM SPIRIT 88, the 1st Brigade stretched its command and control further than any time previous in the division. Using a varied array of command posts, battle staff manning and retrans configurations, the brigade was able to communicate consistently and successfully. This brigade operates four command posts--the brigade TOC, TAC, ALOC and the commander's assault CP. When required, the brigade deploys its TOC and TAC laterally and positions its commander's assault CP well forward and ALOC in depth to facilitate command and control in all directions. Using commercial generators to power retrans sites, with only minimal support required to both sustain and relocate the retrans site on a regular basis, the brigade can broadly extend its communicating range. The TOC and TAC command posts are manned by splitting the battle staff between the two CPs. The commander's assault CP is a HMMWV equipped with a "lower echelon" type C3 computer that allows the commander to position where necessary either to control a battle personally or to facilitate the C3 structure. When the commander is not forward in his assault CP, he will locate in either the TOC or TAC, with the S3 locating in the one not occupied by the commander.

Combined arms operations are a significant strength of the motorized force. Although combined arms operations are not unique to a motorized force, they are certainly more significant. The motorized division was structured with specific habitual command relationships of combat support forces to brigade headquarters. These include engineers, air defense, signal, and military intelligence. The normal direct support artillery relationship also exists. These habitual relationships extend beyond major training exercises. Combat support slices routinely train with their supported brigades. Moreover, LNOs from these organizations are permanently located in the brigade S3 section. They deploy as part of the brigade all the time and are included in brigade and battalion level alerts, EDREs, and commander's calls. This special relationship is one that helps to build their employment and capability into the planning cycle as a matter of routine, as opposed to an afterthought. Consequently, we expect to see company commanders well trained in the use of combat multipliers and insist on their being able to do so. We also expect to see OPLANS that are well synchronized with all possible combat support.

Specific forms of maneuver do not differ between other forces and motorized forces. What differs is how motorized forces use the terrain to enhance the maneuver of their mix of TOW squads and motorized infantry. For example, it is likely, and often times preferable, that motorized forces shape the battlefield so they can position for and execute devastatingly violent attacks against the enemy's flanks and rear. This may cause units to fight while being cut off from other friendly forces on the battlefield. The motorized force has the agility, synchronization, and devastating long-range, stand-off firepower to allow enemy units to penetrate the front and still defeat the enemy decisively.

The mix of motorized infantry and TOW gives the commander the ability to contain enemy strength while the TOWs move rapidly to find and exploit weaknesses in the enemy formations. This is enhanced by capitalizing on the great TOW stand-off range, forcing the enemy into engagement areas in which enemy forces are trapped and defeated using the synchronized effect of all the combined arms. These engagement areas are carefully engineered, integrating obstacles, indirect fire, EW, CAS, and smoke with TOW direct fires. They are not a chance event; they are planned in detail, and then the enemy is specifically channeled into them by the maneuver and fires of the TOW and motorized infantry teams. These engagement areas are best controlled at battalion level.

The motorized force never tries to hold terrain beyond what it takes to execute the engagement area. The motorized force is so maneuverable that its rapid displacement can make the terrain a significant obstacle to the enemy. With the division's ability to gather intelligence throughout the battle area, the motorized force is well prepared to shape the engagement area without the enemy suspecting what was occurring. The speed by which this intelligence can be passed using the automated C3 system makes the process that much easier.

Night operations are a significant part of the motorized operational concept. Equipped with night vision devices, TOW thermal sights, thermal intelligence gathering equipment, FOLTs, and night vision trained and equipped helicopter crews, motorized forces can move and fight nearly as effectively at night as in the day. The significant night vision capability extends the battlefield at night far beyond that of any other force. This allows commanders to execute their engagement areas in limited visibility and makes darkness favor the motorized force.

The single biggest advantage to the motorized force is the synergism created by the carefully crafted synchronization of the combat multipliers. The technology in the motorized division enhances this phenomenon by allowing motorized commanders to avoid enemy fires; to deploy and fight dispersed; to fight at greater stand-off distances; to extend command and control in all directions; to move continuously and rapidly; and to find and attack enemy vulnerabilities decisively.

For the past two years the 1st Brigade focused on executing motorized operations as doctrinally designed with interim organization equipment. If resourced properly and "missioned" accurately, within the context of its unique and significant capabilities and admitted vulnerabilities, I am convinced motorized forces have the potential to contribute significantly to Army readiness. It is the firm belief of the leadership of the 1st Brigade that motorized is a viable and survivable force on the modern battlefield. Only combat will truly prove this belief.

SOME CLOSING THOUGHTS

Over five years I have kept all the documentation pertaining to the brief summary provided here. There is much, much more. My intention is to reduce all this to writing at some future time in an article called "The Birth, Life and Death of a Division." Perhaps I'll never get it done, but the present intent is there. I was indeed fortunate to experience these five years--they were wonderful, exciting, challenging, and stimulating. I learned many things, but most importantly, I learned that a group of professionals with the proper guidance can accomplish anything and the young soldier will succeed despite the challenge. I watched the motorized grow from an idea to a reality to a memory, but it was real. Those great division commanders were all filled with vision, knew the direction to follow, and each truly arrived at the right time in the lifecycle. Each has left a legacy of pride, direction, focus and dedicated service that shall long stand.

As I summarize my thoughts, I'll provide comments in three general areas--strengths, weaknesses and lessons learned. My comments do not focus on motorized capabilities, but more on the process by which the division was built. Through many very fine tacticians you can learn the strengths and weaknesses of the motorized force.

The fundamental strength of the formation of a motorized force was the wisdom in making the user the developer. Those leaders and soldiers charged to fight the organization in combat were the key developers. The leaders had a very simple acid test--"Am I prepared to lead the sons and daughters of Americans into combat with this unit as equipped and as operationally designed?" If the question was not a resounding yes, then there was a need for restructure and redirection. By having the HTTB/ADEA collocated with the 9th Infantry Division and responsible to the same commander, the ability to regroup or change direction was simplified. Such ADEA programs as the Expedited Required Operational Capability and Commander's Initiative Program were especially beneficial. There was an honest willingness among commanders to admit a need for a different focus. The vision of the commanders made this process very painless and the relationship between ADEA and the division facilitated change.

The greatest strength was the individual soldiers' ability to visualize a potential capability. The soldiers were challenged to evaluate operational concepts with only surrogate equipment. Much like playing make believe--the vehicle you are riding in is an assault gun, not a M113. The soldiers did superbly. Had they been given the equipment, a new era in mobile warfare would have emerged. I truly believe that! There were also some very important spin-offs from the motorized experience. Two of the potentially most far-reaching are the automated command and control system and the Integrated Training Management System. These will not be discussed here, but are truly indicative of the potential success of the user/developer marriage.

The weaknesses have been mentioned throughout this paper. They are simply summarized as the failure of the system to provide the equipment necessary for fielding. This is in no way a slap at anyone. There are valid reasons why the equipment was not provided--not the least of which deals with funding. Other weaknesses fall from this, but the driving force was the lack of objective equipment and the seeking of acceptable compromises. The major frustrations associated with the motorized were trying to find low cost and acceptable substitute for the design system. The interim design organization demonstrated the best available alternative, but was still a far cry from the objective design envisioned by the "founding fathers."

Many, many lessons were learned and cannot be treated justly in this space. However, one lesson stands out above all others. Clearly, the Army had a doctrinal authority in residence at the time of the formation of HTTB/ADEA. That agency had been the organizational and operational expert for the Army and is called TRADOC. ADEA was a field operating agency of DCSOPS, not TRADOC. Despite the fact that no divisional design has ever been tested to the degree that the motorized was scrutinized, there was a continuous need to relook, restudy, war game, justify, evaluate, test, and so on. In my opinion, the missions of ADEA and division and their established relationship were a challenge to the establishment which we as an Army were unprepared to accept. I do not judge the result. Perhaps the ADEA-9th Infantry Division team was a great idea at the wrong time. Perhaps it just won't work in our currently structured Army. But, the lesson is clear, use the established structure to accomplish design changes or change the established structure.

Motorized is not merely a unit or a specific type of equipment--it is people with a vision, a belief, a purpose--and with the uncanny ability to transform ideas into reality. They did--it is!

2ND BRIGADE

In my two years of commanding a motorized infantry brigade, I have had numerous opportunities to experiment with, observe, train, and execute tactical operations in many unit combinations. My experience includes force-on-force exercises (involving up to five battalions), several battalion-level ARTEPs, numerous divisions CPXs, brigade BASE exercises, controller/observer experience for a motorized brigade training for the NTC, and two years observing various levels of training, from TOW Table I through TOW Table VIII, to platoon and company level ARTEPs.

Additionally, due to the attachment of the 1st Battalion, 33d Armor to my brigade, I have had a unique opportunity to work not only with pure motorized operations, but to gain more experience than any other commander in motorized/mechanized combinations. To supplement this, 2d Brigade has successfully maneuvered its direct support artillery and forward support battalions in conjunction with maneuver battalions on numerous occasions at Yakima Firing Center.

It is important to caveat what I will discuss about motorized operations with some known constraints. First, the lack of an armored gun system, combined with the interim HMMWV TOW II, has significantly modified our O&O concept and has forced us to accept certain modifications in tactical employment of units. The paucity of the Mark 19 grenade machine gun, which this brigade has yet to have fielded, also significantly reduces our ability to execute the operational concept. Finally, it is important to realize that I believe this division cannot be structured to fight in only one area of the world and be focused on one type of threat only.

It is accepted now that we, as any other division, must be prepared to fight anywhere against any threat. This drives us to certain conclusions in each of the operating systems as to the feasibility of motorized as it is now structured to execute the approved concept.

MANEUVER

As evidenced by numerous CPXs and ARTEPs, motorized infantry, as presently structured, cannot perform with versatility. There is a pressing need for additional infantry if the brigade is to perform missions in conventional terms, such as to defend (to retain), to attack a prepared defense, to fight in built up areas or mountainous terrain, and to accomplish rear area combat operations. The requirement to provide security for moving logistics forward in the vicinity of bypassed enemy forces in Korea is an example. TOWs in HMMWVs are inadequate to support this operation, which requires infantry or MPs.

HMMWVs do not provide adequate protection against indirect fire, although their ability to move about the tactical battlefield, supplemented with required dispersion, may offset this deficiency. I believe our training with HMMWVs versus artillery is insufficient for us to draw the right conclusions concerning casualties in this scenario. My concern is that if motorized units, as presently configured, become fixed, they are extremely susceptible to indirect fire. HMMWV TOWs must be extremely careful in fighting tanks. As long as HMMWV TOWs maintain the necessary stand-off, they are capable of extracting heavy casualties from an armored force. If careless, as evidenced in recent ARTEPs, the tanks close very quickly and TOWs lose their advantage. This is a concern that can be overcome with good training.

A study by the brigade showed that the TOW II system cannot move rapidly from battle position to battle position without allowing time to calibrate the sights after each change of position. For example, a cross-country movement of 3.5 miles required three minutes for the crew to readjust the TOW sights before being ready to engage targets. Without this sight adjustment the TOW II has a very low probability of hitting the target with the first round. In a fast-moving tactical situation, the enemy can move up to one kilometer in three minutes. Clearly, we can not execute a critical component of our O&O, rapid maneuver on the battlefield, with the HMMWV TOW II as the foundation for maneuver.

The motorized brigade is in dire need of ground reconnaissance assets. This is vital, as only ground recon, supplemented with technical electronic assets, is capable of identifying well-concealed enemy forces, thus giving adequate time for a brigade-sized unit to maneuver. This time is critical as the survival of a motorized brigade is directly related to its ability to maneuver. We had the opportunity to employ the division cavalry squadron in conjunction with the brigade on the Battle Command Training Program in this role and achieved great success.

FIRE SUPPORT

There are two major points concerning fire support. This brigade integrated 6-11 Field Artillery's fire direction center (FDC) into our brigade TOC to reduce the response time for indirect fire support, to collect more accurate firing data and to foster a closer working relationship between the maneuver of firing batteries with combat units. Although we practiced this integration during a fall FTX only once, I am convinced this is the right approach. It reduces the amount of communications equipment necessary, as well as the number of vulnerable communication links between the direct support artillery battalion and the brigade headquarters. More importantly, it facilitates

AIR DEFENSE

Present air defense elements have difficulty in maintaining pace with motorized units. Towed Vulcans and Chaparrals are adequate in a stationary mode, but are inadequate in fast-paced motorized operations. A weakness in our training is integrating air defense assets in the day-to-day training of the battalions. We must do better if they are to complement the maneuver elements. The combined arms concept, as it works in our combined arms battalions, must extend to the same integration of air defense units.

MOBILITY/COUNTERMOBILITY

When the armored combat excavator (ACE) becomes a reality, it will greatly increase our capability. Without it, our HMMWVs must depend solely on movement and concealment for survival. It is imperative that we possess adequate assets to prepare engagement areas if we are to be successful. The ACE will be a significant step in the right direction. My biggest concern for our engineering capability is that we presently lack adequate organic assets to increase the protection of our HMMWVs throughout the depth of our battle area. With thin-skinned vehicles, it is imperative that we possess adequate engineering assets to prepare fighting positions throughout the depth of the battlefield, not just to support engagement areas. Fielding of the Small Emplacement Excavator (SEE), which was part of the division during its test phase, should help solve this problem.

AVIATION

The application of attack helicopters has proven itself in maximizing engagement areas. However, we cannot always depend on attack helicopters to fly in all weather. They are a terrific adjunct, but they are not a panacea for all our problems. CPX experience has cast severe doubts as to the feasibility of deep, cross-FLOT operations with helicopters. These unsuccessful tactical operations, combined with our difficulty in sustaining such a force, make me think we should relook this aspect of our O&O.

COMBAT SERVICE SUPPORT

The maneuver brigade commander must be responsible for when and where to displace the forward support battalion (FSB) during operations, while DISCOM should only monitor this movement to ensure that adequate support is maintained. It is imperative that face-to-face coordination between the brigade and artillery battalion commanders/S3s/S2s. This integration increases the size of the brigade TOC by only one vehicle and six or seven personnel.

Towed artillery is not the answer for support of the motorized concept. The time required to displace towed artillery is excessive in view of the fast-paced operations we conduct. It is extremely difficult for the direct support artillery battalion to engage targets in depth as well as support decisive engagement areas. This problem is directly related to the towed artillery presently found in our division. Speed is essential to motorized infantry and, needless-to-say, towed artillery is the antithesis of this concept.

INTELLIGENCE

The only sure way to protect a motorized force, even one equipped with light armored vehicles, is to find the enemy and identify his exploitable vulnerabilities before he finds us. This is the essence of combat intelligence. The experiences of the 2d Brigade Combat Team show that the motorized organization allows for proper collection and dissemination of enemy combat information, but that such collection must be a leader's first priority at all echelons. The brigade must develop the enemy situation for the close-in operations using organic assets. The problem is there are no dedicated reconnaissance assets for the brigade commander. Battalion scouts are essential to the success of the battalion, and the need for a reconnaissance company in the motorized brigade is just as critical. Intelligence is the key to maneuver, and we lack this key.

Intelligence collection, analysis and dissemination were significantly enhanced by the integration of the direct support artillery battalion FDC into the brigade TOC. It allowed for face-to-face communication between the brigade S2 and the field artillery battalion S2. This resulted in faster "target servicing," closer field artillery adherence to the brigade high priority target list, quicker access for the brigade S2 to artillery target information, and more rapid "cuing" of an attached AN/TPQ-36 mortar-locating radar.

Current Army doctrine is to organize the CEWI Battalion for combat and envisions frequent task organization changes. This doctrine is inconsistent with the needs of a motorized division because of the extended frontages and depths of our maneuver area. The current motorized military intelligence company structure that supports the brigade provides an ideal mix of passive surveillance devices, jamming, and signals intercept capability.

the support battalion complement the maneuver of the brigade. Many times DISCOM is not aware of the scheme of the maneuver of the brigade, and as a consequence, should not direct the timing and movement of a support battalion. This has been the cause for concern in some CPXs. Inherent within this concept is the brigade responsibility for developing movement times, routes, and locations for the support battalion. The forward support battalions should move every 36 hours. My experience on FTXs demonstrates this is feasible; however, we must be careful to ensure that continuous support is maintained.

To enhance this feasibility, I believe it is imperative that FSBs should displace to built-up areas and not to field locations requiring the unit to put up tents and camouflage nets. This would save not only in set-up time, but also will lessen the organic equipment to transport. A major concern, never successfully overcome, is that of providing security for the movement of the forward support battalion when the rear area is not secure. This is directly related to the shortage of infantry in the motorized brigade. Considering the depths in which we expect to operate, this problem must be overcome.

COMMAND AND CONTROL

The motorized concept as envisioned in the O&O is highly dependent on a sophisticated C3 system to allow it to fight across the depth and width of the battlefield. MCS 2.0 is still in its infancy. It is a step in the right direction, but is far from what we need. Today, it is an information system that provides raw data, assisting the commander in making decisions, but it cannot yet be called a "maneuver" system. Due to maintenance difficulties, MCS 2.0 is not reliable and requires extensive civilian technical support that will not be available during combat operations. We must accept this deficiency and not try to make MCS 2.0 something it is not.

OPERATIONS

A strong point of the motorized unit is the combined arms concept found at the battalion level. Units that habitually train in combined arms utilization are much better at it. This concept is vital and should be retained. Probably the most significant training aspect of motorized infantry that must be retained is the focus on individual and small unit aggressiveness. This will pay great dividends in the future and is essential to the success of our O&O.

Planning and execution of engagement areas is a major feature in motorized tactics. However, we do not adequately teach our subordinates the rationale for why we structure them as we do.

Our present focus is on teaching junior leaders how to mass combat power, but not why we do this. I consider it imperative that leaders understand why, because only then will they approach the planning and execution of the engagement area with maximum understanding. To do this, I recommend a building block technique which elaborates the basics. For example, a minefield is emplaced to degrade mobility, but, just as important, it should confuse the enemy and should place him in a dilemma. When faced with this obstacle, combined with the effects of various weapon systems, the enemy must make decisions based on multiple threats. To breach the minefield, he must either bull his way through or slow down and accept casualties. If he decides to clear a path, he must choose to do it mounted or dismounted. If he dismounts, his dismounted infantry will take further casualties. Once dismounted, his infantry faces the dilemma of not only clearing the minefield, but of reacting to multiple threats from direct and indirect fire, aerial attacks, and loss of control. This is just one simple example to explain why the engagement area is designed as it is. It puts the enemy in a situation where he is faced with multiple choices, and it takes time to make these choices/decisions. Additionally, it is an excellent method for our leaders to determine if they have designed the engagement area correctly.

SUMMARY

I believe the motorized concept would best be utilized in a brigade configuration as opposed to a division. Assigned at the corps level, a motorized brigade could be employed in specific missions, i.e., covering force or exploitation. This may take the form of a separate brigade tailored to perform these missions. The combined arms concept should be retained, but the amount of infantry should be increased to allow it to perform its missions in all types of terrain and against various threats. Its focus should continue to be on depth and an anti-armor heavy organization, but its staying power must be increased.

In summary, I feel motorized operations are viable. However, to enhance our capabilities, we should: (1) increase the amount of infantry; (2) integrate direct support artillery FDCs into brigade TOCs; (3) streamline artillery making it more conducive to motorized units; (4) provide a reconnaissance company to the brigades; (5) displace FSBs every 36 hours as a minimum and (6) train our leaders to understand better the rationale for engagement areas. We also should: (1) retain the combined arms concept in our battalions; (2) continue to stress independent action on the part of our subordinates; (3) recognize MCS 2.0 for what it is at present; (4) better integrate ADA, and (5) relook the utilization of aviation assets within the division.

MOTORIZED

FROM THE 3RD BRIGADE PERSPECTIVE

Military leaders who identified a genuine need for a "middleweight" division were right on. A cursory examination of the global hotbeds of armored incursion against our limited ability to deploy strategically a force with an armor defeating capability demonstrates the value and operating efficacy of motorized forces. The 9th Infantry Division (Motorized) allowed a projection of combat power anywhere in the world within three days. Once deployed, motorized forces add tactical shock and a great amount of lethality to the battle with their speed and armor-killing capability. With this operational capability on a highly mobile battlefield, the ground component commander has a division that can initially "see" the opposing force, contain it, and then attack to defeat it while supporting itself logistically.

The 82d Airborne Division and the Rangers can rapidly deploy to any point in the world, but they are limited to dismounted infantry tactics once inserted and have limited armor defeating capability. Additionally, they are not fully self-sustaining. To deploy a mechanized or armored division would take immense transportation resources and time, neither of which would be realistically available in this context. During this intervening period the light force would be hard-pressed to sustain its combat capability. With the 9th Infantry Division tentatively scheduled to move away from motorized in the immediate future, the capability to deploy a force rapidly with a significant armor-defeating and self-sustainment capability has disappeared.

IMPLEMENTING THE CONCEPT

The operational concept for the motorized division was and is valid, and it was and is clearly executable with the equipment base authorized in the objective design.

Sadly, the Army failed to carry through with the rest of the bargain--designing and fielding the equipment to support the operational concept. Short cuts in equipment fielding quickly arose. Major problems arose with the armored gun system. What would it be? Nobody could decide. The same mentality that plagued the Bradley was now undermining the design of the armored gun system. If the armored gun system had ever come to fruition, I think it would be safe to say that, after all of gadgets under active consideration were added, we would have ended up with something comparable in weight and bulk to the M-1. Other critical items of equipment designed to fit the operational concept were never fielded. Some of the more significant examples include: Position Location Reporting System, Fast Attack Vehicle, Mark-19 Mod III, Small Emplacement Excavator, and the Palletized Loading System.

As the prospects for an armored gun system faded, the division was given the HMMWV with the TOW II as an interim "in-lieu-of" item. Our experience at the NTC confirmed the inability of the TOW II to fire rapidly, to fight close operations and to resupply its limited basic load quickly. Soldier and leader aggressiveness during the NTC "battles" generated high kill ratios against armored forces. However, on a long term basis the TOW II had significant shortcomings as our main motorized weapon system. The TOW II will be effective so long as the stand-off advantage of the system is maximized. This is easy to say but often hard to do against an adversary who emphasized offensive pace and momentum and will close as rapidly as circumstances allow. Once inside main gun range the opposing tank force has the advantage of rapid fire, the ability to engage multiple targets with one weapon system, and the speed to outmaneuver our forces. The TOW II mounted on the HMMWV in the scout and AT platoons would greatly complement the AGS. The experience of this brigade through various FTXs has shown that the motorized maneuver battalions lack adequate infantry. An optimal battalion mix would be two TOW companies and two infantry companies to provide a better dismounted capability to execute traditional infantry tasks. The problems encountered without additional infantry would have been magnified with the armored gun system. Were the armored gun a tracked vehicle, the crew would have been more confined to the vehicle. Their ability to fight a dismounted threat would have been greatly hampered. Additionally, dismounted infantry is required to secure an armored force and terrain which has been occupied. We attempted to rectify this shortcoming for our NTC rotation by adding an additional infantry company to the light attack battalion. This effort was denied by the NTC as they felt it was a ruse to lower the force ratio with the OPFOR in lieu of cross-leveling our forces to be more mission capable.

Millions of dollars and an inordinate number of man hours have been spent on developing a command and control capability. Though possessing some maintenance challenges, the tactical command, control, and communications vehicle proved highly worthwhile, adding an excellent communication capability to the battlefield. MCS 2.0 may be a different story. MCS 2.0 operates well only when the contractors and maneuver units can dedicate the personnel and time to ensure data flow and continual operation, such as CPXs. In an FTX or actual combat situation, the dynamics of the battle are such that personnel assigned to the various staffs are intensely doing their assigned jobs just to stay ahead of the battle. Subsequently, MCS update data does not get placed into the system in a timely, accurate manner at the lowest level. The data products from that point reflect inaccurate information; ultimately, personnel are diverted from other critical tasks to input the data. We were given a system to implement and use, but were not resourced with additional manpower. MCS 2.0 and its follow-on systems have much to offer, but we must be resourced with the equipment and personnel needed to make it a combat multiplier.

SYNCHRONIZATION

The Cavalry Brigade (Air Attack) is a tremendous combat multiplier. When introduced on the battlefield, it can rapidly change the battle's momentum to our favor. Its cavalry squadron provides the division with a limited but very useful set of eyes. Its attack battalion, with its maneuverability and armor defeating capability, adds the equivalent of another maneuver battalion. Its general support aviation battalion, with two combat support aviation companies, gives this division double the lift capability of a heavy division. This gives a tremendous logistics resupply capability.

Cavalry Brigade (Air Attack)'s drawback is its designation as the fourth maneuver brigade and assignment of a motorized battalion (in the past a CAB-H and now a light attack battalion). To exercise its role as a maneuver force, CBAA was habitually given a deep strike air assault mission employing UH-60s. It required two UH-60s to move one HMMWV with crew and basic load of ammunition. On a hot day such as we would encounter in Southwest Asia, the external load capability would be severely reduced below this minimal capability. In addition, such an operation would require an inordinate number of aircraft and place that aspect of aviation support at high risk of loss. Throughout our exercises with aviation support, the limiting factor for implementation of the asset has been climatological. Insufficient moonlight, winds, turbulence, and inflight visibility have all played to the disadvantage of the ground maneuver forces for the timely commitment of aviation support. If a commander writes the aviation force into a course of action, he needs to be cognizant that it may not be available at a critical time on the battlefield.

Artillery has made significant improvements in their equipment to execute motorized doctrine. At the NTC, motorized artillery success far surpassed that of sister units in the heavy or light divisions. The first ever sustained COPPERHEAD kills were attained. This is attributable to the concept for control and positioning of Forward Observation and Lasing Teams as well as the training within the artillery battalion. The drawback to the artillery support has been gun capability itself, the towed 155mm howitzers. The towed artillery pieces were too slow on the battlefield to keep pace with the motorized maneuver forces. Maneuver forces quickly outdistanced their artillery umbrella in the offense, and the artillery was either bypassed during rapid movements or had to move repeatedly, thus reducing effective fire on target.

The intelligence gathering capability for the division is probably one of the finest in the Army. Again, we have tested the majority of the electronic warfare systems in major training events with good success. In particular, the NTC proved what really worked best. Most significant was our ability to intercept OPFOR frequencies, to obtain intelligence and to jam frequencies that provided direct or indirect fire threats to our forces. Signals communication deception was used extensively to portray the brigade and battalions performing other missions, allowing us to operate on alternate frequencies and conduct our missions unimpeded by OPFOR electronic warfare assets. On the down-side, even though the limited system was made available to exercise imitative deception, we could never obtain sufficient assets to influence the battlefield even partially. HACJAM never worked for us. Many man-hours and aircraft blade-hours were devoted to this system with zero results. This may not be a fault of the operating system, but a lot of smart people could never get this multiplier to influence the battlefield.

CONCLUSION

Although the preceding comments may seem negative, the motorized division accomplished a great deal. Our soldiers are probably the finest trained and most motivated soldiers anywhere within the Army. Our TOW gunnery program has been repeatedly cited by both Fort Benning and Fort Knox as the finest in the Army. The testing of new equipment in a tough motorized environment has placed new modernized equipment quickly within the division and other field units as well. Our long-standing role as the Army's "test-bed" division has allowed the infusion of this equipment without long and costly test cycles. Moreover, we have deployed our forces throughout the world, exercising various war plans and participating in major training events. Our NTC rotation in May 1988 showed that the motorized force, even with its shortcomings in equipment, could still perform on a level exceeding virtually all heavy divisions with more NTC experience.

9TH CAVALRY BRIGADE (AIR ATTACK)

INTRODUCTION

The 9th Cavalry Brigade (Air Attack) is a proud member of the Army's first motorized infantry division. The brigade, since its organization in December of 1980, has been on the cutting edge of Army doctrine and has evolved into a true combined arms maneuver unit. The brigade's array of attack, lift, and general support helicopters, combined with the attached ground maneuver units, provide the 9th Infantry Division a fourth maneuver brigade that is well-prepared to carry out simultaneous missions, both fight as a combined arms unit and coordinate and sustain aviation support for the division. The attachment of ground maneuver units with their associated firepower complements the highly maneuverable aviation force in carrying out the wide and varied mission the Cavalry Brigade may be assigned to execute for the division.

The brigade executes its combat mission in the 9th Infantry Division (Motorized) as it would in any other division. Therefore, many of the issues addressed herein do not apply solely to the motorized experience. It is, however, the operational experiences accumulated over the past eight years within the division which drive these observations.

BATTLEFIELD FOCUS

The motorized division's battlefield is one that is extended up to 100 km in width and 120 km in depth. Likewise, each maneuver brigade also has expanded sectors of responsibility. The Cavalry Brigade's increased area of operations and the multiplicity of missions drove its unique design. No unit in the division is more capable of quickly massing combat power to take advantage of tactical opportunities. The Cavalry Brigade is organized for offensive actions. It is the only force that can exploit the vertical dimensions at any level. Routinely the enemy aligns his forces in endless echelons. The brigade, with its airmobility, is specifically designed to gain the initiative by destroying second echelon combat or support units earmarked to influence the attack or to mass for a counterattack.

COMMAND AND CONTROL

There are unique challenges to the brigade's command and control system resulting from its mobility and extended areas of employment. A valid requirement exists for a dynamic command and control system that will provide the brigade the capability to command units across the width and depth of the division sector, which is the Cavalry Brigade's area of operation. While a marked improvement over FM communications systems, the computer-intensive MCS 2.0 system is still far from an integrated "maneuver control system." It is more of an information system. The challenges of reliability, sustainability, and continued evolution still remain.

FIRE SUPPORT

The brigade's direct support artillery slice consists of two batteries of towed 105mm howitzers from the 1st Battalion, 84th Field Artillery, a light artillery and rocket (LAR) battalion. The 1-84 Artillery's third battery is the MLRS, the division's general support asset. The LAR battalion TOC performs the standard field artillery missions for the brigade and is capable of functioning as an alternate artillery command and control headquarters for the DivArty. The battalion provides a fire support organization to the Cavalry Brigade comparable to the other maneuver brigades. While the other maneuver brigades within the division have significantly more direct support firepower, the Cavalry Brigade is able to compensate for the lesser number of artillery tubes by using internal attack helicopters and the lift assets to move the fire support systems rapidly around the battlefield. Increased mobility allows the brigade to overcome the constraints the other brigades have using towed artillery in the motorized division. The 105mm howitzer batteries in the LAR battalion are ideally suited for rear operations, deep attacks, artillery raids, or, in conjunction with the Cavalry Brigade, battlefield maneuver.

Fire support planning and suppression of enemy air defense (SEAD) plans play a critical role in all of the brigade missions. Without a well-executed SEAD plan, near-FLOT or cross-FLOT aviation operations in the mid to high-intensity battlefield are risky. The brigade relies heavily on the division to coordinate these operations.

INTELLIGENCE

Accurate and complete intelligence is extremely critical to the brigade operations. Because the brigade's area of operation extends across the division sector, it relies heavily on the division to provide "the big picture." The wide dispersion of aircraft, changing OPCON relationships among units, and cross-FLOT operations make collection and, especially, dissemination of current intelligence information down to the pilot level a priority. The brigade S2 must have access to all intelligence compiled by the division G-2 All Source Production Section (ASPS) to update the aircraft crews. The ASPS routinely detects, locates, identifies and projects the movement of enemy air defense systems; this is vital information for the brigade. The G2's ADIS significantly improves the access to current ASPS information. A detailed division intelligence preparation of the battlefield is equally essential to successful aviation operations.

MANEUVER

Many of the difficulties previously experienced by commanders in integrating aviation into the AirLand Battle doctrine have been overcome with the organization of this brigade. The brigade, with the addition of the light attack battalion and associated ground weapons systems, is now fully capable of performing the full-range of reconnaissance and security missions that the AirLand Battle doctrine requires. It is the only unit in the division that has the capability and flexibility to accomplish the mission in any terrain.

Extensive CPX and FTX experience with the 2d Battalion, 47th Infantry (CAB-H) identified several warfighting challenges for the brigade. The most prominent was synchronization. The timing, employment, control, and sustainment of synchronization were paramount to the successful execution of the combined arms operation. The addition of the ground weapons systems and the mobility of the motorized infantry have given the brigade the assets to overcome the limited staying power and firepower deficiency of the Army of Excellence cavalry squadron TO&E. The additional combat power available by task organizing the squadron and the capability of the attack helicopters to respond rapidly to the threat provides the division commander an ideal unit to execute the rear area security mission.

COMBAT SUPPORT/COMBAT SERVICE SUPPORT

The division commander provides sustained support to the Cavalry Brigade to reinforce the maneuver capability of the brigade. As the fourth maneuver brigade in a division organized with combat support TOE units for three, the Cavalry Brigade slice of air defense artillery, military intelligence, and engineers has been primarily drawn from the assets that were units in general support of the division. These slices are a vast improvement over the ad hoc arrangement of area support that supported aviation at one time. Supporting the brigade in most tactical situations today requires a full combat support organization with command and control element to execute support across the extended frontages of the division.

The formation of the aviation support battalion was a step forward for Army aviation. When executing AirLand Battle doctrine, area support lacked the flexibility to sustain adequately a brigade with aircraft and maneuver units that are employed across the width and depth of the division's battlefield. The current organization of the aviation support battalion greatly enhances the brigade commander's flexibility to maneuver the combat team across the entire division front by providing increased Class III and V support. However, there is a significant shortcoming in the brigade's combat service support organization; the lack of a medical company means insufficient medical personnel are available for the cavalry squadron in the execution of the "first to fight mission" and for the ground maneuver battalion when committed to combat operations.

LIMITATIONS

The current design of the Cavalry Brigade, with a cavalry squadron and attack helicopter battalion organized under the Army of Excellence force designs, does not give sufficient manning to operate continuously. The small air cavalry troops and the attack helicopter companies do not possess organic assets to conduct sustained operations.

Extreme adverse weather conditions limit the capability of the air cavalry troop and attack helicopter company to conduct combat operations . Additionally, both units are limited in their night combat capability and cannot operate effectively during low light levels. Both limitations are a result of current system and equipment shortcomings, and receipt of the aviation night vision goggle and the night sight for the attack helicopter will significantly improve the air troop and attack helicopter company capability. Aviation units of the brigade must be positioned to the rear to maintain equipment. The brigade rear base must be located in the division support area to facilitate "white light" maintenance of the aircraft and support equipment.

The brigade initially had limited capability to recover downed aircraft in the combat zone. The battalions and separate companies do not have recovery kits to permit rigging of organic aircraft, and rely on the aviation intermediate maintenance company for this capability. With the formation of the aviation support battalion and its support relationship to the brigade, this limitation has been overcome.

An additional limitation is the inability of the cavalry squadron, when working for the division headquarters, to communicate effectively with the division G-2.

TRAINING

For the past two years the Cavalry Brigade has proven its capabilities while training to execute dynamic and varied mission requirements. No other unit in the division has a training challenge as difficult as the Cavalry Brigade. Within the brigade, there are four totally different battalion training plans: the infantry battalion, the cavalry squadron, the attack battalion, and the lift battalion. An example of the diversity and complexity of the training focus of the brigade is best illustrated by looking back to the first six months of 1988. During this period, the sun literally did not set on the soldiers of the Cavalry Brigade. Our soldiers were deployed from the Yakima Firing Center to South Korea, Honduras, El Salvador, Canada, California, and Yellowstone National Park. Simultaneously the soldiers of the Cavalry Brigade fought with the soldiers of the 3d Brigade in the first motorized division rotation to the National Training Center.

The year included a unique training opportunity for the brigade. The 9th Infantry Division was the first division to conduct the Battlefield Commanders Training Program (BCTP). The WARFIGHTER CPX portion of BCTP challenged the brigade to demonstrate for the first time its capability to command and control and fight as a combat team. The brigade responded with a superior integration of all ground combat, combat support, and combat service support assets. The validation of the brigade's capability increased the division commander's flexibility in fighting his combat force and significantly contributed to the resounding success the division enjoyed. This exercise further validated the capability of the brigade to integrate the battlefield operating systems as a viable maneuver unit within the 9th Infantry Division (Motorized).

This brigade has proven by training in every situation imaginable that it is ready to fight our tactics anywhere, anytime.

COMBINED ARMS BATTALION (HEAVY)

2D BATTALION, 2D INFANTRY REGIMENT
2D BATTALION, 23D INFANTRY REGIMENT
2D BATTALION, 47TH INFANTRY REGIMENT
2D BATTALION, 60TH INFANTRY REGIMENT

2D BATTALION, 2D INFANTRY
THE MOTORIZED EXPERIENCE

INTRODUCTION

In April 1986, the 2d Battalion, 2d Infantry (Ramrod) was reorganized from an infantry TO&E to a motorized infantry Combined Arms Battalion-Heavy (CAB-H). The CAB-H was organized with a standard HHC, a combat support company with scout, anti-tank, and heavy mortar platoons, two anti-armor companies and one motorized infantry company. The two anti-armor companies were equipped with 20 TOW II Systems on M966 HMMWVs in four platoons and a company headquarters. The motorized infantry company consisted of three platoons, each with three eight-man infantry squads and an eight-man weapons squad. The motorized infantry company was armed with M16 rifles, squad automatic weapons (SAWs) and Dragon short-range anti-tank missiles. Each squad rode in a M998 HMMWV modified with a roll cage and seat belts, and mounting a .50 caliber machine gun or, in case of .50 caliber shortages, M60 machine guns. The scout platoon was in six M998s; the AT platoon was in four M996s armed with the TOW II; the heavy mortar platoon carried its six 4.2 inch mortars in the back of M998s.

The learning curve was steep as a group of leg infantrymen had to learn the fine points of vehicle maintenance and had to learn TOW gunnery techniques from the few 11H TOW gunners then assigned. Over time every TOW crew had at least two 11Hs among its three personnel. Keeping the TOW crews up to strength was a continual problem throughout the period the battalion was motorized.

TRAINING

Training to fight as a CAB-H offered new challenges. The primary weapon system in the battalion was the TOW II, but the crew could not simply go to a "rifle range" to train. The 9th Infantry Division (G3) developed a series of TOW Gunnery Tables, starting at the individual level, proceeding through crew, section, and platoon tables. The standard for the division became crew qualification twice yearly on TOW Table V, the TOW squad (i.e., crew) qualification table. TOW Table V used the MILES laser system in lieu of live rounds. Crews were required to hit a variety of targets at various ranges, using all crew drills and within a tight time limit. Each battalion internally supported one TOW Table V per year, while the 9ID G3 externally administered the second required qualification range. One problem was that Fort Lewis training areas do not contain a location where the TOW crews could fire out to the full 3750 meter range. The battalion's solution was to do its internally supported Table V at Yakima Firing Center (YFC), where targets could be arrayed at all ranges to better train the TOW crews. The 9ID gunnery office considered the YFC TOW Table V an outstanding setup and adopted the plans as the division standard for battalions conducting TOW Table V at YFC. Another key training aspect for the battalion's TOW Table V was that the lead crew from each unit to go through the TOW Table had to consist of the commander, XO and senior NCO. Thus, the battalion's commander, XO and CSM were the first crew to take the Table. Each company then led with its commander, XO, and 1SG. As a result, the battalion's leadership had to learn the complexity of the TOW system.

A second training problem for the CAB-H was a lack of maneuver space at Fort Lewis. In the heavy forested training areas, ideal for infantry, there were few areas that maneuver training for TOW platoons and companies could be conducted. Thus, most of the maneuver training at Fort Lewis--training in skills such as position selection for maximum long-range fires--had to be done at platoon level and lower because of the heavy competition for the limited training areas cleared enough for TOW shots to be fired. That problem did not exist whenever the battalion or in some cases, the companies deployed to Yakima Firing Center. However, even in Yakima careful coordination was required to give the CAB-H the significant amount of maneuver space needed to train on motorized operations, which required extensive width or depth to maneuver, preferably both.

Because the HMMWV-mounted CAB-H had no ballistic protection of any kind, the battalion had to train to use speed and agility for protection. It also trained to take advantage of the greatest protection there was for the CAB-H--night. This battalion was extremely lucky in that it had been designated to conduct a test of the CAB-H concept in the fall of 1986 at Fort Hood (which was later cancelled for lack of funds). Because of that, the battalion had received AN-PVS 5 night-vision goggles for every driver and vehicle commander in the three line companies and CSC, and sizable numbers for the drivers in HHC. With those great assets, the battalion did an extensive amount of its training at night, especially because of the great capability of the TOW II thermal sight. For a three week training density at YFC in October 1986, the battalion went totally reverse cycle. For all battalion training densities, the majority of training was during periods of limited visibility. The troops were initially extremely hesitant about operating at night but, with training, came to regard the night as their greatest ally. Possibly the most significant factor about the motorized division is its night-time capabilities. Those capabilities were never able to be portrayed adequately in any of the numerous war games or CPXs played.

The motorized infantry company, the scout platoon, the mortars, and the support from the HHC all revolved around the training for the two anti-armor companies and the AT platoon. While their training was not significantly different from other infantry units, they did a large part of their training and supporting at night with the rest of the battalion. The motorized infantry company and the CSC also did some things differently because of the way the CAB-H had to fight. These procedures will be discussed later.

WARFIGHTING

Learning to fight as a motorized CAB-H evolved over the two-plus years the battalion was so organized. Probably the earliest lesson learned was the requirement to fight at night, discussed previously. Heavy emphasis was made to capitalize on the speed, agility, and relatively small silhouette of the HMMWV to help fight the smartest way possible. The HMMWV cannot stand and "slug it out" toe-to-toe with an enemy who has armor and rapid firing kinetic energy weapons. Therefore, the fightability of the CAB-H had to depend on its mobility, both strategic and tactical. To assess this, the entire battalion moved by either C-141, KC-10, or C-130 aircraft as part of its externally evaluated ARTEP (EXEVAL) in February 1988. The companies conducted training in using both UH-60 Blackhawks and CH-47 Chinook helicopters for tactical mobility. Finally, every part of the battalion learned to move quickly and often as the way to survive combat operations. Vehicles could not occupy obvious terrain features because enemy artillery would blanket those positions, and the HMMWV could not survive. Motorized squad leaders learned to pick positions on the side or base of ridges or took "key hole" (terrain masked positions affording observation of the engagement area and protection for the vehicle) shots from "hide" positions. Part of the battalion's accepted mission was that units would be cut off and have to fight in the enemy's rear. Once accepted, this was seen as a real strength for the CAB-H, as it would be less likely to receive heavy artillery fires after the lead enemy units units had passed through.

Because the HMMWV-TOW had an advantage over approaching enemy armor only beyond 1800 meters, the battalion learned to fight using trigger lines at 3750 meters (or at whatever long-range point the engagement was to be initiated) and disengagement lines at 2000 meters, allowing the HMMWVs to move out before the enemy armor could close within range of its rapid fire kinetic energy gun. These were not lines drawn on a map, but were physical points on the ground that each platoon leader and squad leader had to show the TOW crews so they knew when to engage and disengage to allow them to live to fight another day. This was one of the most critical aspects of fighting a CAB-H.

Fighting as a CAB-H also showed some of the problems associated with indirect fire support. The battalion's organic heavy mortars and to be hand-emplaced each time they were to fire, a distinct disadvantage in the fast-moving scenario envisioned for the CAB-H. Likewise, the DS artillery support was a problem because the towed 155mm howitzers, necessary for air deployability, were slow in emplacing and displacing on the battlefield. During the battalion's EXEVAL, the forward units were forced to hold longer than they should have because the artillery needed time to displace. The DS artillery battalion commanders came up with a number of innovative ideas to make this situation better, but the problem remained.

In much the same manner, the CAB-H had problems keeping control of its air defense artillery (ADA) coverage. On the fast-moving battlefield, there were times that the ADA simply could not keep pace with the rapidly changing situation. The answer to the problem is more training, but--despite a great effort--it never happened during the 28 months this battalion was organized as a CAB-H.

Perhaps the greatest evolutionary change to the way 2-2 Infantry fought as a CAB-H was in the use of the scout and anti-tank platoons. The AT platoon was manned with exactly the same systems as the two anti-armor companies, the TOW II on HMMWVs. Because the battalion had a total of 44 such systems, the AT platoon could be used in what would otherwise be a non-doctrinal role--in support of the scout platoon. Through tactical experimentation, confirmed in computer-assisted wargaming, the command group determined that the scouts could be greatly enhanced by adding the firepower available in the AT platoon. The scouts could be overwatched from long-range by the ATs, covering their extraction if necessary. At the same time, should the scouts discover a particularly lucrative target--such as air defense systems, command and control, or artillery, there was a system available, the TOW II, to destroy that target. Thus, 2-2 Infantry combined its two scout sections with its two AT sections and made two SCAT platoons, one commanded by the scout platoon leader, the other commanded by the AT platoon leader.

The SCATs were employed in the defense in classic scout missions, reporting enemy movements, covering a flank, etc., but with the additional capability of destroying specified targets. They often assumed a stay behind role and were 8-10 kms from the main body. In the offense the SCATs were sent out far in advance to find routes through enemy positions, which would then be passed to the motorized infantry company (to be discussed in the next section). Again the SCATs had the capability of moving on or near the battalion objective, reporting enemy activities, calling artillery fires, and--if the situation warranted--using direct fire from the TOWs.

The battalion had great success with the use of SCATs. During the battalion EXEVAL, the SCATs played a key role in the great training event the battalion had. At one point a SCAT team came out of a hide position deep in the enemy's rear and destroyed two tank platoons which were in an assembly area. At another time the SCATs successfully identified and engaged an enemy artillery battery as it was setting up. Using SCAT teams greatly enhanced the capabilities of the battalion.

CAB-H tactics were different from "standard" infantry or mech infantry tactics. The CAB-H fought the same whether in the defense or the offense, the only real difference was who had the initiative. Tactical operations centered around getting the enemy force into a designated engagement area, where all available assets could be called in to destroy the force. A battalion frontage could be 10-12 kms in width and a sector should be 25 km deep to give sufficient maneuver depth. The battalion maneuvered by designating battle positions (BP) throughout the sector/zone and moving companies or platoons to those BPs to keep control and ensure units were capable of overwatching avenues of approach. For a TOW company, a BP had to be at least 5 km in size, because the TOW vehicles must keep 300 meters apart to preclude heavy losses from enemy artillery. In the attack, the companies moved from BP to BP, with designated engagement areas prepared behind the leading companies. If the lead companies hit an enemy force they could not bypass or quickly defeat, they would fall back into positions around the designated engagement area to defeat the enemy force or to fix the enemy while another force maneuvered around the enemy's flank. Battalion engagement areas were normally planned to be 5 kms wide and 4-6 kms deep (terrain dependent) to allow overlapping TOW fires and enough depth to shift platoons around to get better shots.

The defense was built around a well prepared engagement area using engineer obstacles, minefields, massed artillery targets, FASCAM, and direct fires. Delay and defend missions were executed in the same manner, the only difference being the amount of time available to prepare for the mission. Upon displacement, the companies could be ordered to move to the rear, the flank, or to the enemy's rear to establish another BP and engagement area. The CAB-H had very little capability to hold terrain. It maneuvered to destroy the enemy force.

The 2-2 Infantry (CAB-H) conducted movements to contact in a manner that was very successful. (See Encl 1 for schematic of formation.) SCAT teams were sent out as early as possible, at night, to infiltrate through enemy defenses and identify enemy positions to be fixed or bypassed by follow-on forces. Next the motorized infantry company, augmented by one or two TOW platoons, would move forward as the battalion's recon element. Normally moving at night, the infantry company team would move along routes designated by the SCAT teams and would cover the entire battalion front. On contact the infantry would either destroy the enemy force or quickly fix it with a small element and bypass with the rest of the force. Following after the infantry company team were the two anti-armor companies, which moved in column along at least two routes. The battalion Tactical CP would follow behind the motorized infantry company along the most critical avenue. The two anti-armor company commanders moved with the Tac CP. Thus, when the infantry company hit a force that required the battalion to maneuver, the battalion commander was able to call the company commanders forward, issue a quick verbal frago, then send them off to join their companies and execute the mission. This technique worked extremely well during battalion FTXs and during the battalion EXEVAL.

One of the greatest problems in fighting the CAB-H was the lack of infantry. With only one company, the battalion did not have enough infantry to accomplish all the missions that had to be done. As a result, the mission of the motorized infantry company evolved into mainly a recon and counter-recon role. When the battalion was on the offensive, the motorized infantry company, usually task organized with a platoon of TOWs, had the mission of following the scouts or SCATs and finding specific enemy positions and either fixing or bypassing them. As the battalion would always attack at night when it had the initiative, this mission was one that the infantry company was readily able to accomplish.

In the defense the motorized infantry company had the mission of stripping away the enemy's reconnaissance elements, usually through the use of ambush patrols. The infantry company also had the mission of destroying those enemy forces, such as the combat recon patrol, which were allowed to penetrate the defense to get the main body into preplanned Engagement Areas. In every tactical operation, there was always a need for more infantry than the CAB-H had available to it. It was a limiting factor under the motorized concept.

The final motorized warfighting topic is command and control. The battalion had the capability of using Grid Compass computers to transmit information by radio from the TOC to the brigade TOC. By placing an additional radio and another Grid in the battalion commander's HMMWV, the battalion gained an additional capability of communicating between the commander's tactical command post and the battalion TOC, as well as further to the rear. This allowed the commander and S-3 in the TAC CP to receive detailed warning orders from the TOC without tying up the command net for long periods. The commander and S-3 could develop planning guidance and commander's intent, then send that back to the battalion XO in the TOC, who oversaw the development of the new frag order. This concept worked very well as long as the Grids could be kept operational. Unfortunately, this usually required a civilian contractor about once a day during field operations, an option not available in combat.

SUSTAINABILITY

Many of the sustainability problems of the CAB-H resulted from receiving vehicles that were just coming into the Army inventory--the HMMWV. There were periods of time when vehicles were down waiting parts that simply were not in the system yet. Additionally, there were the problems always associated with new vehicles as certain parts could not hold up to day-to-day tactical operations, i.e., alternator bolts that sheared and generator brackets that cracked. Because of the intensity of training in 2-2 Infantry, and especially because so much training was at night, other maintenance problems surfaced. A large number of cross members were bent while traversing the rocky ridges of Yakima. Flat tires were a serious problem, especially because the company maintenance team had to come forward to change the tire; parking brakes locked up and burned out in the mud and cold.

In other areas of sustainability, the battalion did very well. Night log packs were the norm and flowed smoothly. Except for emergency resupply, all log packs were conducted at night. The lack of trailers for the HMMWV caused a serious strain on resources as we tried to carry all our equipment during operations. Ammunition resupply was a continual problem for the TOWs. Each vehicle was designed to carry only six missiles. On a fast-paced battlefield that basic load was used very quickly. The battalion experimented with giving each TOW platoon sergeant an M998 instead of an M966. The platoon sergeant then had the capability to carry extra missiles, water, fuel, and even food. A recommendation to change the MTO&E to give all TOW platoon sergeants an M998 was forwarded to division, although no action has occurred as of this time.

Another sustainability problem was with the SCAT teams. Operating far forward, up to 8-10 kms ahead of the battalion, they could not easily link up with nightly log packs. As a result they had to carry additional supplies of Classes I, III, and V to support themselves for several days without resupply.

The MTO&E for the CAB-H calls for all cooks to be consolidated and for T-rations to be transported with log packs to get the troops hot chow. We found that system worked very poorly, resulting in food almost always arriving cold. In 2-2 Infantry cooks were assigned with each company headquarters. Class I came out with the log pack, and the cook was then responsive to the company commander, who could decide when the best time was for hot chow, based on the company's mission. Although initially hesitant, the company commanders soon found this system gave them great flexibility and also took better care of the troops, because the food was hot at a time they could consume it. This had a great impact on troop morale.

One other sustainability area needs to be discussed--personnel replacements. Because of the small crew size (three men in a TOW crew), casualties will quickly impact on the unit's capability to conduct combat operations. The battalion did not train adequately in this area, which will require close attention in combat operations. There is no fat in this organization. Each little cut takes part of the muscle of the battalion.

SPECIAL EXERCISES

Company A, 2-2 Infantry, participated in a National Training Center rotation while attached to 3d Bn, 9th Infantry, 7ID (Light) in Jan-Feb 1987. The experience brought out several key points. The HMMWV-TOW is hard to hit. OPFOR commanders made the M966s priority targets because of their impact on the OPFOR armor. The OPFOR had great difficulty hitting the relatively small and agile HMMWV. Unfortunately, the light infantry took away that flexibility for periods of the rotation by dismounting the company's TOWs and having them dug in. The OPFOR simply smoked the area and blew past the immobilized TOWs. The light infantry battalion commander later stated that he would not dismount the TOWs if he could do the battle again. The TOW company played a critical role in keeping the dismounted light infantry supplied with water during the rotation. The mobility the TOW company gave to the light infantry, when used properly, was a great combat multiplier. For a part of the NTC rotation the TOW company was chopped to a Bradley-mounted mech infantry battalion task force. During that period, fratricide accounted for more loses than the OPFOR. Friendly tank gunners kept mistaking the HMMWVs for OPFOR scout vehicles and engaged them.

2-2 Infantry helped develop its tactics by conducting four CPXs at the JANUS War Game, located at the Army Development and Employment Agency (ADEA) on North Fort Lewis. With the high resolution computer war game, which used digitized terrain from such places as Europe, Iran, Korea, and NTC, the battalion was able to train the companies and the staff in motorized operations. Each platoon leader was able to control his own platoon over actual terrain and fight against a doctrinally correct OPFOR that included all artillery and air assets that would be found on the modern battlefield. Tactical reports were sent through a radio net established in the facility, out to the battalion TOC, which was set up for full operations. The ALOC also played its part, thus allowing the training of the entire staff. Tactical battles were fought on JANUS, then used again in an FTX at Yakima to see if the results were similar. Modifications initiated at Yakima were later fought using JANUS, again checking to see if the computer war game had similar results to what actually happened on the ground. In almost all cases there was a close correlation. The JANUS War Game proved to be a tremendous tactical trainer for the leadership of this battalion.

The battalion commander and Company B commander also played JANUS at Fort Knox in testing the capabilities of the HMMWV TOW versus an armored gun system. By using motorized tactics that worked in the field environment, the Fort Knox test was able to develop solid data to be used for the acquisition of an armored gun system. In addition, the doctrine developers at Fort Knox learned a great deal about how a CAB-H actually fought.

One other special exercise contributed to the training of 2-2 Infantry during this period. The battalion ran a Fire Coordination Exercise (FCX) as part of a program to show the US/Norway Bilateral Staff Committee how U.S. forces train. This exercise allowed the battalion to tie together all weapons that would support it in time of war: USAF, Army attack helicopters, artillery, heavy mortars, TOWs, Dragons, and small arms. This was a tremendous exercise for the staff and the troops, who were able to fire more live ammunition, in support of the train up and execution, than in the previous two years. The result was a much more highly trained battalion that had showed its ability to tie the entire spectrum of fire support together.

CONCLUSIONS FROM THE MOTORIZED EXPERIENCE

Organizational

Motorized infantry tactics are truly maneuver warfare. Failure to use maneuver would result in unacceptable casualties. Unlike the heavy forces, which have a tendency to hunker down and slug it out, the CAB-H depends on the fundamentals of AirLand Battle doctrine to survive: agility, initiative, depth, and synchronization.

A CAB-H does not have enough infantry to accomplish all its missions. A "J Series" CAB-H with two anti-armor companies, two motorized infantry companies, and an HHC with all combat support and combat service support would be much more viable.

The use of combined scout/AT teams (SCAT teams) was absolutely invaluable to the CAB-H and could have applications Army-wide.

Class I support for the companies was greatly enhanced by putting cooks with each company headquarters and fixing hot food to fit the missions of that company--a great morale booster.

Tactical

A CAB-H cannot allow the enemy to close. Trigger lines and disengagement lines are an absolute necessity. TOWs must keep a stand-off distance. It is extremely difficult to do, even for well-trained units. Failure to do so will result in defeat.

Motorized units must plan to fight cut off. If it is a part of the tactical plan, cut off units will not panic, but will take advantage of the unique opportunities of being in the enemy's rear. The CAB-H can create havoc in the enemy rear area.

Although the HMMWV cannot go cross country as fast as tracked vehicles, in most parts of the world where we can expect to fight, the HMMWV will have greater tactical mobility because of road networks. We should not be fooled because we only train in extremely primitive areas which reward the superior cross country mobility of tracked vehicles. In Europe a HMMWV-mounted CAB-H could have distinct advantages over an armor/mech force, in spite of the limitations of the TOW.

A CAB-H can out-fight almost any unit at night. It has a tremendous advantage, given night vision goggles for all drivers and vehicle commanders.

MCS 2.0 in its present configuration cannot work without extensive civilian contractor support. We need a system that will work for soldiers.

Combined arms training is the exception rather than the rule. Even during brigade-sized training densities, it is extremely difficult to get combined arms training. The engineer, air defense artillery, military intelligence, artillery units, and others, all have their own agenda to train to. Combined arms training is more an ideal than reality, but will only get better with additional training.

Infantry battalions, especially CABs, need more engineer training in emplacing and breaching obstacles. We barely touch on this in our training, but absolutely must be able to execute these tasks if we go to war.

Control of the artillery Forward Observation and Lasing Teams (FOLT) remains an issue. The artillery position is that the battalion FSO must control the FOLTs to have them in position to capture COPPERHEAD rounds and execute engagement areas. Forward infantry company commanders feel they need to have some control over friendly forces that are in their sector/zone to control direct and indirect fires and avoid fratricide. This problem still needs to be fixed.

The platoon leader in each TOW platoon needs to have a Mark 19 Grenade Machine Gun mounted on his M966. His job should be to move his assets into position to engage the enemy, not be just another TOW crew. The Mark 19 would give the platoon some protection against enemy forces that close within the 2000 meter stand-off buffer that a TOW must maintain. Overall combat power in the platoon would be greatly enhanced by putting a Mark 19 on the platoon leader's vehicle.

All CABs must have a lightweight motorized TOC. The present configuration is too cumbersome to keep up with motorized operations.

Logistics

A CAB-H cannot support its ammunition requirements because each HMMWV TOW is designed to carry only six missiles. The platoon sergeant, whose primary mission is to keep his platoon supplied, has an M966 just like everyone else. He needs an M998 cargo carrier to carry additional missiles, fuel, water, and food. By using the M998 to resupply missiles, then shuttle to cache/resupply points, the overall combat capability of the platoon will be greatly enhanced.

A CAB-H cannot carry its required equipment without the trailers it is authorized, but is not issued. We are fooling ourselves.

Log packs absolutely work if run at night to give the protection the CSS troops need. Log packs should be run by supply sergeants and 1SGs, not XOs.

CONCLUSIONS

Despite all its drawbacks, the motorized infantry concept and organization is closer to AirLand Battle doctrine than any other organization in the Army. Agility is a key part of each battalion's concept of operation. Depth is an absolute necessity without which the motorized force cannot fight. Initiative is required by the widely dispersed platoons and sections of the motorized force. Commander's intent must be the driving force in the motorized combined arms battalions. Synchronization is easy to say, but hard to do. The motorized units must synchronize their assets to have a chance at surviving, and they know it from the beginning. In the fog of war, the speed, agility, and firepower of the motorized infantry division will win by taking advantage of a confused battle-field to strike against the key assets of the enemy force.

The <u>concept</u> is right. The equipment technology has not caught up to the concept.

MOVEMENT TO CONTACT

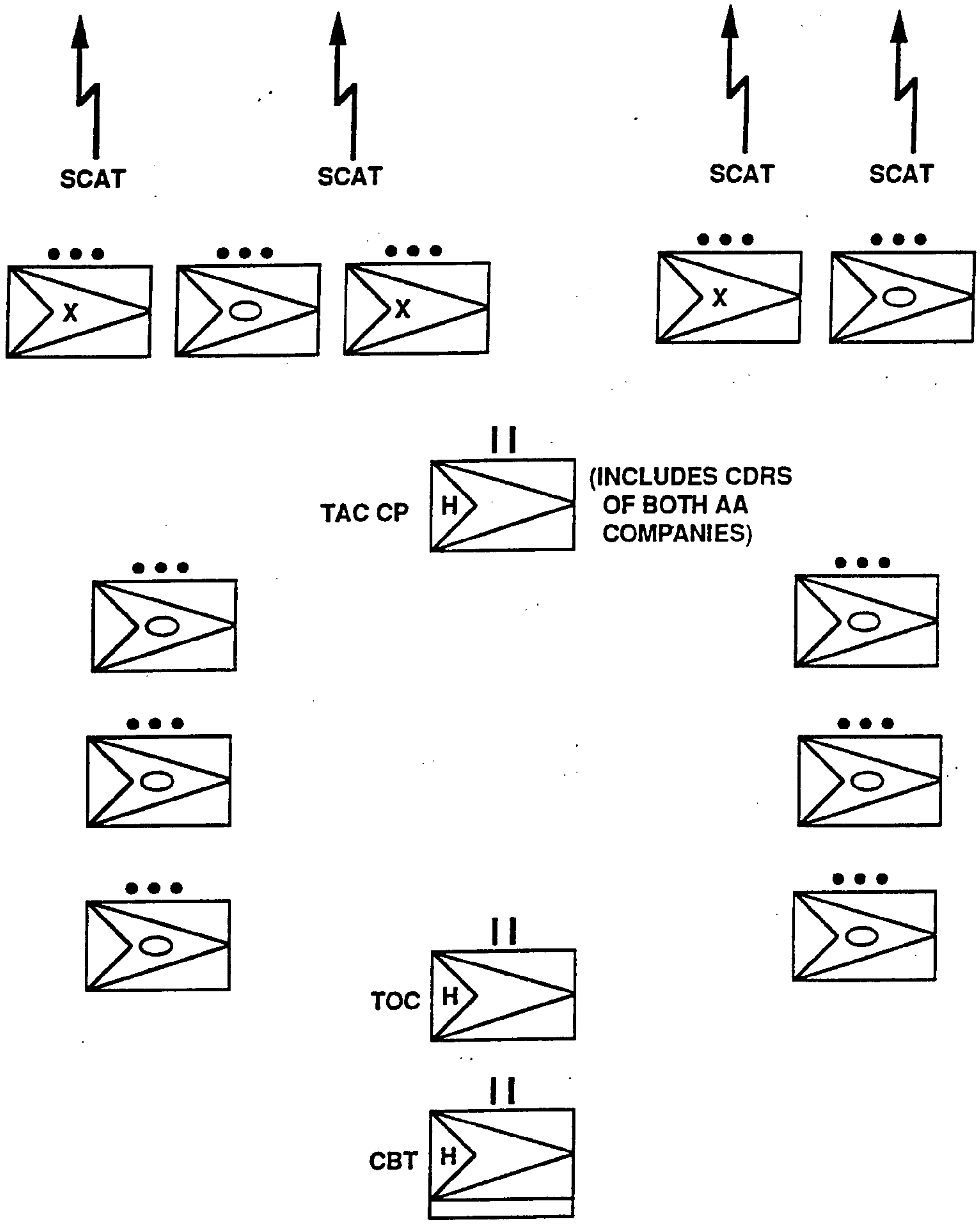


FIGURE 1

THE MOTORIZED FORCE IN TRANSITION

A PERSONAL EXPERIENCE IN 2D BATTALION, 23D INFANTRY

For the past four years I have been intimately involved in the fielding, development, and training of motorized battalions and brigades. My perspective has been at both brigade and battalion level and extends from the post-LASER STRIKE era to the present. To me, several things have become clear from this close association. The doctrine, tactics, organization, and equipment as originally conceived and partially fielded represent the most effective mix of combat power and deployability that has ever been developed. The basis of this potentially outstanding force was found in four key areas: an improved intelligence collection and dissemination network; direct fire systems that were rapidly deployable and in a high ratio to the number of soldiers required to operate them; an unmatched night capability; and an environment that encouraged innovation and imaginative employment of these assets and organizations.

In spite of the fact that the objective organization was never achieved, considerable learning took place that has value Army-wide. That value exists because, for a time, the lid was off, and the talents of a division of imaginative and creative American soldiers and leaders tried to blend technology and tactics to produce a radical departure from the standard military organization.

INTELLIGENCE: THE KEY

The impact of the intelligence systems on motorized operations cannot be understated. Uncertainty about the enemy was reduced at the tactical level. Commanders previously frustrated by insufficient means to see out the 12 to 24 hours required by doctrine were able to see the enemy. The intelligence systems in the motorized division overcame those frustrations. The new family of visual acquisition means such as thermal viewers, long-range electro-optics and range finders were certainly a key component. Newer, lighter, more reliable signals collection equipment was another. A long-range reconnaissance unit added a human intelligence dimension heretofore missing at the division level. An aerial sensor package, used either on unmanned aerial vehicles or heliborne platforms, provided an enhanced observation and detection capability.

These were the major components of an intelligence system that underwrote the agility of the division--providing enough accurate information about the enemy in near-real-time to allow commanders to take the initiative. Maneuver commanders had great confidence in these systems. Much of the guesswork about what the enemy was doing during the battle could be eliminated. When properly employed, these intelligence systems yielded a truly decisive edge.

COMBAT POWER VS DEPLOYABILITY

One of the most impressive capabilities of the motorized battalion is its substantial combat power in relation to its low number of soldiers and corresponding high degree of tactical and strategic mobility. The motorized force did, in fact, neatly fill a void in our force structure. The original mission was to develop an organization that balanced the deployability of light divisions with the firepower and survivability of the heavy forces. The motorized division clearly accomplished that mission even with the shortfall from its objective design. The ability now exists to transport quickly to the battlefield a force with adequate firepower and mobility to engage and defeat the heavy forces of potential adversaries. A supplemental benefit is the ability to "harden" a light division with desperately needed anti-tank capability--and yet not diminish its strategic deployability --by augmenting it with a motorized brigade or battalion-sized task force.

NIGHT CAPABILITY

Another remarkable asset in motorized battalions is the proliferation of night vision devices. Essentially, every vehicle is equipped with a night vision capability. This represents a quantum leap in the ability to move platoons and companies rapidly at night. Additionally, the thermal capability of the TOWs, Dragons and laser designators add yet another dimension to the passive night capability. When coupled with some type of vehicular navigational aid, such as PLRS (Position Location Reporting System), the advantage at night over forces with more constrained capabilities is exponential. Our experience with night vision devices and PLRS dramatically demonstrated the ability of the motorized battalions to move, concentrate forces and communicate at night better than any other force yet fielded. Furthermore, PLRS enhances communication and provides higher level commanders an immediate answer to that frequently asked (and fire support inhibiting) question, "Where are you?"

CREATIVITY

Perhaps the most noticeable characteristic of motorized units has been the attitude it bred among its members. A maneuver-oriented doctrine, the bedrock of motorized tactics, seems to propagate a type of leader and soldier who will try almost anything. The imagination, spontaneity, and willingness to take ideas to their limits is embedded within these units. This phenomenon may have the most far-reaching impact on those who were associated with the motorized force. The leaders who experienced the development and fielding of motorized units will go on to lead other units of all types; they will take with them an open mind, a tolerance for ambiguity, and true tactical flexibility.

The characteristics of the motorized units--a willingness to try new ideas, the paradox of fighting an offensive battle with defensive systems, the synchronization of all combat multipliers required to overcome its fragility, and the emphasis on rapid maneuver (almost to a fault) produced a unique soldier and leader. The soldiers and leaders who make up the motorized division are not elite, hand-picked or specially chosen. They exist in every unit in the Army. The point is that any unit can likewise tap the potential to develop leaders and soldiers with those traits. They simply need the challenge and the command environment that will allow imagination and risk-taking to flourish. That is the single most important observation of my experience with the motorized experiment.

2D BATTALION, 47TH INFANTRY
THE MOTORIZED AIR MANEUVER EXPERIENCE

INTRODUCTION

The essence of motorized operations has been well captured by my fellow commanders elsewhere in the Motorized Experience. What I wish to add is based on the unique experiences of the 2d Battalion, 47th Infantry (Combined Arms-Heavy) while assigned to the 9th Cavalry Brigade (Air Attack). The 2d Battalion, 47th Infantry was selected in September 1986 for permanent assignment to the Army's only officially recognized maneuver combat aviation brigade. Our mission was to explore and develop the air maneuver dimension of the motorized concept. The result of these experiences is recorded in an article entitled "Air Maneuver, The Leading Edge of AirLand Battle," (Military Review, July 1989), which should be reviewed for more details.

INITIATIVE

Initiative is the absolute leadership bedrock of air maneuver and motorized operations. An E4 TOW HMMWV squad leader has to cover an area normally occupied by an infantry platoon. He must displace to alternate positions at night over what are normally company to battalion-sized distances. A TOW platoon leader covers a company or battalion-sized area. Each soldier must know and execute the commander's intent, which is to "kill tanks and live to fight another day." The good news is that our soldiers proved equal to this challenge. They proved very capable of making independent decisions and taking decisive action guided by the commander's intent. They also became adept at the individual soldier skills needed to do this. They mastered the placing of target reference points, engagement lines and disengagement lines and night air/ground navigation. Each crew could rig their vehicle and conduct sling load operations at night or in blinding dust or snow. They also demonstrated discipline beyond their years by doing this for over a year and a half without any significant accidents or incidents.

DEPTH

Depth was also greatly enhanced based on our ability to rapidly shift our forces with vehicles throughout the battlefield by air allowing them to remain highly mobile once again on the ground. We were not bound by the stated limitations of other airmobile forces, that of having limited ground mobility once inserted. In one highly successful 100 km air assault, the battalion secured a 44 km front and was able to influence an area of over 500 square kilometers by using its combined motorized and air assault capabilities. This provided the space needed to fight using motorized tactics while securing a vital air assault bridge-head line. Such an expanded anti-tank screen capability would surely be of value to light, ranger or airborne forces who are limited by their lack of tactical mobility once inserted into an objective area. Our air assault motorized force is a currently available answer to the anti-tank shortfall that makes light forces so vulnerable even in "third world" scenarios. A motorized force, particularly with air assault capability, could easily tip the scales in the successful defense of a lodgement against enemy armor. Such a force could better defend a lodgement until the arrival of heavy "war winning" forces deployed by sea. In fact, motorized units provided our only strategically air deployable anti-armor force. The lack of an armored gun system or a fast attack vehicle does not make such deep defensive missions infeasible. It is incredible that the United States does not further develop and refine this potent and relatively inexpensive strategic capability.

AGILITY

The addition of the air assault and air maneuver dimension doubles or triples the speed and range by which motorized operations could be executed. Agility was greatly enhanced by our proven ability to displace platoons and companies at 100 knots given a minimal preparation period. Each platoon could rig for vehicular air extraction and set up a pickup zone from scratch with the 12 minute battalion standard. The 2-47 scout platoon trained to the point where they could execute an air displacement including sling-loading HMMWVs with no visible light. They used infrared "chemlites" and night vision goggles (NVG) in conjunction with NVG UH-60 Blackhawk crews.

SYNCHRONIZATION

Synchronization of fire support with all other battlefield operating systems (BOS) is critical to all motorized and air maneuver operations. The lack of armor protected vehicles and a direct fire, kinetic energy armored gun forces units to remain mobile. Without careful preplanning, synchronization is the first casualty of high mobility. Flexible preplanned options were always needed to ensure the responsive integration of all BOS. Synchronization is fundamental to all AirLand Battle operations. It tends to receive more serious consideration and is more consistently applied by soldiers trained in motorized operations. The added air assault dimension required of 2-47 was that of the total integration of all aspects of Army aviation as a combat multiplier and a full combat arms team member. This total integration into the maneuver, intelligence, fire support and sustainment operating systems portends the future direction of tactical growth in our Army. The complete integration of Army aviation into the combined arms team will be almost as significant as the adoption of the "blitz kreig" tactics was to the battlefields of World War II. This is particularly true of the non-linear battlefields of the future.

COMBAT SERVICE SUPPORT

Combat service support was provided by the Army's first aviation support battalion (ASB). This uniquely capable organization is described in detail in another article. I would simply state that never were our ground or air maneuver options restricted in any way due to a lack of logistical support from the ASB. This support concept proved to be so effective that it is now being fielded for the other aviation brigades in the Army. During air assault operations, extensive use was made of preconfigured air log-packs, container delivery system (CDS) drops and heavy drops. Due to the isolated nature of air assault operations and deep attacks, special attention was paid by maneuver elements to operator maintenance and organizational PLL stockages. Very rarely did even a single vehicle return from major deployments other than under its own power.

LESSONS

The most significant lesson derived from the air motorized experience is the existence of the tremendous potential now lying dormant in our young soldiers, NCOs and junior officers. They always exceeded the high standards of performance demanded of them. When the tenets of AirLand Battle doctrine are pushed to the extreme, soldier trust, training and leadership must expand exponentially. Our soldiers demonstrated the ability to fight on a non-linear battlefield. They have proven more than equal to the task. Being behind enemy lines to these soldiers did not mean defeat, it meant better flank and rear shots at a rapidly dwindling enemy force that did not dare slow down. Air inserted HMMWV TOW sections took out entire tank companies from the rear during MILES force-on-force exercises and devastated rear area logistical and C2 sites. The potential for this same level of initiative exists in our armor and mech units today. These units have not been forced to push the limits of maneuver warfare to the same extent that motorized forces have. The potential is there in both the soldiers and their equipment. What seems to be lacking is a clear vision of the possible. The assimilation of Army aviation as a combined arms team member is the way to leverage our strengths against our enemies' vulnerabilities. The air maneuver of motorized forces made part of that vision a reality in the 2d Battalion, 47th Infantry.

2D BATTALION, 60TH INFANTRY

THE MOTORIZED COMBINED ARMS BATTALION (HEAVY)
A TRUE MILITARY MIDDLEWEIGHT

This article recounts my professional experience as commander of the 2d Battalion, 60th Infantry Regiment, a "Combined Arms Battalion-Heavy" (CAB-H) in the 9th Infantry Division (Motorized), during the period June 1986-June 1988--one which culminated in a fully motorized NTC rotation. Like most who arrived at the division during these years, I was unfamiliar with the concepts and techniques embodied in the term "motorized" and skeptical as to their utility. This was especially so when it became known that the HMMWV TOW was to replace the armored gun system in the battalion design. June 1986 was midway in the conversion from "surrogate" CAB-H of the ITV and the pick-up truck to the HMMWV. Alpha Company, the first M966-equipped company in the Army, had been to the NTC on a Blue Force rotation several months previously, but had been employed dismounted by the 7th Infantry Division light battalion to which it was attached. The company had done little work with the new weapons system. Large numbers of the old ITVs were still in the unit motor pool awaiting turn-in. But the expertise from the 3d Brigade's pioneer era was still present in the unit, and as the new equipment continued to arrive, this collective memory of tactics and techniques provided the essential foundation for the task at hand, namely to adjust the CAB-H O&O concept as worked out from 1983-1986 to the TOW M966-dominated MTOE.

To give a perspective to the scope of that challenge, it is worth listing the systems envisioned by the High Technology Light Division designers that were not available to the motorized battalions after transition. Besides the armored gun system, these included the Mark 19 Grenade Machine Gun Mod 3 (we in 3d Brigade at least had the Mod 1, but other brigades had to contend with heavy machine guns, a serious shortfall); a Position Location Reporting System; ground-launched HELLFIRE; adequate numbers of night vision devices; a satisfactory heavy mortar trailer; a heavy-variant, shelter-carrying HMMWV for command and control and medical needs; and a host of lesser devices. Taken individually these shortages could be perceived as minor but irritating shortfalls. The cumulative impact of these missing items to a force which had been designed to wrest advantage from every conceivable combat multiplier was a different matter. The challenge to see if the equipment actually provided by the Army for this purpose was up to job forms the focus of this article.

OPERATIONS

The first issue was how to fight the TOW-heavy force. The basic tactical technique worked out from 1983 to 1986 was using the engagement area as a tool to synchronize all combat power to defeat the enemy. It was immediately apparent that this technique was fully translatable to a TOW-heavy force. By 1986, due primarily to the influence of the NTC, the heavy divisions had adopted this concept anyway, at least for defensive purposes (I will return later to a discussion of offensive techniques).

It also became immediately clear that contrary to the popular notion of the 9th Infantry Division as a "light" force, its tactics had virtually nothing to do with light infantry division tactics or techniques. Instead they bore every resemblance to heavy doctrine, with a "cavalry" flavor. Therefore, I found that for a CAB-H, FM 71-2J worked well; its use in conjunction with FM 7-54 proved a mainstay during NTC training and at the NTC itself.

Clearly a sharp focus on gunnery for the TOW and Mark 19 was essential. The division had properly established a comprehensive gunnery program for TOWs. In addition, the 3d Brigade and its battalions were blessed with some great innovative master gunners. Accordingly we expanded upon the division TOW Table V (squad MILES qualification) and set up a "Top Gun" Table V in the desert terrain of Yakima Firing Center. This training approach was repeated twice more, in a totally tactical setting, including real tank "targets" with shoot-back capabilities and always followed with live missile firing and then force-on-force tactics. These tough and realistic Table Vs were the prime source of our gunnery excellence and strongly affected the development of our tactics.

In setting up engagement-area techniques, several salient points emerged. First, the use of infantry was vital, most importantly to shape the battlefield by retaining key terrain and to secure the battlefield by augmenting screening forces and by conducting patrols. The use of infantry to "secure TOWs" from close-in threats was not possible due to insufficient numbers of infantry in a CAB-H, nor was it necessary. The TOW platoons proved able enough to secure themselves in all threat environments with appropriate techniques and good discipline. The use of the Mark 19 was a key combat multiplier for the infantry, providing a marvelous defense against a dismounted threat and protection against lightly-armored enemy vehicles. The 3d Brigade 12 and 24-hour infantry defense SOPs summarized the detailed techniques developed to make motorized infantry a potent battlefield force. It was clear at the NTC that these tactics were right on the money. A middleweight force needs good infantry capabilities.

Second, the command and control of TOWs was not easy. Having "pure" disengagement lines to ensure constant stand-off was not a good technique, since all too often this meant taking frontal shots and ensuing races to the rear in the face of advancing armor. We developed extensive use of flank, and rear battle positions, focusing on "keyhole"--using terrain masking to protect the TOW from extensive enemy observation and counterfire while providing good, but limited fields of fire--and other imaginative techniques. Distribution of fires was vital.

Thirdly, as for the size and type of engagement areas, we concluded that with a deep sector, use of repositioning and multiple single-company or two-company battle positions worked well. Of course, fighting such a sector was a battalion mission in the sense of organizing the series of smaller battles. With limited depth, one or two battalion engagement areas were generally appropriate. At no time did we see a place where a brigade engagement area was appropriate.

An absolutely vital motorized technique was camouflage. The 3d Brigade totally mastered this technique, and our units could literally disappear into a desert floor. I have been within a few feet of an infantry company on open desert terrain--with its vehicles and Mark 19s--and have been completely unable to see it. The MILES-driven limitations on camouflage at the NTC severely hindered our battle efforts there. There is, of course, an inverse relationship between camouflage and mobility, in that some time is required to take off the camouflage and move. Good training and effective decision support templating made this a non-problem.

Finally, security in the defense was a vital issue. The NTC has highlighted the "recon/counter-recon" battle to the Army. We used the CSC commander to take charge of a mix of assets--scouts, UAS-11s, FOLTs, and often the AT platoon and an infantry platoon--to fight this battle. This worked extremely well at the NTC for reconnaissance, but killing the enemy recon at night required more work--motorized weapons systems were at some disadvantage in this environment (slow-firing TOWs and Mark 19s with no thermal capability were not as good as the Bradley 25mm chain gun). But the CSC-led screen force is the right idea and with work and good gunnery (and close linkage with the mortars) can get the job done.

OFFENSIVE OPERATIONS

The issue of how to fight the motorized CAB in the offense was one which provided even greater challenges. The TOW limitations--slow-firing, slow rate of speed, difficult ammunition resupply--seemed even more constraining for an attacking force. Initially our thoughts were that TOWs would necessarily be limited to overwatch with light motorized infantry doing any actual attacking required. This limited our training on offensive tactics considerably. It was not until the pressure of NTC operations, where we were thrust into situations requiring the attack, that we began to squeeze the most out of the synergy between our masses of quick TOWs and our limited infantry. Some considerations that evolved at the NTC included the following:

- An aggressive spirit was vital--one had to believe in the ability to take the battle to the enemy--but this spirit had to be channeled in M966 crews to ensure that they stayed at stand-off range routinely during offensive operations. In shorter-range terrain they had to preserve the ability to use quick cover and concealment.

- Hasty engagement areas in the offense required careful advance planning based on maps, imagery, and patrolling. Tentative battle positions and target reference points down to platoon level needed to be designated throughout the sector. This facilitated the rapid occupation of battle positions, with TOW systems arrayed in depth to avoid presenting linear targets to enemy air.

- Breaching is a battalion operation (per heavy force doctrine) and well within the capability of a motorized force. The use of engineers and infantry are precisely the same--and in a pinch, M966 crews can use their machine-guns or even dismount to supplement breaching operations.

- "Frontal attacks" are just as viable for a motorized force as for a heavy one, which is to say for both, only with great care. Find an assailable flank with aggressive recon, isolate it, assault it, and roll up the enemy a piece at a time, with infantry leading the way and TOW sections using battle drills--with one system drawing enemy fire while his wingman engages the enemy. Next the unit infiltrates the enemy's rear and catches the enemy while he is counterattacking and repositioning. All of this should, of course, be done in limited visibility.

SURVIVABILITY

The next set of issues we confronted dealt with that greatest of concerns for a motorized force, survivability.

A primary concern was that of enemy artillery. One of the most important results of the NTC in our minds was a strong confirmation that our array of techniques to survive the massive Soviet artillery threat worked well. These techniques included:

- Heavy emphasis on counter-battery fires. Though a DivArty mission, battalions and brigades have vital roles in prompting and cuing counter-battery fires. MLRS is also a vital weapon system to assist in this regard.

- Security operations. Cutting off or reducing enemy targeting information by aggressive counter-recon was vital.

- Deception operations, active and thorough. These almost always entailed involvement of combat forces to be effective.

- Repositioning company/teams. This usually occurred under a battalion plan, and usually within 2-3 hours of expected enemy attack.

- Repositioning platoons/squads. This type of repositioning was done locally and often just prior to or during combat, to avoid local enemy artillery fire boxes.

- Use of hide positions. The best technique here was by platoons for TOW companies and by squads for infantry companies. Precise timing on company and battalion decision support templates to occupy fighting positions was vital.

- Survivability positions. Some motorized tacticians felt that a motorized force should never dig in. We disagreed, and found that skillful use of blade assets to dig vehicle positions for the battalion greatly enhanced survivability. Sometimes this was tied into deception operations, and a company would dig in the secondary battle position, reposition forward under cover of darkness to a primary position, and later reoccupy the secondary holes and fight from there.

- Camouflage. Again, this was a vital, indispensable tool which on a non-laser, real battlefield would be even more essential. Constant attention and drill on the smallest details were needed to master this skill.

- Another great concern to motorized force survivability was enemy air. Due to the lack of armor and lack of heavy machine guns, enemy air took a heavy toll on us during the first couple of battles at the NTC. We solved this by the following measures:

-- Small arms air defense. A platoon task in the manuals, it simply needs to be drilled and trained, both with live fire and MILES. Use the RCMAT. Coupled with alert air guards and good SOPs, small arms air defense worked.

-- Careful integration of Stingers and use of the battalion air defense officer. This is exactly the same for heavy forces except that lack of self-propelled Vulcans made it harder and more important.

NBC operations are not much tougher than for a heavy force. Heavy forces have an advantage in that they do not have to go to MOPP 4 while inside their vehicles. NBC is much easier than for a light force, since all needed equipment and NBC resupply is readily carried and stored.

The Mark 19 is superb weapon against enemy dismounted soldiers. Moreover, great individual marksmanship was an indispensable part of defeating this threat, as was the ability of small-unit leaders to adjust accurate mortar fire against dismounted forces. TOW platoon "self-defense drills," both MILES and live fire, tied all these elements together.

COMBAT SERVICE SUPPORT

A major success story in motorized operations was combat service support. Operations here were a tremendous combat multiplier. A motorized battalion proved easy to sustain. Use of heavy force doctrine and motorized equipment was effective and reliable. The Fort Knox doctrinal sketch on Battalion Task Force Combat Service Support (FKSM 71-2-8) was especially helpful.

SPECIAL MISSIONS

In operations against light forces we enjoyed excellent success. On one operation, CASCADE RAIN, in December 1986, we "EDRE'd" to Yakima to oppose a light battalion. Though they were disposed along terrain well-suited for light infantry, we were able to infiltrate their positions by use of our own equally skilled but rested troops, by virtue of being mounted infantry, and then slip masses of TOWs into their rear. Although terrain will play a major role, all things being equal, a motorized force's advantage in mobility, command and control, lethality, and combat service support will enable it to defeat a light force.

Finally, for operations on restricted terrain, we enjoyed good success against both heavy and light forces on such ground. We used the MOUT technique for TOW shots at close ranges by digging in and preparing the terrain with engineers, and camouflaging. As always, infantry was at a premium.

CONCLUSION

Based on our operations in desert and forest, a TOW/Mark 19 motorized force could go to war in Europe, Korea, or Southwest Asia and win. As confirmed at the NTC, our "basics" were essentially the same as for heavy forces. We needed more infantry--a "two-by-two" mix of TOW and infantry companies for all maneuver battalions would be ideal--but we made do with what we had. Above all, we had confidence in the idea of being a motorized middleweight, and adapted this idea and the systems we were given into a combat-capable force. Motorized worked!

COMBINED ARMS BATTALION (LIGHT)

4TH BATTALION, 23D INFANTRY REGIMENT

THE "MOTORIZED EXPERIENCE" OF THE 4TH BATTALION, 23D INFANTRY REGIMENT

INTRODUCTION

For a traditional light infantry battalion, the transition to a motorized combined arms battalion-light called for not only the influx of huge amounts of new equipment but, more importantly, the adoption of an entirely new way of thinking how to fight. The new motorized MTOE detailed what equipment the unit would eventually have to organize, plan, operate, and execute its new mission on the battlefield. Similarly, it hinted at how the individual soldier--the key component on that battlefield--would need to be trained in new skills to operate his motorized systems and otherwise perform his job. The unit's task in effecting the motorized transition promised to be a tremendous challenge for all concerned, irrespective of rank or duty position. This transition challenge ranged from turning in old equipment; receiving new equipment; reducing and realigning the manpower structure within the unit, while simultaneously teaching personnel to think, act, and fight motorized; and, most importantly, defining for the unit and for the US Army the "motorized concept." The unit was to explore the capabilities of that concept in terms of the synthesis of the equipment, the personnel, and the tactical doctrine. After roughly two years of such transition, 4-23 Infantry, one of two CAB(L)s in the 9th Infantry Division, will use this forum to discuss its experiences and observations as a motorized infantry fighting force.

THE BASIC MOTORIZED CONCEPT

The goal of the AirLand Battle doctrine is to prevent the enemy's application of mass at a decisive point by attacking his formations throughout the depth of the battlefield with new and improved maneuver and firepower systems (FC 7-54, 1986). In an effort to address this need for new and improved maneuver and firepower systems, and to fill the void in existing Army infantry capabilities, the motorized infantry was conceived and developed. The intent of this new motorized infantry was to create a highly-mobile and high-powered fighting force capable of moving fast, striking hard, finishing rapidly, avoiding decisive engagement, and ultimately maximizing the basic tenets of the AirLand Battle doctrine.

The concept of the motorized infantry was designed to offer numerous advantages over the Army's two more traditional infantry configurations--light and mechanized. The principal advantage a motorized infantry unit is able to provide is significantly greater firepower than its light counterpart and comparable firepower to a mechanized force. As designed, this is primarily due to the fact that the TOW II, M2 .50 cal machine gun, and when fielded, the Mark 19 grenade machine gun weapon systems are all organic to the motorized unit. A light unit, on the other hand, would encounter extreme difficulty, if not impossibility, trying to employ these weapons (if it had them) due to the innate inability to transport them on the battlefield. Of course, a mechanized unit has virtually the same weapon systems at its disposal.

The motorized unit is capable of covering much more terrain in significantly less time than a light unit. This is true both regarding mobility and firepower. A motorized unit is also much more maneuverable and deployable than its mechanized counterpart. The vehicles employed by the motorized infantry can deliver troops and firepower to more places in less time than a mechanized unit because the vehicles are both faster and lighter, yet they are also able to carry the same vital weapon systems as a mechanized force. Due to the vehicles' smaller dimensions and lighter weights, the motorized unit has greater deployment flexibility and requires far fewer sorties. Tactically, a motorized unit and its organic firepower can be easily and rapidly relocated virtually anywhere on the battlefield with limited aviation assets.

THE EVOLUTION (FROM DRAWING BOARD TO BATTLEFIELD)

The motorized infantry was conceived as a unit that would be light, fast, highly-maneuverable, and capable of striking fast and hitting hard and then moving again without being decisively engaged. In simple terms, the goal of the motorized concept was to field a unit that would epitomize and maximize the notions of move, shoot, and communicate. The motorized concept can and must be defined in terms of the environment, equipment, personnel and training provided to accomplish its mission. And, in turn, a motorized unit can only train for and expect to execute fully its mission to the extent that its equipment and the environment supports the dedication, motivation, and willingness of its soldiers to make themselves a proficient and combat-ready motorized fighting force. Throughout the continual and uneven evolution of this unit, problems have been identified in the areas of equipment and environment; problems which have constrained this unit in the training for and execution of its motorized mission; problems which have made it difficult for the unit to realize its full motorized potential.

As originally conceived, the armored gun system, a weapon system capable of shooting while moving, was to be the main weapon for executing the mission of the motorized infantry. Because the Army did not possess a weapon system capable of adequately filling this need, the existing wire-guided TOW II was substituted as an "interim" armored gun. The TOW's inability to "shoot on the move" combined with the very limited survivability of the TOWs thin-skinned firing platform (i.e. the HMMWV), has produced three adverse consequences. Conceptually, the flexibility of the main motorized weapon is reduced, thereby causing the motorized concept and its associated tactics to be redefined before even leaving the drawing board. Moreover, this has mandated that the soldiers and leaders at every echelon in the unit train and develop tactics during a crucial initial transition period with an "interim" weapon system whose capabilities are much different than the weapon they may actually take to war. Practically, the HMMWV TOW II combination promises a greatly reduced life expectancy for TOW crews (and their weapon systems) as they are required to fire and track their missiles from stationary, unarmored vehicles.

The fielding of the new equipment required to implement the motorized concept has also been a constraint for the unit during its two-year transition. The ability to train effectively for and execute the motorized mission has been directly linked to the amount of vehicles, radios, weapon systems (and ammunition), night vision devices and related equipment that have been on hand or could be borrowed at any given time. No field deployment was exactly like its predecessor because the amount of critical equipment had changed and, therefore, the tactical and technical capabilities of the unit would necessarily have to be modified as new equipment was integrated into the scenario. Continuity of training was particularly troublesome in this respect; however, operational flexibility, creativity in planning, training and operations, and "learning" (sometimes by trial-and-error) were always maximized during this unstable progression.

Once the lag between the implementation of the motorized concept and the fielding of the equipment began to be resolved, a subsequent lag in the arrival of related logistical support became evident. Shortly after fielding, apparent problems with the manufacture of the HMMWV's generator and half-shaft bolts surfaced. This problem was further compounded by an initial lack of availability of repair parts (e.g., windshield wiper motors and parking brakes) for the HMMWVs rendered many vehicles not fully mission capable for extensive periods. This problem has diminished over time but has constantly detracted from the unit's ability to train for and execute its motorized mission.

PRACTICAL MOTORIZED LESSONS LEARNED

While the theory underlying the motorized concept is fairly straight forward and would seem simple enough to apply, the actual implementation of that concept and its trial on the simulated battlefield revealed some interesting insights into its apparent capabilities and shortfalls.

COMMAND AND CONTROL--The motorized infantry is capable of and in fact must use speed and dispersion in its tactical operations. These two elements are key to the survivability of the thin-skinned HMMWVs. But these two elements also necessarily require a communications system capable of maintaining effective command

and control. However, because equipment maintenance, weather and terrain are not always ideally conducive to good communications, motorized communications sections must and did effectively adapt their operations to meet the fast-paced and long distance demands placed upon them. They did this by configuring communications systems that maximized the efficiency of available communication equipment to meet the needs of the vehicles integral to the execution of the motorized mission, not configuring communications systems to the MTOE arrangements. They then augmented this basic system with the aggressive and proactive use of mobile retransmission capabilities.

FIRE AND MANEUVER (on a combined arms battlefield)--Under its present configuration, the blend of maneuverability and firepower makes the motorized infantry a fighting force with formidable combat potential. However, the same elements (i.e., fast, lightweight HMMWVs with heavy machine guns/anti-tank weapons) that promise this lethality are not without liabilities. The speed and maneuverability of the HMMWV are made possible by the vehicle's light weight. But this light weight is made possible only because of the vehicle's thin-skinned nature--a condition which affords the HMMWV and its crew minimal protection from every form of enemy munitions (including small arms) and even several forms of "natural" munitions like tree branches and rocks. The motorized infantry is additionally limited by the types of terrain in which it can realistically operate. Extremely steep or thickly wooded terrain is virtually impassable for the HMMWV; nor are these practical for its available weapon systems.

The relationship between the HMMWV and its weapon systems is also problematic in another respect. A motorized rifle unit can and must dismount to conduct its mission, but a motorized TOW unit cannot do so while still retaining any mobility and, therefore, flexibility. While a HMMWV-TOW II crew consists of only three personnel, it is a demanding task for even five or six soldiers to "manpack" a TOW II system any appreciable distance.

The motorized infantry vehicle also experiences difficulties operating in a fully integrated combined arms environment, since the HMMWV is incapable of maintaining the same high cross-country speeds of a modern tank or APC.

In the face of the above-stated issues, practical experience has shown that careful and creative planning, flexible execution, and proactive leadership is capable of meeting these challenges.

FIRE SUPPORT--Careful pre-planning and swift, coordinated execution of fire support is critical to the motorized infantry mission. Experience has shown that without proficiency in this area, both on the part of the motorized infantry personnel and fire support personnel, as well as effective coordination between the two, the motorized mission is doomed to failure. The inherent susceptibility of the HMMWV to destruction from enemy weapons requires that the motorized infantry remain moving while conducting tactical operations. To accomplish this, the infantry must not be stopped by enemy suppressive fires. Those fires must be effectively nullified by friendly indirect fire support.

Of equal importance is the tremendous potential that effectively planned and timed indirect fire has for creating the kind of chaos and disruption among the enemy's various echelons, chaos that is critical for establishing an environment conducive to the motorized mission. Whether such coordinated fire support is used in the execution of a friendly engagement area or is used to weaken an enemy defensive position, the result is the same--the enemy's organization and momentum is disrupted, and a situation is created whereby the fast-moving, hard-hitting capabilities of the motorized infantry can be exploited.

Regardless of the scenario or the intended application of fire support, effective planning and smooth coordination are fundamental to the motorized infantry being able to retain the mobility and momentum necessary to accomplish the mission.

AVIATION/AIR DEFENSE SUPPORT--As with indirect fire support, the carefully planned and effectively coordinated use of attack helicopters and US Air Force close air support is critical to the success of the motorized infantry. The ability of these assets to harass, disrupt, destroy, and otherwise distract the enemy is fundamental to motorized infantry mission accomplishment and the survival of the thin-skinned HMMWVs.

Other aviation assets (e.g., Blackhawk and Chinook helicopters) play an equally crucial role. These assets help to extend greatly the mobility of the motorized infantry by allowing it to be relocated rapidly both laterally and in depth throughout the AirLand Battlefield. Similarly, these assets allow the motorized infantry's supply lines the same mobility and, therefore, the flexibility necessary to sustain the battle.

The threat to the thin-skinned motorized infantry from enemy aircraft is self-evident. Enemy ground forces can be outrun, outmaneuvered or suppressed with supporting fire, but with enemy air the solution is not so simple--and the consequences are potentially devastating. For these reasons, the carefully considered and tactically optimal placement of air defense assets is critical, as is an intelligence and early-warning systems that allow these assets sufficient time to react to approaching hostile aircraft.

LOGISTICAL SUPPORT--Supporting the motorized infantry provides many challenges, but these can be overcome easily with creative planning and flexible execution. Due to the amount of fuel needed and the bulk of ammunition such as TOW missiles, large field trains with many support vehicles are required. These in turn require significant maintenance support. In total, the entire package becomes a large, vulnerable target for enemy artillery and air attack, thus requiring extensive active and passive security considerations on the part of the unit. In addition, the speed at which the motorized battle is fought requires these trains to be highly mobile if they are to stay within effective range of the maneuver elements. This problem is ameliorated by unit supply sections being motorized in a manner comparable to the combat troops and using resupply systems (e.g., logistical release points--LRP) that take advantage of the mobile character of both the unit's front and rear elements. Due to the distances and time factors involved, it is almost impossible for the motorized infantry to operate and sustain itself without the use of such LRPs.

CONCLUSION

After roughly two years of logistical, doctrinal and administrative turmoil, the motorized infantry still remains a concept and a unit in transition. Because of major lags between the fielding of all of the equipment required to implement the concept and execute the mission, and the early absence of a definitive doctrinal basis outlining the tactical tools for implementing the concept, the motorized infantry is still in the midst of evolutionary development. The concept has tremendous, if not limitless, potential. With the recent equipment and personnel fills in the units that are recipients of 2d Brigade's inactivation, combined with the two years of doctrinal and tactical experimentation and refinement, the environment has finally reached a point where the motorized infantry could develop significantly and realize its full potential in the near future. All of the ingredients are present for this final evolutionary step to occur except one--the guarantee of a "Motorized" 9th Infantry Division.

LIGHT ATTACK BATTALION

2D BATTALION, 1ST INFANTRY REGIMENT
3D BATTALION, 60TH INFANTRY REGIMENT

THE LIGHT ATTACK BATTALION MOTORIZED EXPERIENCE

2D BATTALION, 1ST INFANTRY

This chapter will chronicle the light attack battalion (LAB) experience as a part of the motorized concept. This article will be based primarily on the 2nd Battalion, 1st Infantry's experience as a part of a motorized rotation at the National Training Center (NTC). First will be an evaluation of the seven operating systems as they apply to the LAB. Following that will be a short discussion of training, fighting, and sustaining issues. Next, will be some thoughts on the LAB's capability when equipped with Fast Attack Vehicles (FAV). Finally will be an assessment of missions that the LAB performs.

INTELLIGENCE

As a unit that performs many cavalry-like functions, intelligence assets of the battalion are its most important element of combat power. The lack of a dismounted reconnaissance capability is a severe limitation. Further, the "eyes" of the battalion, i.e., the scouts, have the poorest night vision capability of any maneuver platoon within the battalion. The lack of a dedicated battalion O&I FM radio net with supportive secure radios is a shortcoming. During a train up exercise this battalion had a downlink channel to the RPV. This was enormously beneficial. A LAB prefers to operate at night, and this battalion executed extensive night operations. Even with the sophisticated night vision aids available, collection and analysis of the required intelligence is far more difficult at night.

At the TOC, the S2 shop has serious challenges. The wide and deep sectors required for operations meant the S2's reconnaissance and surveillance plan, decision support template and battlefield area analysis products require a robust staff to track, analyze and report. The S2 is poorly supported; he is not even authorized a vehicle. The importance of this staff officer is significant in every battalion, but in a LAB his role can not be understated. He should be a major and the most experienced officer on the staff.

MANEUVER

The LAB works optimally in a sector/AO that provides for maneuver space and long-range fires. The rugged durability of the HMMWV, the extensive communication capability, and the great quantity of night vision aids make a LAB a very agile force that can often out-maneuver even a mechanized/armor force in most terrain. To optimize the long-range weapons systems and to increase survivability, platoons typically are deployed over a distance of one and a half to two km. Companies may deploy over a four to five km front. Ideally, the depth of sector allows the unit to engage, disengage, withdraw to a subsequent position and prepare to re-engage the enemy force before it regains momentum. At the NTC widths of 10-15 kms and depths of up to 30 kms were common for the LAB during defensive and retrograde operations.

FIRE SUPPORT

A major concern with a LAB is the ability of towed artillery units to support operations adequately. This is a result of the large sectors/AOs the LAB occupies and the rapid repositioning within those sectors. Typically, the dilemma for the artillery is whether to position forward, at the risk of being overrun when the LAB withdraws to subsequent battle positions, or to stay back initially and rely on the LAB's organic mortars to fill the gap. Both the artillery and mortars are noticeably less maneuverable than the LAB. The use of artillery assets to provide COPPERHEAD support was beneficial at the NTC. The cost is, of course, reduced artillery assets available for conventional missions. Because of its mobility, dispersion, and propensity to operate at night, the LAB did, on occasion, operate outside artillery support. This was the case primarily during offensive operations such as infiltration attacks or deep raids. Additionally, even when in artillery range, LABs often have to rely on a reduced ability to mass artillery due to the wide and deep sectors and numerous enemy avenues of approach in sector.

Other forms of fire support are used in fairly traditional roles. Often CAS and attack helicopters can overcome some of the problems discussed above with artillery.

AIR DEFENSE

The most frequent and likely ADA assets available to a LAB are Stinger teams. A "fair share" is four Stinger teams, each consisting of a HMMWV with driver and gunner and 12 Stinger missiles. Experience at the NTC showed that while the Stinger is excellent, even two or three times that many are probably not enough to cover the widely dispersed task force.

Consequently, the need for a LAB to employ passive air defense measures and use small arms for air defense (SAFAD) is accentuated. The TOW is only effective against stationary or slow moving rotary wing aircraft. The .50 caliber machine gun is effective, but an important point to remember is that the ability to mass SAFAD fire is very limited in a LAB because of dispersion and small squads (five men, two of whom are drivers). The MK19 achieved fair SAFAD results at the NTC, but it will be more difficult to achieve those results with live ammunition due to the slow rate of fire and the arched trajectory of the live MK19 rounds.

MOBILITY/COUNTER MOBILITY/SURVIVABILTIY

The LAB has no dismounted infantry by TOE; hence manpower intensive operations, like breaching obstacles, are most difficult. At the NTC, experience dictated that soldiers dismount their HMMWV, abandoning their MK19 or TOW II to become part of the breach, security or assault team. Attached combat engineers soften somewhat the manpower drain of these operations. None the-less, providing dismounted skills for breaching was always a very significant loss of motorized capabilities. For example, an obstacle requiring an infantry company to breach will take the better part of a dismounted LAB to attain the same "breaching strength." On the other hand, the highly mobile and rugged capability of the LAB multiplies opportunities for finding a bypass or gap.

Counter mobility operations are limited to point minefields and point obstacles with organic LAB assets. Each vehicle can carry three AT mines and, through consolidation of a platoon or company, can emplace a point minefield. Engineers can obviously beef up this capability. Experience at the NTC demonstrated that motorized engineers have extensive capability to do this, particularly with GEMSS. Once again, any decision to employ obstacles using LAB infantrymen must balance carefully the amount of motorized capability lost versus obstacle emplacement capability gained.

Survivability without armored protection is almost exclusively a function of attached engineer assets and good passive measures. Maximum use is made of hide positions and operations at night as well as great dispersion at all times. Also the soldiers of the LAB must be absolute masters of camouflage. The LAB seldom dismounts in a way that would make digging in with pioneer tools useful. The NTC experience did suggest that when engineer assets were available, digging survivable vehicle positions was effective. Blade hours are probably more effectively used on survivability than on countermobility.

COMBAT SERVICE SUPPORT

A LAB possesses some unique and operationally effective CSS assets. The mini-fueler, a HMMWV with a 150-200 gallon diesel fuel pod in the cargo bed per company, proved extremely valuable. The LAB provides the platoon sergeant a M998 cargo carrying HMMWV for resupply. This proved invaluable time and again. The relatively small crew-to-vehicle ratio allows the LAB to carry more basic load and sustainment supplies than other infantry battalions. The LAB's fleet of HMMWV-pure vehicles was very conducive to standardized maintenance operations both in terms of parts supply and repairability.

The LAB also has some unique CSS challenges. The medical evacuation of casualties over a widely dispersed battlefield puts a premium on aid vehicles and aid men. This is compounded on deep strike missions inside enemy lines. Although initial loads of classes of supply are good in a LAB, the heavy, bulky ammunition (TOW II, MK19) means that initial basic loads will soon be gone even in engagements of limited duration. Additional racks on the exterior "trunk" of the M1025 enabled the LAB to significantly increase their initial load of TOW II missiles. Still, at best, each system will have 10-12 missiles before resupply is required. This, coupled with the LAB's large AOs and continuous operations, is a significant CSS concern. Class I is generally a T-MRE-T cycle. Once again the dispersion and need to hide inherent in a LAB's mission makes serving T-rations difficult. At the NTC the unit relied more heavily on MREs. Under many conditions this may be best in the future. Battlefield recovery assets are limited. Platoon or even lower level requirements for tow bars can reduce this problem somewhat. While there are many CSS concerns, our NTC experience indicates that CSS need not be a "war stopper" in LAB operations.

COMMAND AND CONTROL

The extensive FM capability makes the LAB a highly agile and maneuverable unit. Orders can quickly be disseminated to every member of the task force. The depth and width of the sector typically used by a LAB dictates that AM radios also be used. The scouts, field trains, TOC, and commanders have great need of an AM capability. The TOC is relatively sophisticated, but too slow and cumbersome to suit the rapid tempo of LAB operations. The LAB at times will operate much like a cavalry squadron and consequently can be augmented with some additional assets, e.g., RPV, I&S Teams, LRSU Teams, DF and jamming teams, and air cav elements. The TOC, S2, and FSO radio capabilities are insufficient to handle all these assets at once.

FIGHTING, TRAINING, AND SUSTAINING ABILITY

Additional LAB issues pertaining to the ability to fight, train, and sustain will now be addressed. The issue of lack of dismounted infantry has been made. However, the requirement for dismounted tasks (such as local patrolling, security, breaching) remain, which only increases the problem of continuous operations. The LAB has two or three-man crews in each combat vehicle. The rigors of training and potential combat stress the structure of a LAB perhaps more than any other infantry battalion in the Army.

The lack of armored protection robs the LAB of any survivability margin of error. The LAB is extremely vulnerable to artillery. This intense vulnerability must be compensated for by extensive night operations, dispersion, and camouflage.

Another consideration unique to the LAB is the employment of the TOW and Mark 19 team. Careful consideration must be given to their synchronization or the TOW may disengage at the same point the Mark 19 begins engagement.

The LAB is the most fragile unit in the Army in terms of personnel shortages. A one soldier shortfall can ground a complete combat system. Loss of three or four soldiers puts two systems out of action. This significantly affects routine training when, due to personnel shortages, a light attack platoon leader may be able to train with only four or five of the authorized eight systems in his platoon. Priority training must be carefully planned and conducted by the chain of command to be of value.

SURROGATE FAST ATTACK VEHICLE

Until November 1986 the LAB was equipped with a Surrogate Fast Attack Vehicle (SFAV). This commercial "dune buggy" was equipped with the same weapons and radios as the HMMWV-configured LAB, but had a markedly smaller load carrying capability. Additionally, the SFAV's open frame structure made it and the soldiers manning it more vulnerable to the elements. The SFAV's primary advantages were camouflage and the ability to be loaded two per UH-60 for deep operations. The capability of an SFAV-equipped LAB to conduct infiltration and deep strike missions was greater than that of the HMMWV-equipped LAB. The Teledyne version of the FAV or some other vehicle of this nature, may well resolve the shortcomings, combining the best of the HMMWV and SFAV equipped LABs.

WHAT WORKED, WHAT DID NOT

Finally, this section will detail the missions which proved to be most suitable for a LAB and those which did not. The LAB is structured and configured to perform reconnaissance, counter-reconnaissance, and covering force missions. This is particularly true when assigned the large sectors/AOs previously discussed.

In terms of defensive operations the LAB, is suited for defense in depth. The LAB becomes less effective when operating in restrictive terrain or small sectors which do not provide for dispersion and maneuver space. The LAB has virtually no capability to hold ground in a conventional linear defensive sense.

In offensive operations the LAB is agile and can rapidly mass combat power. This makes it suitable for many counterattack missions. As currently configured, infiltration or deep attacks must be executed only when some very specific battlefield conditions exist, e.g., known enemy weak points, detailed intelligence, and a high-payoff objective. While LAB tactics are offensive in nature, the LAB's lack of armored protection, slow firing weapons systems and vulnerability to armor and obstacles make it a poor unit to commit to a penetration or frontal type attack, or "blunting" versus flanking-type counterattack.

CONCLUSION

Like much of the motorized concept, the LAB gives its higher commander many unique capabilities. It also has some significant shortcomings which must be understood. A LAB is not mechanized infantry in HMMWVs. It is more like a light cavalry squadron with infantry weapon systems and infantrymen.

THE LIGHT ATTACK BATTALION MOTORIZED EXPERIENCE

3D BATTALION, 60TH INFANTRY

The primary concept upon which the motorized division was formed was the ability to deploy rapidly worldwide by air and provide the firepower and anti-armor punch necessary to defeat armor-heavy forces. One of the organizational building blocks that make up this versatile "middleweight" division is the light attack battalion (LAB). The mission of the LAB is to conduct mobile combat operations throughout the AirLand Battlefield and to destroy enemy forces primarily through firepower.

CAPABILITIES

As the mission statement implies, the LAB is organized and equipped to perform a variety of missions throughout the battlefield. The LAB is a highly mobile, lethal force which makes it extremely well suited for covering force operations in support of the main effort. Its ability to move quickly on the ground and by air, using UH-60 or CH-47 helicopters, also makes the LAB an agile force for rear area operations or reserve missions. In addition, the LAB may be used to conduct infiltration missions to support deep operations.

To conduct these varied operations, the LAB is organized using a headquarters and headquarters company, three light attack companies, and a combat support company. At the heart of the organization is the light attack section, consisting of a HMMWV TOW II system (with an M249 SAW mounted as secondary armament) and a HMMWV Mark 19 automatic grenade machine gun. The combination of these weapons gives the unit the firepower and flexibility necessary to perform any of the operations previously discussed.

OPERATIONS

Although extremely mobile and flexible, the thin skinned HMMWVs are also quite vulnerable. Dispersion and the masterful use of terrain are essential to the survival of motorized units. Because engineer assets are limited, it is often not possible to fight from well constructed firing positions. Instead, the LAB uses "hide positions"--a location from which the HMMWV cannot be detected. When enemy forces enter an engagement area, the HMMWV will move from the hide position to a predesignated firing position to kill enemy forces. This method requires that the unit to have "eyes" forward to view the engagement area, and reliable communications between the forward elements and the vehicles in hiding. A standard procedure is to position the HMMWV-TOW on the reverse slope of a hill overlooking an engagement area. This protects the HMMWV from both enemy observation and indirect fires. The unit's forward eyes are dismounted OPs, dug-in and well concealed on the forward slope. With binoculars, night vision devices, and radio or wire communications, the OP can observe and report enemy activity. When the enemy enters the engagement area, the HMMWVs quickly move to their firing position to destroy the enemy.

How well the LAB integrates all combat power into a combined arms battle has been a frequent point of concern. Experience from Yakima Firing Center and TEAM SPIRIT 88 indicates that armor units and a LAB complement each other extremely well. The armor provides shock and firepower, while the LAB provides long-range TOW fires and close-in suppressive fires to protect the tanks. Generally, motorized forces should lead armor during offensive operations. Light attack units can locate the enemy main body, determine how it is disposed, what it is doing, identify likely engagement areas, enemy weaknesses and boundaries, and then develop the situation. Armor can subsequently be committed to exploit the situation fully with its speed, shock, and immediate direct fires, overwatched by light attack forces.

Light attack units and armor together can also conduct a very effective delay. As the enemy approaches, he enters a "fire trap" which is an indirect fire engagement area designed to force him to deploy, button-up, and neutralize the effectiveness of his C3I. This, combined with electronic warfare measures, removes the capability to control and synchronize his attack effectively. The fire trap immediately precedes the direct fire engagement area executed by the HMMWV TOWs. As the enemy orients on the motorized forces, the armor force moves rapidly from a hide position into the enemy's flank and rear, destroying enemy forces in the engagement area. Overwatched by the motorized units, the armor force may either pass through the enemy or reposition--depending on the terrain and enemy situation. The light attack Mark 19s provide fires to strip away enemy infantry or thin-skinned vehicles and to protect the HMMWV TOWs as they disengage. Light attack companies can conduct trap plays without armor forces, but they lack shock action and must execute this mission by fire only.

One drawback to this combined arms integration is that in rough, open terrain HMMWVs cannot keep up with tanks or other tracked vehicles. The suspension system of the HMMWV is the limiting factor. HMMWVs are also not capable of negotiating soft terrain. These mobility differentials must be taken into consideration during operations planning. In addition, armor units task organized with a motorized force should be designated OPCON and bring their complete support slice. Motorized forces lack the fuel, package POL, Class V hauling assets, and recovery/ maintenance capabilities to support an armor unit of any size.

Sustaining operations is a major challenge for light attack companies. Because the Mark 19 crew consists of only two soldiers and the TOW crew only three, it requires special planning to insure that each soldier receives adequate time for personal hygiene and rest while maintaining the required alert posture. One method used to overcome this problem is to man only the HMMWV-TOW vehicles during periods of reduced alert status. All five soldiers in the section rotate their watch on the HMMWV-TOW. This method provides the soldiers on watch with the TOW's thermal night sight for observation and anti-tank capability, as well as a SAW for close-in suppressive fires.

CONCLUSIONS

The 3d Battalion, 60th Infantry participated in Joint Readiness Exercise Team Spirit 88, and gleaned several valuable lessons from the experience. First, good TOW shots were often limited by masking terrain or man-made objects such as telephone poles and wire. In several battles against the tank-heavy OPFOR, light anti-tank weapons were more useful than TOWs. Second, even with only limited engineer assets, the battalion was extremely successful at employing hasty wire obstacles and hasty protective minefields to canalize, delay, and destroy enemy forces. Each vehicle carried two or more rolls of concertina wire, two M21 anti-tank mines, and two M16 personnel mines. Finally, the integration of motorized infantry was vital. In the Korean terrain, the LAB could not cover enemy dismounted avenues of approach. On several occasions the dismounted capability of the motorized infantry played a key role in the overall success of a mission.

The LAB is a mobile, flexible force capable of tremendous firepower. Its ability to conduct rapid tactical and strategic deployment makes the LAB a valuable component of the Army force structure. To commanders who understand its capabilities and limitations, the LAB has proven to be an extremely effective and lethal force throughout the AirLand Battlefield.

ATTACK HELICOPTER BATTALION

1ST BATTALION, 9TH AVIATION REGIMENT

ATTACK HELICOPTER BATTALION MOTORIZED EXPERIENCE

1ST BATTALION, 9TH AVIATION REGIMENT

PREFACE

The lessons learned from the attack helicopter battalion (AHB) portion of motorized operations stem largely from the FY 88 training effort leading to Exercise RELIABLE STRIKE I in March 1988 and the first motorized rotation to the National Training Center (NTC) in May 1988. The nature of the work-up training and the realistic combat environment at NTC provided very credible doctrinal and tactical lessons. The seven operating systems succinctly focus warfighting concerns and will serve as the basis for this paper.

Doctrine for the 1st Battalion, 9th Aviation Regiment is contained in one primary document, FM 1-112, Attack Helicopter Operations. This manual does not directly address motorized units, but does include heavy divisional and some light infantry-related concerns. Overall, it adequately describes how attack helicopters fight in relatively mobile divisions such as the 9th Infantry Division (Motorized). FM 1-112 further includes all the original motorized O&O conceptual designs for the AHB from C3 through fighting and sustaining.

COMMAND AND CONTROL

The motorized division has one specific system not common to most other organizations: Maneuver Control System 2.0. Each battalion and brigade level unit has the potential for operating on different COMSEC keying variables and over various directed FM nets. The attack battalion can conceivably operate in one brigade sector in the morning and be directed to move across the division zone in the afternoon. The coordination required to secure appropriate variables and effect new command and control relationships seems quite simplistic on paper. However, it has actually proven very difficult and extremely time-consuming. Experience at NTC and other exercises has indicated that if the assigned and OPCON units in the brigade combat team operate on one variable, C3 is more easily established. Likewise, at division level, quick adjustment of the organization for combat seems dependent on limiting the number of COMSEC keying variables. It is seemingly more advantageous to minimize the proliferation of variables to facilitate immediate task organization of any combat or combat support units.

The Cavalry Brigade (Air Attack) in the motorized division enjoys a distinct advantage over other divisional aviation brigades by having MTO&E authorized, fully-supported, permanent LNOs to send to each maneuver brigade. These officers serve to assist the brigade commanders in integrating and planning all required aviation support well ahead of time. This constant training relationship exists in garrison and in the field, with generally excellent results for both parties. In itself, the liaison system is a significant combat multiplier. By detailing plans, routes, and expected support requirements, these LNOs allow the division to make the best use of aviation and, in particular, attack helicopter assets. Without brigade LNOs the attack battalion would be at a distinct disadvantage in rapidly moving across the battlefield. In addition, the austere nature of the J-series attack battalion and the forthcoming reductions in the L-series units will not provide for any type of liaison capability. A final note: at times there seems to be a tendency to keep the LNO at the respective brigade TOC as a full-time battle staff member; it is still highly beneficial to allow the LNO to transit between the brigade and attack battalion for reports, graphics and exchange of other critical information.

There is a perception that the attack helicopter unit's planning and preparation time is short because it can quickly move across the battlefield. The NTC confirms that there is no substitute for a good warning order and commander's intent, adequate graphics, reconnaissance, rehearsals, and back-briefs. It is still paramount to follow the "one-third, two-thirds" rule, and also to achieve some type of rehearsal, be it map, sand box, or even an on-site overview. Clearly, the best battlefield performance came about when subordinate unit commanders had the opportunity and time to do their planning and accomplish their mission according to our doctrinal guidance.

A method of planning that seems to be effective at brigade level was for the commander to bring together his S-3, S-2, FSO, ALO and battalion commanders upon receipt of the division warning order. Given time the commander and S3 would have worked out a few courses of action to discuss and quickly war game with the other combat team members once gathered. Subsequent open discussion and forthright guidance would then establish a solid course of action, intent, graphics, and would lay out support and resource priorities and establish immediate green tab coordination to synchronize the brigade fight. By the time the map on the top of the HMMWV was folded up, each commander would be able to take away a copy of the graphics and scheme of maneuver to issue immediately a detailed battalion warning order. When the brigade order is finally produced, the early parallel planning by the battalion staff would allow early completion of each unit order and would create more time for rehearsals, battlefield preparation, and continual coordination.

In my view, the division commander needs to have a firm string on the attack battalion to mass at the critical point on the battlefield. If the AHB is placed OPCON to another headquarters, it should be chopped no lower than the brigade level. The nature of the motorized battalion task force fight, and the consuming role the battalion commander faces, just simply makes it more practical for the brigade commander to control the fight when multiple battalions are involved. The brigade commander best synchronizes the battalions, which focus on their own missions, to ensure they carry out his intent. This brigade synchronization yields coordination and mutual support, a clear scheme of maneuver and combat power at the right place and time. Another C2 point--the division staff needs to remain sensitive to the ramifications implied in changing the organization for combat. One cannot simply recall the AHB to division control in the middle of a brigade fight, expect a total, instantaneous withdrawal, and a subsequent immediate entry on the division command net. I am not sure what an ideal planning time for changing the missions should be, but the friction of war clearly would not allow such a change to occur in five minutes.

Because of the AHB's perspective on the battlefield and a good ability to reposition physically without undue terrain restrictions, the aeroscouts and pilots can provide timely and accurate combat intelligence to the division staff. This reconnaissance and reporting effort may even turn out to be the AHB's biggest contribution. However, the AHB can readily generate a conglomeration of spot reports which, if not carefully controlled, can cause duplication and confusion leading to a loss of focus and inability to make sense out of the battlefield situation. The SITREP, using a SALUTE type format, provides an intelligence product easier to assess and control. Its dogmatic use in reporting can be invaluable in the establishment of motorized engagement areas, and the repositioning of motorized forces. Accurate SITREPs from the AHB at the NTC clearly gave the brigade commander the most timely intel, confirmed his scheme of maneuver, and allowed him to synchronize his combat power at the critical time and place.

INTELLIGENCE

NTC experience proves that intelligence preparation of the battlefield (IPB) is absolutely essential and leads to proper positioning and employment of the brigade combat team. It is particularly critical for motorized forces to ensure our stand-off combat concept, enhance survivability, and project our depth on the battlefield. The brigade must avoid a perilous race with an enemy armored/mechanized force potentially able to close more rapidly and move faster than we can. One technique to improve this IPB process is a common numbering system of establishing and labeling NAIs, TAIs and decision points. This approach provides a means to focus clearly our collection and combat assets and to minimize confusion over multiple sets of each of these critical points and indicators. Without this clarification, it became very difficult to make sense out of the proliferation of symbols on the overlay, such as NAIs and TAIs.

Recon and surveillance planning seems simple enough, but again, without such a plan, there is no central means to focus all our possible intelligence gathering assets on the threat. It must be simple, yet address all the systems and means within the brigade combat team. The good recon and surveillance plans at the NTC really paid off by providing meaningful intelligence, employing everything we had, and allowing maneuver against an engagement of the enemy on our timetable.

MANEUVER

There genuinely seems to be no substitute for employing the AHB in mass to destroy or disrupt enemy armored or mechanized formations. This tactic focuses the entire effort of the unit, retains battalion integrity, and causes the threat force to stop its maneuver and to react to our plan. Without this commitment to massing the AHB, it becomes quite easy to parcel out the unit or to employ it to respond to a variety of smaller firefights or tactical dilemmas. By planning for the AHB employment at the determined critical point on the battlefield, the fight is conducted on our terms and impacts significantly on the threat's timetable, momentum, and ability to maneuver. It firmly dovetails with the tenets of AirLand Battle doctrine, simplifying synchronization and creating, in time, space and resources, depth on the battlefield.

The motorized battalion-sized units have undoubtedly done more work to develop the engagement area (EA) concept than any other division unit. At the battalion task-force level, checklists are readily available to ease the planning process and to incorporate all available assets. An observation from NTC simply seems to be that we have to do it exactly right and to standard, or else a freely maneuvering, non-cooperative enemy force frequently renders our fires ineffective and continues to move unimpeded to the objective. The key appears to be that we have not completely thought the process through at the brigade and higher level. Here more thought, discussion, TEWTs, and full scale practice seems in order. Four items in particular stand out as lessons learned:

- The motorized engineer assets may simply be unable to build sufficient minefields, obstacles, and other complexes to force a threat element into the desired EA--it seems more beneficial and logical to reinforce terrain to <u>shape</u> the threat's move for flank and rear TOW engagements.

- The AHB also provides a means to shape the battlefield and to provide depth by engaging at some point prior to the ground force EA.

- Commanders must keep engagement area planning simple. We tend to proliferate the number of EAs. We can't prepare and overwatch an unlimited number of EAs. The EA must relate to our NAIs, TAIs, and threat timetables. In addition, we still seem to number and name EAs without a distinct system or pattern.

- We must remain extremely sensitive to the problems of repositioning our forces. If the plan requires a displacement of a unit, we must be aware of the threat timetable to identify better the point at which we must reposition. Otherwise, we will be driven to the rear in continuously failed attempts to get tenable positions against the rapidly advancing threat.

Move, shoot, communicate, secure, and stand-off really capture the essence of our requirements. If we do not execute the basics, we become decisively engaged by the enemy. None of the motorized units, to include the AHB, can afford to violate the basics of good tactics; when we didn't follow these precepts at NTC, we were killed by the enemy and became bogged down by his systems. Conversely, when flank and rear security elements were established, when AHB pilots remained outside of the ranges of the threat weapons, and when terrain was used effectively, the unit was able to engage, destroy, and retain freedom of maneuver. It simply requires continual practice and commitment by all elements.

FIRE SUPPORT

The targeting process at NTC proved to be cumbersome and untimely. A frequent result was a very late production of a pre-planned target list which was nearly impossible to disseminate to the companies and aeroscouts. One time-saving technique which was adopted required the nomination process to be limited to a certain number of targets for each battalion and to be terminated at a specified time to allow for processing and distribution. This proved to be much more effective since each possible user of the fire support systems then had time to digest the data, plot it along with the maneuver graphics, and then call for fire when the opportunity arose.

The NTC provided numerous opportunities to incorporate JAAT into the battle. Although the AHB company commanders were able to bring A-10s into the fight, they never achieved what could be termed a classic, synchronized JAAT battle, with attack helicopter, A-10s and artillery operating against the threat forces in the same fight. The mechanics of doing the mission were well understood by all the participants--to communicate effectively to bring this about was a consistent challenge. A few concerns complicate the matter. First, it would be more beneficial to designate a principal agent for a deliberate JAAT, one who will have the appropriate emphasis to ensure all elements are immediately responsive. Next, the communications net, CEOI call signs, and authentication tables for the USAF (they use a separate authentication table) have to be coordinated and distributed prior to the mission. The designated fire support net must be isolated and cleared to ensure timely calls for fire and to provide the opportunity to make a good, two-way positive communication. In addition, the fire support coordination measures, such as the airspace coordination area (ACA), must be as simple as possible to allow quick implementation, deconflication of other artillery missions, and ease of recognition by the A-10 pilots. In fact, the use of gun target lines may prove to be a better coordination measure to minimize cutting off required artillery missions for the other maneuver elements on the battlefield. Finally, a deliberate JAAT should be rehearsed, if possible, with at least the key leaders and combat team members for the mission.

ENGINEER/NBC

The AHB commanders need to understand, in particular, the obstacle and minefield countermobility (CM) effort of the motorized engineers. The AHB can be more successful in selecting battle positions and distributing fires when aware of how the CM network will reinforce terrain and shape the battlefield to create flank and rear shot opportunities. When tuned into the CM plan, the AHB can also assist in the overwatch of the obstacles. In addition, by knowing the plan and priority of work, other aviation assets, such as the UH-60 or medium lift aircraft, can readily serve the brigade combat team by rapid delivery and transport of prepared Class IV and Class V loads for quicker construction and emplacement.

The decontamination assets of the motorized division are stretched thin due to their dual smoke/decon mission. With all the brigade's units in possible need of decon on a dirty battlefield, it became more practical for the AHB to use organic decon equipment, set up a decon site, and divert personnel to accomplish a decon mission. At the NTC this proved a time-consuming and manpower intensive event. All the parameters surrounding this subject are beyond the scope of this paper; however, we have barely scratched the surface and must continue to develop training programs and practical methods to accomplish this task.

AIR DEFENSE

The aviation task force clearly must be integrated into the air defense structure. When possible, Stinger teams should be task organized with the AHB task force headquarters to protect key elements such as the aircraft, stocks of fuel, and ammunition. This task organization was done several times at the NTC, providing solid protection for the unit. As a minimum, forward assembly areas and forward arming and refueling points (FARP) must be coordinated and positioned to take advantage of already existing air defense coverage. Identification friend or foe (IIF) is a current topic of concern; training and maintenance programs are in progress to improve our posture and to reduce the possibility of fratricide.

COMBAT SERVICE SUPPORT

The Cavalry Brigade (Air Attack) is unique in that it is the only type aviation unit with its own support battalion and greatly enhanced Class III/IV organic capability. The expected depth and width of the motorized battlefield reinforces the importance of the support battalion and its role in expediting the employment of the AHB across the division sector. Detailed planning and integration of support requirements into all current and proposed AHB operations are still required; nonetheless our job is much easier compared to AHBs in other type divisions.

FARPs should always be planned in depth; motorized tactics and generally expanded area of operation serve only to reinforce this requirement. Coordination with the brigade S-3 is imperative to get adequate land space and to deconflict occupation of the same space by other units.

SAFETY

Our major concern is to preserve combat power and irreplaceable trained soldiers. Motorized tactics often result in widely-spread forces and independent decisions at lower levels. Aircrews and soldiers frequently operate near performance limits due to mission loads or expected environmental impact. Aircraft cannot be readily replaced since there is no assembly line producing new ones. As a result, safety pervades every mission and has become a necessary, natural process for the chain of command. Risk assessment and careful planning direct us to the conclusion that no training event or mission is worth a possible accident.

SUMMARY

This paper has addressed a variety of topics and concerns for each operating system. The experience in employing the AHB in the motorized division will continue to serve us well regardless of the final design or force structure conversion of the 9th Infantry Division (Motorized).

CAVALRY SQUADRON

1ST SQUADRON, 9TH CAVALRY REGIMENT

THE MOTORIZED EXPERIENCE OF 1ST SQUADRON 9TH (US) CAVALRY

Transitioning to a motorized force has been a unique and interesting experience for the divisional cavalry squadron. Despite the many challenges of resourcing and training, the unit to be the division commander's "eyes and ears," the squadron has become a highly trained force that is 100% strategically deployable by air. It is similar in design to the heavy division's "J"-series cavalry squadrons with two air cavalry troops and two motorized (ground) cavalry troops.

As shown in figure 1, the squadron also has a headquarters and headquarters troop and has formed a provisional "Echo" troop built around the aviation unit maintenance assets previously organic to the HHT. Being a truly combined arms organization in its own right, the squadron is extremely trainable, fightable, and sustainable. It is specifically designed, equipped, and trained to perform its mission independently as an element of division troops, and is optimized for combat operations in desert and arid regions in low to mid-intensity conflicts. When provided additional maneuver forces, the squadron can fight in the high-intensity arena.

Although the motorized squadron does not have the long-range surveillance unit of the heavy divisional squadrons, it does have a motorcycle reconnaissance platoon and a "command aviation" platoon, equipped with eight UH-1 aircraft, both organic to the HHT. The motorcycle reconnaissance platoon is equipped with three HMMWVs, 19 military motorcycles, and three PPS-15 ground surveillance radar sets. Figure 2 provides the structure and highlights of the HHT.

Troop A and B are the ground combat elements of the squadron. As shown in figure 3, each troop has three HMMWV-equipped motorized scout platoons, a 4.2 inch heavy mortar platoon with FDC, and a headquarters platoon with maintenance, supply, and NBC sections. The troop also has a command post to enhance C3I.

Troop C and D are the air cavalry troops of the squadron. Each troop has an aero scout platoon consisting of six OH-58 aircraft, an attack platoon with four AH-1 Cobra aircraft, and provides the squadron with the ability to conduct reconnaissance rapidly over wide expanses of terrain. Scout and attack aircraft are normally task organized into three teams to sustain operations and provide aero scouts with security. Figure 4 provides the organizational structure of the air cavalry troops.

Troop E (provisional) is the squadron's aviation maintenance troop. It is commanded by a captain and is composed of specialized sections that are vital in maintaining the squadron's aviation combat readiness. Since the formation of Troop E, aviation maintenance management and aircraft readiness rates have improved throughout the squadron. Figure 5 shows its organization.

During the past two years, the squadron has participated in numerous tactical exercises and conducted several strategic deployments both by sea and air. It has performed a myriad of tactical missions, spanning the spectrum of cavalry operations (against heavy and light forces) and thus recorded many "lessons learned."

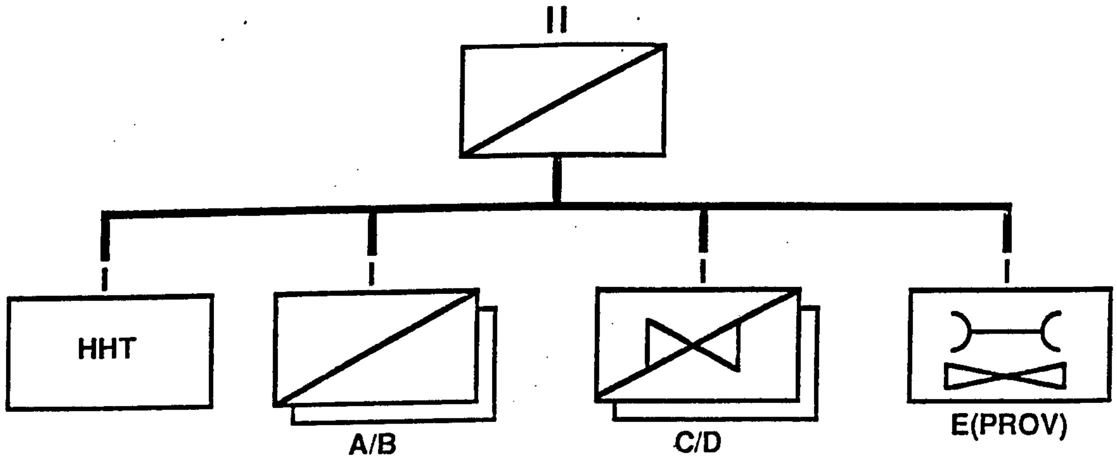
The squadron excels at combined arms integration and easily receives operational control of combat, combat support, and combat service support assets. In fact, the cavalry squadron is the ideal organization upon which to build a covering force for either offensive or defensive missions. When resourced with sufficient assets, the squadron can fight the covering force battle and shape the battlefield to force the enemy to show its hand early in the fight. This facilitates battle hand-over with the forward brigades and, in many cases, creates opportunities for offensive actions against second echelon elements.

Experience has shown that the squadron routinely performs its reconnaissance and security missions in an exceptional manner. With both air and ground assets working closely together, the squadron moves extremely fast and is rapidly able to collect enemy information for the division commander. To off-set the vulnerability of operating in unarmored vehicles (HMMWVs), the cavalry squadron must move with great stealth, execute mission objectives rapidly, and optimize the use of indirect fires. These actions provide a high degree of security and are within the capabilities of the cavalry squadron.

Command and control systems within the squadron are particularly strong. Each maneuver troop employs a command post, and the squadron routinely employs both a TOC and a tactical command post during combat operations. In addition, the squadron can employ four re-trans systems, a RATT system, and has a HF capability that can extend our communications to greater than 2000 miles. It can easily maintain internal communications across the division's front and simultaneously maintain radio contact with unit trains and supporting elements in the rear area.

In summary, the motorized cavalry squadron is a potent fighting force that is tactically employed primarily for reconnaissance and security missions. It is strategically deployable by air, arriving in theater with far more combat capability than its light infantry division counterparts--a true combat multiplier!

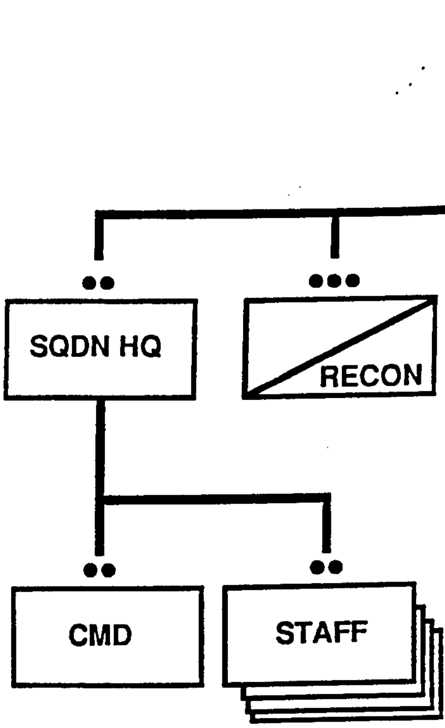
CAVALRY SQUADRON



EQUIPMENT		PRESONNEL	
VEHICLES	161	OFFICERS	35
AIRCRAFT	29	WO	39
TOW	12	NCO	154
MORTARS	6	EM	236
GSR	9	TOTAL	464

FIGURE 1

HEADQUARTERS AND HEADQUARTERS TROOP

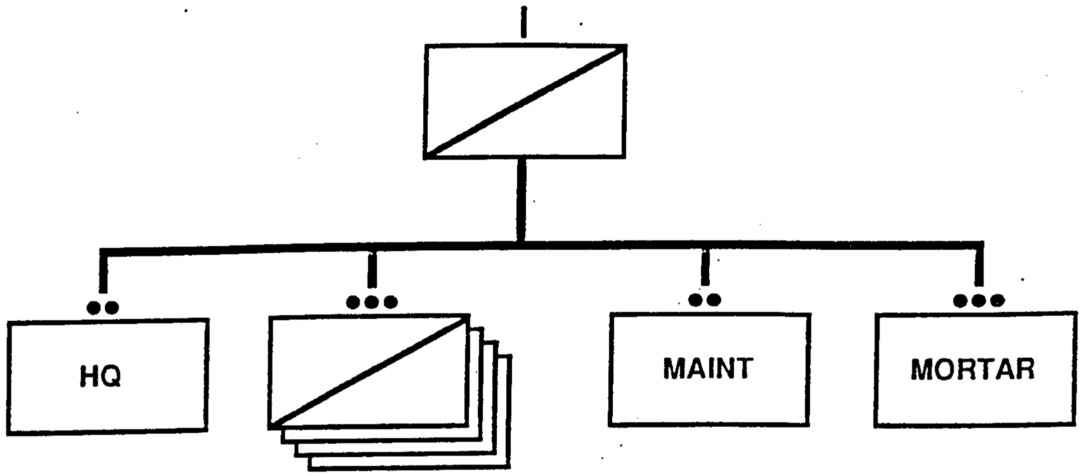


EQUIPMENT	
VEHICLES	64
AIRCRAFT	8
GSR	3
MOTORCYCLES	19

PERSONNEL	
OFFICERS	15
WO	14
NCO	58
EM	78
TOTAL	165

FIGURE 2

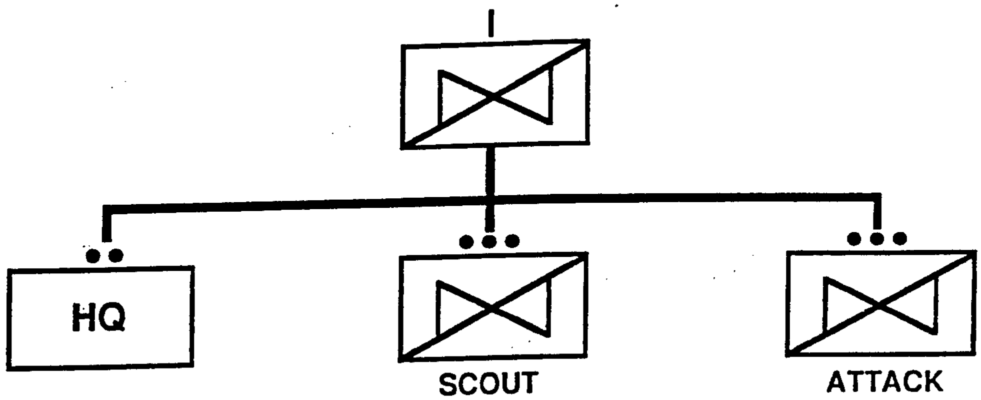
GROUND TROOP



EQUIPMENT		PERSONNEL	
VEHICLES	38	OFFICERS	6
TOW	6	NCO	29
GSR	3	EM	54
MORTARS	3	TOTAL	89

FIGURE 3

AIR CAVALRY TROOP

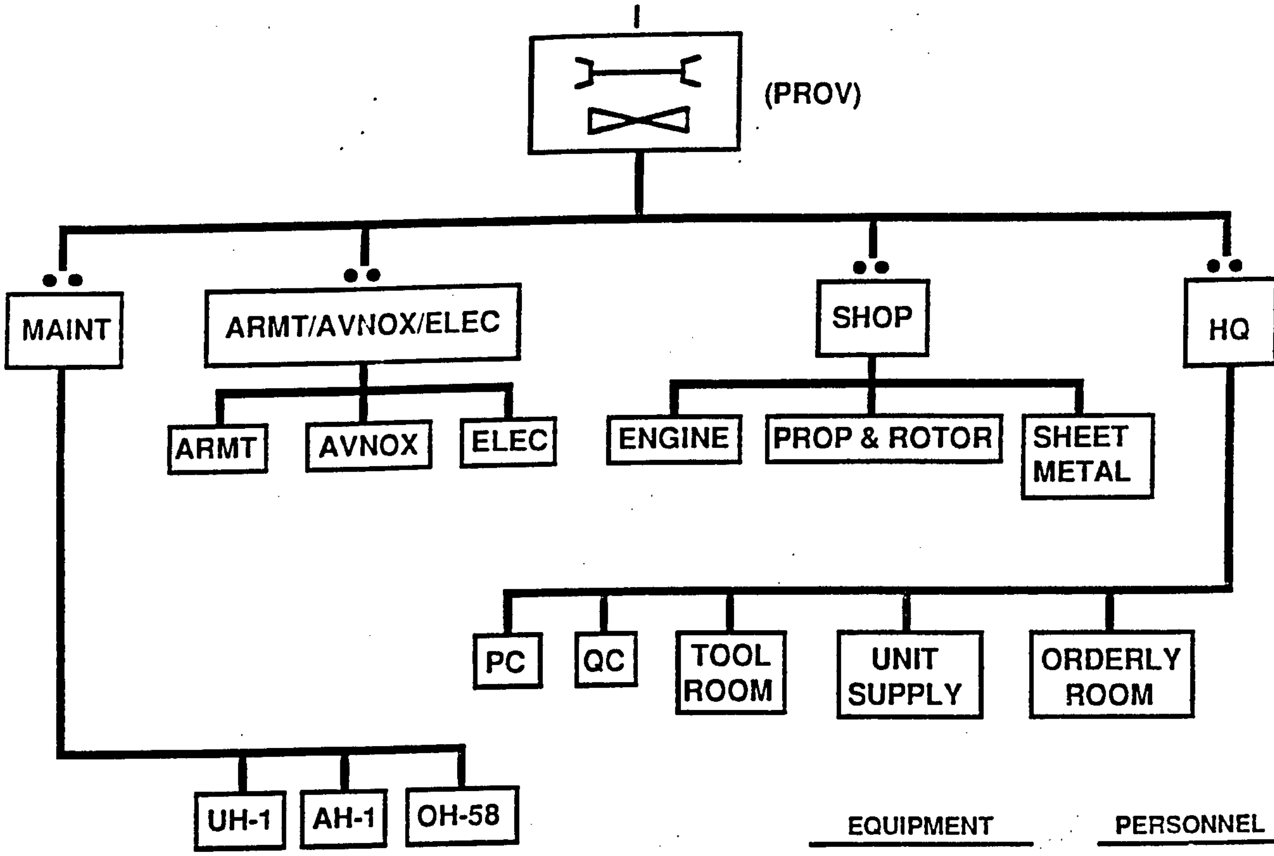


EQUIPMENT	
VEHICLES	3
AIRCRAFT	10

PERSONNEL	
OFFICERS	3
WO	11
NCO	6
EM	14
TOTAL	34

FIGURE 4

AVIATION MAINTENANCE TROOP



EQUIPMENT	
VEHICLES	12

PERSONNEL	
OFFICERS	2
WO	3
NCO	24
EM	26
TOTAL	55

FIGURE 5

PART III

MOTORIZED EXPERIENCE OF COMBAT SUPPORT UNITS

DIVISION ARTILLERY
AIR DEFENSE ARTILLERY
COMBAT SUPPORT AVIATION BATTALION
ENGINEER
MILITARY INTELLIGENCE
SIGNAL

DIVISION ARTILLERY

9TH DIVISION ARTILLERY COMPENDIUM
3D BATTALION, 11TH FIELD ARTILLERY REGIMENT

"THE MOTORIZED EXPERIENCE - FIRE SUPPORT"

I - FORCE STRUCTURE

The artillery force structure of the motorized division grew out of the envisioned strategic role of the High Technology Light Division as a rapid response to an armor heavy threat in contingency areas. Rapid response mandated strategic deployment by air. For DivArty, strategic deployment considerations implied towed rather than self-propelled artillery, and an armor heavy threat implied the need for tank killing munitions--DPICM and COPPERHEAD shot by 155mm artillery. Thus, the basic structure of 9th Infantry Division Artillery was built around three direct support battalions of M198 towed 155mm howitzers with a general support battalion of two M102 105mm towed howitzers batteries and one M198 battery.

The motorized artillery force structure also was shaped by the operational and organizational (O&O) concept of the division--fluid, semi-autonomous operations by combined arms brigades occupying areas of great frontage and depth. Such a maneuver pattern would often preclude artillery fan overlap, forcing physical repositioning of artillery to mass fires. Eventually, as the HTLD transitioned to motorized, a MLRS battery replaced the M198 battery in the general support battalion to augment the division's limited capability to mass fires, despite the resulting deployability penalty. The MLRS can traverse nearly 6400 mils and has inherent ballistic crew protection, but must be deployed in C141 or C5 aircraft. The remaining two M102 batteries became direct support to CBAA. These choices, driven initially by deployability and sortie considerations, were to have a major impact on the operational employment of the division.

The O&O intended that state-of-the-art command and control technology would be a major force multiplier. This required an alternative to the standard TACFIRE system, a heavy, cumbersome system unsuitable for a HMMWV-mounted maneuver force. Therefore, Lightweight TACFIRE, with a distributed processing system using stand-alone briefcase terminals mounted in HMMWV shelters, was fielded in the division to replace heavy TACFIRE's five ton truck-mounted mainframe/workstation architecture.

To obtain full effectiveness from COPPERHEAD, DivArty was richly resourced with HMMWV mounted, Ground/Vehicular Laser Locating Device (G/VLLD) equipped Forward Observation and Lasing Teams (FOLTs) capable of engaging armored targets with both ground and air delivered smart munitions. Some 15 of these teams were fielded with each infantry brigade fire support slice, plus a few more to support the 9th Cavalry Brigade (Air Attack). To obtain these numbers, teams were reduced from three to two soldiers. DivArty's COPPERHEAD delivery systems, enhanced by the acquisition and directing capability of the FOLTs, represented a significant portion of division's overall anti-armor firepower.

Our fourth maneuver brigade, the 9th CBAA, was another factor driving unique artillery force structure. Not only was a fourth combat slice required, but that slice had to possess mobility equivalent to CBAA's. To allow for organic lift capability by UH-60, 105mm howitzers were selected over the 155mm. DivArty's general support battalion was converted into a unique light artillery and rocket (LAR) battalion of two M102 105mm howitzer batteries and one MLRS battery. Concurrently, the operational and organizational (O&O) concept explicitly recognized the requirement for fire support for rear operations. Since it was envisioned that this mission would most often be assigned to CBAA, a rear battle FSE was added to the TOE of the LAR battalion. This and other aspects of division's approach to fire support of the rear battle are described in Part V.

By early 1987 the structure of the DivArty was essentially complete, with fairly standard headquarters and target acquisition batteries, three 3x6 M198 towed 155mm howitzer battalions, and the LAR battalion. The next step was testing the employment doctrine for the structure. The testing took place throughout 1987-1988 in a series of division CPXs and FTXs. The CPXs culminated in January 1988 in the Battle Command Training Program Exercise WARFIGHTER. The brigade level force-on-force FTXs culminated in May 1988 in the division's first rotation to the National Training Center. Several conclusions emerged about the structure and employment of divisional fire support assets from this testing cycle.

The most salient conclusion was a maneuver/fire support mobility differential so serious that it became labelled "the motorized artillery dilemma." The towed howitzer was simply unable to keep pace with the fluid operations of the HMMWV-mounted maneuver forces. Both lack of comparable cross-country mobility and the greater emplacement/displacement times of the M198 impaired both responsiveness and artillery survivability. Moreover, the 800 mil traverse limitations of the weapon adversely affected both massing and mutual support for battery self-defense. Without doubt, for the kinds of tasks artillery was called upon to perform during the wring-out of the O&O, M109 self propelled howitzers would have been more suitable.

The M198 towed howitzer as a direct support weapon system is a dichotomy. Positioning, movement, and survivability of the system can be argued in seemingly opposite directions. As a towed system weighing 15,700 lbs, the M198 can be strategically deployed by C130 aircraft and moved around the battlefield by CH47D Helicopter. On the ground, however, its cross country mobility is greatly restricted by its high center of gravity and the need to use a five ton truck as a prime mover, which together make it significantly slower and less mobile than a tracked vehicle. Likewise, emplacement time is nearly twice that of an M109 self-propelled howitzer (two minutes vs four minutes). In addition, the M198 is restricted to 800 mils of on-carriage traverse before shifting trails, which required approximately six minutes. The

M198 has no ballistic protection and thus the crew of ten is significantly more vulnerable to counterfire than that of a self-propelled howitzer.

On the other hand, the M198 can quickly move long distances on improved roads, a feat which would be impossible for tracked vehicles. Also, the M198 enjoys a high equipment readiness rate compared to self-propelled artillery which has numerous hydraulics and servo systems that are subject to failure.

Over time, the issue of strategic deployability of the M198 became less significant as the division's wartime contingencies directed deployment of equipment by sea, not air. Even so, the costs described above still might have been justified to gain the tactical mobility provided by the M198's heliborne capability. In practice, however, scarce CH47D aircraft to lift 155mm howitzers invariably were reserved for other tasks. Not once in either series of exercises were CH-47s committed to reposition artillery.

In preparation for BCTP Exercise WARFIGHTER, much thought went into employing the unique capabilities of 1-84 FA (LAR). In the end, the decision was to detach C/1-84 (MLRS) and control and support it directly from DivArty headquarters. This method was physically exercised over actual deployment distances during I Corps Artillery's FIREX 88 and found to be practical and effective. Freed of operational and logistical, but not administrative, responsibilities for C Battery, 1-84 FA (-) was essentially converted from a general support battalion into a fourth direct support battalion complete with its own fire support slice. The LAR's M102 towed howitzer can traverse a full 6400 mils and takes two minutes to emplace. Its mobility and survivability is comparable to the M198. Habitually associated with CBAA, 1-84(-) would have primary responsibility for rear area fires and close support of air maneuver.

The NTC confirmed the value of the division's 47 FOLT teams. Maneuvered around the battlefield under the control of battalion and brigade fire support officers, FOLTs provided a highly flexible and responsive shooting asset for the maneuver commander. To enhance their survivability and effectiveness, DivArty taught the employment of FOLTs in pairs and linked designated FOLTs directly to COPPERHEAD dedicated howitzers. At the NTC, DivArty units scored the first COPPERHEAD kills ever recorded in NTC force-on-force engagements, proving the worth of these procedures. Even so, the pace at the NTC clearly revealed that two man FOLT teams lacked the robustness for sustained combat operations, suggesting that at some point FOLT manning will need to be reexamined. FOLT management techniques and other aspects of fire planning and synchronization are outlined in Part III.

By the end of 1988, the division commander became persuaded that DivArty's towed howitzers should be replaced by self-propelled weapons. In the interim, a more rapid decision-action cycle and special movement and occupation techniques were devised to minimize the mobility limitations of the M198. These are discussed in more detail in Part III and IV.

The problem of massing widely dispersed artillery was never completely solved, but intensive efforts were undertaken to secure maximum tactical benefit from the available fires. Capitalizing on the small size and mobility of Lightweight TACFIRE, DivArty began to collocate direct support battalion TOCs with supported brigade command posts. Such integration was found to offer significant benefits in rapid fire planning, development of target intelligence, coordination of artillery positioning, and real-time synchronization of fires with maneuver.

II - FIRE SUPPORT PLANNING

The fundamental principles of fire support apply to motorized as well as to other kinds of field artillery. However, the unique challenges and features of the 9th Infantry Division force structure and motorized tactics required certain innovations in the manner in which those principles are applied. Two elements of fire support planning particularly deserve discussion: the motorized FSCOORD and automated command and control.

The Motorized FSCOORD

Force modernization, in particular communications technology, has dramatically increased fire support capabilities. Fortunately, the fire support planning process has progressed in step with force modernization to allow the most efficient application of these advanced capabilities. The artillery battalion commander in the 9th Infantry Division (Motorized) has learned to focus on the actions at the brigade TOC. Moreover, increased emphasis has gone into training fire support elements at all levels.

Clear understanding by the FSCOORD of the maneuver commander's intent is especially important. Even more than heavy forces, the motorized battlefield tends to be fluid and unpredictable. The closest possible integration is required among motorized commanders and their fire support coordinators at every level to assure that all understand clearly at what time and at what location the commander intends to maximize the destructive power of his combat elements.

Even more relevant to motorized operations, the reality of depending on an accurate but relatively sluggish weapon system has required brigade commanders to deal with the probability that artillery may not be available to support the entire battle because of repositioning and movement times. Accordingly, commanders must carefully pick a finite number of missions for artillery during a given engagement. The challenge is deciding which of those missions will contribute most to mission success. The FSCOORD's knowledge and discussion of the factors of IPB, terrain available to the enemy, and enemy combat formations help shape decisions on planning for fire support which is required to be this specific. The motorized FSCOORD's challenge is to present clearly field artillery's capabilities and limitations to the maneuver commander and to weave other fire support operating systems into the plan to help offset artillery shortfalls.

The FSCOORD is a member of the brigade battle staff throughout mission planning and execution to synchronize fire support with the other elements of combat power. By actively participating in the decision process at the brigade TOC, the FSCOORD allocates fires. As contact becomes imminent, the FSCOORD moves to a forward location to coordinate fire support with maneuver and the displacement of firing batteries. The FSCOORD must have the freedom to move where he best supports the scheme of maneuver and not be procedurally tied to the TOC or the location of the maneuver commander.

Automated Command and Control

One of the fundamental concepts of the motorized division was that its command and control systems would enable it to conduct semi-autonomous operations on fluid battlefields of great frontage and depth. The goal was to be able to gain the tactical advantage through speed, mobility, agility, and "high tech" automated command and control systems, which could operate inside the adversaries' decision cycle. The force structure, automated systems, and doctrine of the DivArty and the maneuver brigades presented the artillery community with some unique challenges.

Automation and other decision support tools, particularly MCS 2.0 and Lightweight TACFIRE (LTACFIRE), are the most dramatic innovations within the motorized fire support planning process. MCS 2.0 allows the motorized brigade fire support officer to transmit instantaneously, in hard text, to appropriate fire support agencies the bulk of the fire support plan including commander's intent, coordinating instructions, all applicable portions of the OPORD and most important, the fire support matrix. However, as a system for directing and tracking fire unit movement and positioning, it suffered from several liabilities, such as no link to battery-level. At best, therefore, MCS 2.0 could furnish movement and positioning information only to brigade and higher echelons. Even if there was a link to firing batteries, MCS 2.0 proved far too slow to keep up with the movement of subordinate elements. MCS 2.0 reports were typically two to four hours old when received and in peak periods even later. Additionally, MCS 2.0 software was primarily designed for tracking maneuver units' logistical data, not operational information.

In contrast, LTACFIRE was an excellent system for processing of fire missions and the tracking of unit locations. LTACFIRE concurrently distributes the fire support coordination measures, target lists and engagement criteria, and operational graphics. This does much to reduce fire support planning and execution time, thus somewhat off-setting the delays in repositioning and emplacing towed artillery. However, it has no automated way to solve the unit movement, control and positioning dilemma facing the artillery battalion S-3. If the S-3 fell behind in the planning process or did not have accurate unit updates, then fire support was often not available when required because of repositioning.

The combined effect of MCS 2.0 and LTACFIRE enable task force fire support officers, the artillery battalion S-3 and the brigade fire support officer, to conduct concurrent but focused planning in support of the brigade missions. The major limitation in this architecture remains the inability to distribute applicable portions of fire plans and target lists down to the company FIST without translating to manual target lists and acetate at the task force level to distribute with the OPORD.

The solution reached by the motorized artillery community to control subordinate unit displacement was the movement matrix. This matrix depicted the planned movements of the TOC and firing batteries to support the maneuver commander's scheme of maneuver. The movement matrix normally was keyed to maneuver control measures, such as phase lines, and enabled the artillery S-3 to develop his own critical decision points.

III - FIRE SUPPORT EXECUTION

Execution is the key to fire support. The 9th Infantry Division (Motorized) is leading the Army in streamlining fire support execution through innovation in fire control and communication networking.

Automated planning assets have allowed more time for effective use of the tremendous number of forward observation and lasing teams (FOLT) available to the motorized FSCOORD. The tactics associated with the FOLT have evolved from an initial routine association between a particular company FIST and "his FOLT" to a greater emphasis and planning on the part of the FSCOORD and brigade FSO to assign FOLTs based on the concept of operations. Task force FSOs are assigned responsibility for discrete brigade missions and are allocated pairs of FOLTs based on these missions with redundancy in positioning, communications, and observation. Direct commo links are allocated to individual delivery units for rapid engagement for key missions such as COPPERHEAD. Experience has proven the correlation between successful missions with centralized mission assignments and positioning in pairs with a direct linkage to a designated delivery asset.

While the techniques mentioned previously greatly improved the FOLT processing of missions, the development and refinement of targeting procedures at the brigade TOC has improved the impact of fire support as a decisive component to the brigade's operations. The importance of the maneuver brigade and battalion S-2s to the effective planning, positioning and executing of the fire support component of the battle cannot be overstated. The 9th Division Artillery has recognized this and has fully embraced close and rigorous training between S-2s and fire support officers. The ability of the FSO to understand, contribute to and refine the IPB decision templates and to report key intelligence events is vital to the later success of his fire plans. The asset allocations, positioning, and other initial planning actions stemming from the FSOs appreciation of the IPB allow him to distribute a basic fire plan which can then easily accommodate the refinements provided by the rest of the staff.

A key ingredient to this process is the maneuver commander's realistic articulation of his fire support needs. Given the significant difference in mobility between HMMWV TOW companies and M198 batteries, a battalion cannot mass in support of every engagement area throughout the full course of the battle. The maneuver brigade commander therefore designates early-on where, when and how much fire support he wants in discrete terms, so that the necessary repositioning and targeting lashups can occur. This information is immediately passed by MCS 2.0 to all fire support agencies to take maximum advantage of those lateral massing opportunities that exist as a result of the M198's range capabilities. It also serves to identify those trigger lines which require displacements in depth to set up for the next priority engagement area. The result is a higher volume of fires with less importance attached to volume of missions.

The 4.2 mortar has not contributed its full potential to fire support. There is still room for improvement in the synchronization and utilization of mortars within task force operations to provide additional fires in support of company/task force targets. Control of mortar positioning, movement and mission responsibilities remains an issue and has resulted in their underutilization during key engagements. In the future mortars must be entered in automated fire control systems to integrate their capabilities in the planning process that is now virtually automated. Additionally, with no organic 4.2 mortar platoon FOs, there exists a need for emphasis on platoon leader call for fire proficiency.

Fire Control

A major challenge was fire control, which was complicated by increased frontages and rapid movement of supported maneuver forces. The beginning of the fire control process is the initiation of the mission with the "shooters" of the direct support battalion. The DivArty force structure included 15 FOLTs per direct support battalion. These FOLTs were normally under the control of the brigade FSO who apportioned them to the battalion FSOs based on the tactical situation. Those FOLTs not apportioned were usually positioned directly by the brigade FSO.

Initially FOLTS were used solely to adjust indirect fires using their G/VLLDs. With time and experience their value and importance in triggering engagement areas became crucial. FOLTs employed in pairs became the best means for ensuring that a fire support element was in position, ready to observe the enemy and to call for and adjust artillery fires. Their locations were identified based on a detailed analysis of terrain, enemy intentions and the commander's intent. Lessons learned from force-on-force exercises and NTC validated that this positioning of FOLTS in pairs, with placement at critical points on the battlefield, was a decisive factor. Eventually, positioning of FOLTs became centralized under the brigade FSO.

Placing responsibility for originating fire missions on the E5 or E4 FOLT team chief required revision of the communications networks. A conference held in December 1987 fundamentally changed the net structure for fire mission processing. The goals behind the revision were to structure fire mission processing based on the type of fire mission while standardizing the procedures for reviewing and processing calls for fire, and providing a separate net to capitalize on the armor killing capability of the 15 FOLTs.

At the conference DivArty made standard a specification that all missions were initially sent by voice to the appropriate battalion fire support element (FSE) for clearance and review. If the mission was approved for artillery fires and was a grid or shift mission, the FSE relayed the mission to the battalion fire direction center (FDC) using its assigned digital fire direction net. Approved polar plot missions were sent directly to the FDC by the FOLT and FIST. Subsequent corrections were sent using a voice net devoted to triggering engagement areas, and adjusting fire for effect (FFE) or other digitally sent fire missions. This net also served as a coordination net between FOLT/FIST, FSE and FDC. Experience soon disclosed that all voice transmissions, to include requests for fire clearance, were best conducted on this net.

Digitally, fire direction nets were apportioned one per maneuver battalion. A digital link was also maintained between the brigade FSE, battalion FDC and the DivArty fire coordination element. To capitalize on the armor killing capability of the 15 FOLTS, a single voice/digital net was established for COPPERHEAD mission processing. This was formalized in each battalion CEOI. The concept was to link FOLTs directly to firing batteries for the conduct of fire missions. The linkage was to be orchestrated by the battalion FDC. The concept was tested at the NTC and produced the first-ever recorded COPPERHEAD kills. Net overload was never a problem as rarely were more than four pairs of FOLTS ever positioned at one time as dedicated COPPERHEAD killers. Other nets within DivArty are not unique to the 9th Infantry Division (Motorized). Hence they are not discussed here.

Synchronization

Synchronizing the seven battlefield operating systems over increased frontages and rapidly changing battlefield situations caused heavy reliance on the fire support execution matrix. The matrix was used by fire support officers to depict critical information that supported the maneuver commander's plan in a time-phased or contingency-based format. Priority of fires, critical targets, engagement areas with their trigger points and integrated phasing, and airspace coordination areas were normally segmented or phased using maneuver control measures.

Using the matrix demanded more real-time data and the ability to change plans rapidly. The logical outgrowth was integration of the artillery battalion TOC into the brigade TOC. The artillery S-3 was then present during the planning process which gave him and his subordinate batteries more time to react. Fire support synchronization was enhanced by having everyone present to react as tactical situations changed. An unexpected benefit was the revitalization of the S-2's role in targeting. In the past, the fast moving motorized concept often meant that by the time the brigade FSO transmitted intelligence information to the artillery S-2, it was no longer valuable for targeting purposes. However, with the artillery S-2 collocated with the brigade S-2 and military intelligence liaison officer, near-real-time targeting was once again possible. The ability to integrate TOCs fully was gained largely by the compactness of the down-sized LTACFIRE and its mobility when mounted in the HMMWV.

IV - POSITIONING, MOVEMENT AND SURVIVABILITY

The characteristics and limitations of the motorized field artillery systems have required unique and innovative employment techniques to support the motorized maneuver forces. Positioning, movement and survivability of artillery units across extended frontages complicated the mobility differential between HMMWV mounted maneuver forces and towed M198 howitzers. To keep pace with maneuver units required batteries to move independently with maneuver formations, placing a considerable burden on battalion control of subordinate units. LTACFIRE, MCS 2.0 and the movement matrix, all discussed in Parts II and III, were tools for the commander to position and move his forces while ensuring their survivability.

Positioning

Positioning artillery battalions is based on the five factors of organization for combat:

- Weight to the main attack in the offense; to the most vulnerable area in the defense.

- Adequate artillery support for committed forces.

- Immediately available artillery for the commander to influence the action.

- Facilitate future operations.

- Maximum feasible centralized control.

For the motorized direct support towed artillery battalion, the most important rule in positioning batteries is to cover the zone by shifting trails not batteries. In the offense, battalions attempt to gain 10-12 km range forward of the FLOT (This assumes a 15 km range for most ammunition). This allows maximum engagement range with the batteries emplaced three to five km behind the FLOT. In the defense only three to nine km of range beyond the FLOT may be possible to provide the maximum time for the batteries between displacements. When repositioning is required, batteries attempt to reposition laterally, again to engage the enemy in depth by shifting trails as necessary. In either case, massing fires is what makes artillery effective. Motorized maneuver commanders have had to learn that not every target can be covered or attacked. Tough decisions must be made on what priority areas get coverage.

Similarly in the defense, special techniques have been required to minimize the need for repositioning. This enables them to avoid counterfire and reduces displacements. Firing batteries typically deploy to cover up to 1500 meters of frontage, using terrain-gun positioning whenever possible. In a fast moving offensive or defensive situation the frontage distance may be reduced to 150-300 meters if movement is a primary consideration over survivability. MLRS positioning should be well forward to maximize counterfire and deep fire for the division. Shoot and move tactics improve survivability. M102 batteries in direct support of CBAA may be positioned by helicopter for deep or rear operations.

Movement

Just as the relative lack of towed artillery agility requires special positioning considerations, movement to contact, hasty attack and even withdrawal under pressure require innovative approaches to movement to provide necessary support without jeopardizing the survivability of the supporting artillery.

Maneuver forces move forward to find and develop the enemy situation during movement to contact. Normally the enemy disposition is unknown and significant resistance is not a factor. When significant resistance is encountered, further operations become hasty attacks.

To support a lengthy movement to contact, artillery batteries must move in march column with the maneuver forces. Lead batteries should be tucked up behind lead maneuver forces. Because of the time consumed in emplacement and displacement, firing batteries should not go into firing position until and unless significant contact occurs and the maneuver commander decides to forego future coverage for immediate fire support. For example, if a movement rate of 20 km per hour is being maintained and the brigade commander wishes to have the fires of six howitzers continuously available, the lead maneuver unit can proceed for no more than 23.3 km before it moves out from under its fire support. The maneuver force will then need to wait more than an hour to allow its supporting artillery to catch up.

Even then, only minimum coverage will be available. The commander desiring the much more effective support of a massed battalion can move forward only 10 km or so before he must halt, and again allow 50 minutes for the artillery to catch up. This problem is not unique to motorized artillery, afflicting in some measure any force whose artillery is no more mobile than the force it supports. It is far more acute for towed artillery in a motorized operation because of the mobility differential between HMMWVs and M198s and the greater emplacement/march order times associated with this howitzer.

An additional technique under review is the notion of providing each task force commander in a movement to contact with one or two dedicated howitzers and a dedicated FOLT as assault artillery. These howitzers furnish immediate fire support against small pockets of resistance not warranting commitment of the majority of available fire support. This permits the remainder of the battalion to continue moving in march column with maneuver forces.

Unlike movements to contact, hasty attacks and withdrawals under pressure require frequent commitment of all or most of the fire support available, forcing rapid redeployment either to regain offensive momentum or evade attacking enemy forces. In turn, this may necessitate moving into forward or rearward hipshoot positions with guns relatively close for command and control. This technique may be employed with the howitzers either preparing for action in each position or remaining "trails up" but pointed in the direction of fire for emplacement only if required. This trails-up configuration allows the battery to displace immediately instead of taking 10 minutes from a march column.

Survivability

Survivability is doctrinally linked with numerous techniques to include movement, hardening, dispersal and concealment. On the motorized battlefield, although movement may be required to avoid being overrun, it cannot be the principal technique for surviving counterfire. Instead, motorized artillery's lack of agility forces it to stay in place and "slug it out" to provide fire support to the force. Dispersal of guns becomes a crucial factor because of Soviet counterfire and rolling barrages. Terrain-gun positioning utilizing every conceivable depression or "wadi" is paramount. Pairing howitzers for security and support operations while spreading the platoons over a distance of 1500 meters is desirable. Use of PADs to survey in each howitzer position and then using the "aiming post back-lay method" for laying howitzers both increase effectiveness and efficiency during spread operations.

Preparation of subsequent positions should be accomplished throughout the depth of the brigade zone where possible. Engineer assets are key to building push-up burms for howitzers and holes for personnel survivability. Camouflage should be employed except when movement is expected. Minimizing the amount and size of netting is important. In open terrain the highest point of netting should be the highest point of the equipment to be covered. This lessens the equipment signature.

Another component of survivability for field artillery has been early warning. It is essential that brigades have trigger lines for execution of movement such that units can prepare and execute movements to the rear with sufficient warning. For example, a firing battery will need approximately eight to ten km lead time to evacuate its position and evade an advancing enemy force moving at 20 km per hour. Ideally a brigade FOLT should be tasked to notify the brigade FSO when the enemy has passed the trigger point and immediate displacement of the battery is required. In addition, batteries should plan and rehearse mutual defensive fires to cover each others' displacement. OPs to trigger defensive targets should be positioned one significant terrain feature beyond the battery position. Observers should be equipped with wire or FM communications, binoculars, and night vision devices. A standard clock method and color coding to focus defensive targets placed generally to the front, rear and flanks can provide generic executable fires. Simplicity is key so that any soldier placed at the OP can perform these duties without being an expert forward observer.

Local security for firing batteries is accomplished by locating battery elements in clusters which facilitate self-defense. Perimeters spread over 1500 meters are impossible to man and cover with a single reaction force. For example, a cluster consisting of two guns, a fire direction center, and ammo vehicle within a two or three hundred meter area can man roving guards for the cluster and provide an immediate reaction force if one of the elements in the cluster comes under attack.

Survivability for MLRS is dependent principally on moving between a series of firing positions after each firing. The Self Propelled Launcher Loader itself offers some crew protection and survivability. Survivability for counter mortar and artillery radars is gained by limiting cueing to a cumulative cueing time based on enemy capabilities. Once the total cueing time has been met, the radars move to a previously prepared, surveyed position to continue operations.

Positioning, movement and survivability are all interrelated. The ability of the field artillery to provide timely and accurate fires in support of motorized forces is dependent on using all three factors to the maximum advantage.

V - FIRE SUPPORT OF REAR AREA COMBAT OPERATIONS

Because of the unique motorized operational concept, Rear Area Combat Operations (RACO) are more important for the motorized divisions than other types of divisions. The expanded division area of operations envisioned in the motorized organizational and operational concept requires a massive increase in the size of the division rear area (DRA)--the division sector to the rear of deployed brigade rear boundaries. Further, the expanded brigade zones, fluidity of maneuver, and inability to hold terrain and survive without extensive position preparation will tend to make even the forward area of operations extremely porous. It will be almost indistinguishable from the rear in terms of vulnerability to infiltration and vertical penetration. The utility and importance of responsive fire support in these conditions can scarcely be overstated.

The motorized division possesses some unique fire support assets and is developing techniques and procedures to assure effective RACO fire support. The division's light artillery and rocket (LAR) battalion offers a number of fire support capabilities for RACO. The fire support structure of the battalion includes two brigade level fire support sections--one for the Cavalry Brigade (Air Attack) (CBAA) which frequently supports RACO directly or is prepared to provide a rear area tactical combat force, and another fire support section for the division support command, which integrates directly with the rear area operations center (RAOC) to plan and coordinate RACO fire support requirements. The two 105 mm cannon batteries of the LAR battalion are normally employed in direct support of CBAA when that maneuver brigade is committed. Until then, the LAR battalion (minus its MLRS battery) is typically positioned and tasked to provide fire support in the division rear area. While normally employed against deep targets in general support of the division, the MLRS battery has the longest range and greatest agility of all organic field artillery assets. Accordingly, it too may respond to fire support requirements in the DRA.

There are two types of RACO--purely defensive operations conducted by divisional support units located in the DRA, and defensive/offensive operations conducted in the DRA by a committed tactical combat force from a maneuver unit to eliminate a significant threat in the DRA. The fire support implications of these operations differ in terms of intelligence preparation of the battlefield (IPB), movement and positioning of fire support, targeting and fire planning, fire support coordination, observation, command, control and communications, and logistics.

Intelligence Preparation of the Battlefield

RACO IPB, as in all other types, seeks to identify threat capabilities and assess friendly advantages and vulnerabilities. In defensive RACO operations, key challenges affecting fire support include early identification of avenues into and through the DRA and potential drop/landing zones which threaten key DRA installations. The persistent weakness in this area has been the failure to define critical installations, facilities, or terrain in the DRA which, if controlled by an enemy force, would adversely effect division operations. While there is not sufficient maneuver combat power in the DRA to defend these points, plans for observation, surveillance, and fire fan management can be adjusted to defense priorities.

Before a tactical combat force (TCF) is committed to RACO, IPB information must be provided to the TCF as part of the on-order mission from division. Without this planning TCF tactical planning and fire support have proven much more difficult and generally less effective.

Positioning and Movement

In defensive RACO, fire units are positioned and employed by battery rather than battalions. This reflects the need to cover a very wide area with limited range fans and targets to be engaged early in a RACO situation--air or ground infiltrated infantrymen. Emphasis in positioning is on covering critical threats identified through IPB and providing fires in support of base/base cluster defenses and along main supply routes. In the expanded DRA of the motorized division, the two 105mm batteries frequently have range fan underlap and limited capability to mass fires. Repositioning by ground or air is planned to support contingencies developed via the IPB process to compensate for this weakness. Every effort is made to incorporate all available fire support assets including the mortars of units passing through the DRA, even if availability is conditional.

Fire Planning

Defensive targets are planned to support the defense of bases and base clusters. Fires are planned along avenues into and through the DRA and in likely landing/drop zones. Targeting of key terrain identified in DISCOM and CBAA is also accomplished. All targets and plans are forwarded to division FSE to facilitate contingency planning to meet unresourced fire support requirements.

The battalion fire support element (FSE) of a tactical combat force considers the division rear area IPB product in fire planning to support TCF operations. Again, all unresourced fire support requirements are sent to division FSE via the DISCOM FSE.

Fire Support Coordination

In RACO self defense, restrictive fire control measures (no fire areas and restrictive fire areas) are effective in controlling fires in the vicinity of bases and base clusters. As discussed further below, mechanisms for clearance of fires tend to be cumbersome. Permissive fire support coordination measures, although very desirable in the DRA, are extremely difficult to coordinate with host nation liaison representatives. Without such measures, clearance of fires with host nation authorities is wholly dependent on the reliability of communications.

In offensive/defensive RACO, fire support coordination measures have tended to be left to the discretion of the TCF and its FSE. Because TCF commanders seek to retain the greatest freedom for fire and maneuver, boundaries or restricted fire lines tend to be shunned even where their use is indicated. The absence of such fire support coordination measures severely inhibits responsive employment of fire support in RACO. Manual clearance between the DISCOM and TCF FSEs of every target to be fired in the DRA is very cumbersome at best. Unfortunately, neither the DISCOM nor the TCF FSE is ideally suited to assume full fire support coordination responsibility for the DRA. The DISCOM FSE is too remote from TCF current operations to be adequately responsive in clearing close support fires for the TCF. On the other hand, the TCF FSE is likely to be poorly situated from a communications standpoint to clear fires throughout the entire DRA. The DISCOM FSE possesses the linkages with bases/base clusters and with host nation liaison to do this more readily. Experience suggests it will be more advantageous in the future to apportion fire support coordination responsibilities between TCF and RAOC FSEs via establishment of boundaries or restricted fire lines, allowing each FSE to clear the fires in which it has the greatest interest and over which it has the greatest influence.

Observation

In addition to positioning artillery assets, another important aspect affecting engagement of RACO targets is the availability of observers. In the 9th Infantry Division (Motorized), a significant training investment has been made to insure that soldiers of the main support battalion and the military police company are capable of calling for indirect fire. Listening posts/observation posts in the bases and base clusters are trained to trigger defensive fires for those nodes. The few available MPs are used to observe, patrol or control other key points in the DRA, and each has adequate forward observer skills. Even so observation and surveillance capabilities are stretched very thin in the DRA. Dawn and dusk reconnaissance missions throughout the DRA by 3d Battalion, 9th Aviation Regiment, and the possible commitment of OH-58D aircraft to track and direct attack of targets in the DRA are additional potential observation resources. Although their availability is limited, these are resources routinely considered in rear area fire support planning.

In offensive/defensive RACO, observation is assisted by the TCF observers to complement the limited DRA capability. Employing OH-58Ds to find and target significant threats in the DRA is a viable option until adequate observation assets are available.

Command, Control and Communications

The DISCOM fire support element deploys with the RAOC, which is normally collocated with the DISCOM TOC. The DISCOM fire support officer serves as fire support coordinator for the ADC(S), who normally controls RACO. The DISCOM FSE plans, coordinates and approves all fire plans and targeting for the DRA until a TCF is committed. The FSE is equipped with a Lightweight TACFIRE briefcase terminal which affords digital capability to plan employment of, communicate with and maintain a status on all available divisional fire support resources. However, distance may preclude linkage of the DISCOM FSE via tactical FM communications with the other networked tactical computers in the LTACFIRE system. In that case, voice contact via switched PCM circuits serves as an alternate link to division FSE and to division artillery.

Internally, all actual command and control and fire support coordination traffic in the DRA is handled on the RAOC net, which the DISCOM FSO monitors. However, the absence of retransmission capability and repeaters will usually preclude extending this net throughout the DRA. Also, the intensity of combat activity risks self-jamming from the inevitably high volume of messages, requests for fires, clearance of fires and the like which the single RAOC net must accommodate. A separate fire support net would be useful, but as yet remains unresourced with radios and frequencies.

The DISCOM FSO serves as the fire support coordinator for a TCF of up to company or company team size. When a maneuver unit of battalion or task force size or larger is committed as a TCF, the LAR battalion commander will normally relocate to the RAOC to assume those duties unless CBAA is part of the RACO mission. Of course, a TCF of battalion size or larger will normally have its own FSE. Repositioning of the 105 mm batteries is directed by the LAR battalion commander or DISCOM FSO from the RAOC after coordination with the TCF FSO. The TCF conducts fire support coordination on the RAOC net. Calls for fire from TCF observers are voice to the appropriate FSE--the DISCOM FSE on the RAOC net for a company-sized TCF and the TCF FSE on the maneuver battalion mortar net for subsequent digital entry and transmission to the DISCOM FSE in the case of a battalion or larger TCF.

Logistical Support

While operating in the DRA, the 105 mm batteries receive organization level support from the LAR battalion combined combat/field trains, which are typically located in the DRA. Direct maintenance and all classes of supply support are provided by the main support battalion which is located in a DRA cluster in the DRA.

While the 105 mm batteries are capable of rapid aerial repositioning to support a TCF, until ground link up is accomplished by battery trains, all resupply, including a presumed high volume of Class V, must be sustained by air. As in the previous case, all ground based support flows from the main support battalion, through the LAR battalion combined field/combat trains located in the DRA, to the cannon batteries in the DRA.

Given the importance of responsive RACO fire support and the unique combination of assets within the motorized force design for RACO, the development of techniques and procedures for RACO fire support has been a priority. Nothing has been revolutionary, except possibly the force design itself. Others have recognized the need for fire support elements and assets to prosecute the rear battle and have provisioned the requirements "out of hide". Given the modest force structure investment of a DISCOM FSE, and the more significant commitment to RACO and air assault fire support requirements represented by the two 105 mm batteries of the LAR battalion, the motorized division has addressed the complex RACO fire support issue.

Even so, the challenge of providing fire support for RACO remains a problem of wisely allocating the scarce elements of fire support combat power over a broad range of situational requirements. The techniques, procedures and structure described here offer a sound basis for planning and executing responsive fire support for RACO, from the identification of a rear area threat through committing a TCF and additional field artillery in conducting offensive/defensive operations in the DRA.

VI - FIRE SUPPORT TRAINING

A year of experimentation with the "high tech" automation provided by the digital transmissions of LTACFIRE and MCS 2.0 did not realize the command and control advantage we hoped to gain. The problem with automation in general is the lack of the "man in the loop". We have learned continually that the fire direction officer must be the "conscience" of the system, able to overrule the rapid computations of the system, and to prioritize and place required fires at the critical time and place on the battlefield. Automation is unintelligible by design, leaving the fire support structure unable to synchronize fire support. Sometimes voice, while slower, provides the necessary ability to understand what is really going on so that necessary human interventions can be made.

Accordingly, DivArty instituted consolidated training programs designed to exercise concurrently both hasty fire planning, synchronization and development of real-time fire orders. Continued effort must be made to streamline procedures and to attain the proper balance between manual and automated command and control systems. The challenges of movement and control of artillery units, fire control, and synchronization will always be evident and in need of refinement regardless of the training tools available to solve them.

Innovations and improvements in training and training simulators proved themselves at the NTC. Successful training of individual FIST and FOLT has revolved around the aggressive use of the Fire Coordination Theater (TSFO) and the FOLT/DMD Certification Program. The TSFO remains the staple for cheap, efficient training of maneuver and 13F personnel in basic calls for fire and digital message device procedures. The artillery battalions are required to provide EIB standard call for fire training to all companies within their supported brigades. This has also been expanded to include the support battalion leadership which has resulted in a greater capability to provide fires in support of the BSA.

The Fire Coordination Theater is an essential training device for the efficient training of FIST with their platoon leaders and company commanders. The stresses of rapid planning and execution are fully exercised and the results are documented on video and sound recordings. This facility became a key ingredient in the train up for division's first rotation to NTC and provided the maneuver company leaders with their first real appreciation for the coordination and planning requirements which accompany the establishment of fire support priorities. This facility has excellent payoff for both 13 and 11 series leaders.

Given the importance of FOLTs to the division anti-armor capability, the capstone training event for DivArty is the FOLT Certification Program. G/VLLD technical tasks, DMD tasks and "soldier skills" have been combined into a certification test/exercise administered by the division and brigade fire support elements. This training paid off at the NTC where there was not a single incident of a G/VLLD mission being denied as a result of poor procedures.

One training resource appropriate for lower echelons is the anti-armor theater. The facility provides opportunities to track targets. Expanding the facility to allow FOLTs to learn to engage vehicles as they move through the COPPERHEAD footprints will provide an even greater payoff. This suggestion is based on the explanation for COPPERHEAD failures at NTC, that FOLTs typically try to "chase" individual tanks around the battlefield with COPPERHEAD footprints. In contrast, division FOLTS were very successful as a result of analyzing the IPB, placing footprints in front of canalizing terrain, and then engaging with continuous COPPERHEAD fire as columns moved through the footprint. The Anti-Armor Simulation Theater may be the best facility for practicing the tracking component of this type engagement.

VII - CONCLUSION

For the next few years DivArty will enjoy a versatility unique among division artilleries. With a combination of ground mobile M109s and MLRS, 9th DivArty will enjoy some of the tactical agility and survivability of heavy division artilleries. At the same time, retention--for the moment, at least--of airmobile 105 and 155 howitzers will provide some of the operational agility for which it was originally designed.

Challenges remain. Communications is an area that requires upgrading. The AN/VRC 46 and the PRC 77 are still the bedrock of our communications. Their tendency to fail in high heat and to lose alignment limits fire support. SINCGARS should be a significant increase in capability. Total integration of the mortar ballistic computer and the FIST DMD also offer increased capabilities in the future.

Splitting of the four man FIST into two M1026 HMMWV vehicles with radios will give the task force commander far more flexibility in covering obstacles, main avenues and other company targets without having to request FOLT allocation.

The entire structure of the DivArty was altered by the decision to draw down one of division's motorized brigades, replacing it with a roundout separate infantry brigade from the Washington National Guard. In turn, DivArty lost one of its three M198 howitzer battalions, while assuming peacetime training responsibility for and wartime control of the M109 howitzer battalion organic to the roundout brigade.

At this writing, the future structure of the DivArty remains unclear, dependent on decisions yet to be reached concerning the ultimate shape of the 9th Infantry Division. Whatever the outcome of that process, however, it is likely that the next few years will see the complete replacement of DivArty's towed 155mm artillery with self propelled weapons. Less certain is the future of the LAR battalion, retention of which will depend on convincing force developers of the continuing need for artillery capable of supporting air maneuver. Regardless of the outcome, DivArty's challenge, like that of the division it supports, will be to develop tactical methods which will exploit this unique combination of capabilities.

CONFESSIONS OF A DIRECT SUPPORT BATTALION COMMANDER IN NINTH INFANTRY DIVISION (MOTORIZED) ARTILLERY

3D BATTALION, 11TH FIELD ARTILLERY

FORWARD

Observations contained herein are based on 25 months service as an artillery battalion commander in direct support of the 3d Brigade, 9th Infantry Division (Motorized) during the period 10 May 1985 through 23 Jun 1987. This brief article is divided into the classic field artillery requirements of move, shoot, communicate and survive.

MOVE

The motorized division artillery was built around the M198 155mm, towed howitzer. This weapon system provided an indirect fire capability out to 30 km (with rocket-assisted projectiles) and was deployable in C130 aircraft. The M198 is towed by a five ton cargo truck which also carried section equipment and up to 54 rounds of ammunition. The truck and howitzer combination is a vehicle over 64 feet long with a wide turn radius. Although the system travels well over paved roads (45 mph), it does not travel well over unimproved roads or cross-country. The M198 has a very high center of gravity while in the towed position and will readily roll over when encountering small tree stumps, rocks or a cant in excess of 10 degrees. This susceptibility to roll over was demonstrated by two accidents during my command which resulted in over $70,000 in damages.

The M198 is an eight ton howitzer which was designed to be serviced by an 11 man crew. The motorized TOE reduced crew size to 10 soldiers to save spaces. Deliberate emplacement time for a battery of six howitzers is 12 minutes (daytime) and 18 minutes (night). An emergency occupation can be conducted in approximately eight minutes provided there is suitable terrain.

The direct support artillery battalion equipped with a towed, undermanned, slow emplacement time system with virtually nonexistent cross-country mobility is directly opposed to supporting a motorized force which is based on rapid mobility over all terrain, deep attack through infiltration and operations on an extended and fluid battlefield.

The towed artillery battalion became the Achilles heel of the brigade's combat power because it could not keep up with the maneuver unit. This was especially evident during movement to contact. By agreement with the brigade commander, I placed all artillery on the road in the maneuver column when possible. If maneuver elements were conducting the movement cross-country, I obtained an engineer squad and limited infantry support to provide some additional security and mobility capability. The brigade commander accepted the risk of not having immediately responsive artillery support to ensure the artillery was able to keep up with his lead elements.

It became apparent to me that motorized maneuver forces need motorized field artillery systems to support them. The M109A3 would be a good candidate for a direct support weapon system provided the division can accept the detriment to strategic deployability. Continued work by the Field Artillery Center to develop a lighter, motorized cannon (Improved Mobility Cannon System) would be beneficial to motorized and light forces alike.

SHOOT

Missions

Missions of field artillery remain basically the same for every type of maneuver unit. The motorized division was designed to serve primarily as an anti-armor force without the weight and protection afforded to heavy units. They rely on mobility and stand-off capability to succeed. The focus of field artillery is to shape the battlefield through delivery of scatterable mines to channelize the enemy formations; kill high-payoff targets with COPPERHEAD laser-guided projectiles; cause the enemy to button-up and kill soft targets with dual purpose, improved conventional munitions; and assist the withdrawal of friendly forces with smoke. The vulnerability of maneuver forces to enemy fire support makes counterfire a high priority mission any time enemy fire support resources affecting friendly units are found.

Shooters

The most dynamic contribution the field artillery has made in the motorized design is creating the two man Forward Observation and Lasing Team or FOLT. The FOLT is different from the standard Combat Observation Lasing Team (COLT) found in other forces. The FOLT does not have the sustainability of the COLT with its reduced size, but it does possess the same capability to provide accurate target information and tactical intelligence, and to designate targets for air and ground launched laser-guided munitions. There are 15 FOLTs in a motorized direct support battalion while there are only three COLTs in a heavy division direct support battalion (augmented by a FISTV in each maneuver company). The high density of FOLTs provides tremendous flexibility in positioning shooters on the battlefield. We found FOLTs to be especially effective when providing overwatch of maneuver units or observing enemy activities with scouts. Since FOLTs are in the same type of vehicle as maneuver forces, they have equal survivability and mobility.

Training of these teams is especially difficult due to personnel turbulence, unfamiliarity with the digital message device (the interface from the FOLT to TACFIRE) and the Ground/Vehicular Locator Laser Designator (G/VLLD). Land navigation and self-location skills are of the highest priority because the division trains extensively for desert warfare. Camouflage and other survival skills are also critical because FOLTs often operate outside the umbrella of large friendly forces to maximize visibility of the battlefield. We created a FOLT certification test consisting of a round-robin system of stations to provide the best gauge of FOLT training. A standardized course was developed within the battalion incorporating the major FOLT skills. Early courses focused primarily on shooting from stationary positions; however, subsequent iterations included shooting on the move, an absolute must for motorized artillerymen.

Lack of ammunition and range restrictions limit FOLT live firing; therefore, a rigorous program of simulator training and crew drill is a must. A well trained FOLT can emplace a G/VLLD in less than two minutes from the time the vehicle stops. FOLTs must be trained in--and made to adhere absolutely to--SOPs for transmission of digital traffic. When left to their own devices, FOLTs and battery fire direction centers (FDCs) developed their own procedures. These procedures adversely impacted on cross-attachment of FOLTs and were finally eliminated by avoiding any habitual FOLT/FDC relationship. Our FOLTs routinely trained with A10, A6, and A7 attack aircraft at Yakima Firing Center.

The number of FOLTs within the battalion allowed me to organize them tactically for combat. Although we routinely assigned five FOLTs to each maneuver battalion fire support officer (FSO) in garrison, we often broke this relationship during operations. For example the maneuver battalion with the main effort may receive seven or eight FOLTs for an operation while the battalion in reserve may have one or two. This flexibility gave us the capability to provide overwatch during movements to contact and move FOLTs into position to provide optimal laser capture angles, instead of moving firing batteries. Later, management of FOLTs would be at brigade level.

Aside from its small size, the primary limitations of the FOLT are: lack of an inertial navigational system, lack of a pedestal for the G/VLLD on the HMMWV, and limited range of the AN/TAS-4B thermal sight for the G/VLLD (the FOLT can lase targets out to 10 km, but the thermal sight is only good out to about two km in most weather).

The military intelligence battalion of the motorized division has organic UAS-11 teams to assist in the collection of combat information. The UAS-11 is basically an AN/GVS-5 laser range finder mounted on a tripod and equipped with an AN/TAS-6 thermal sight. MAJ Pete Kai, my brigade FSO, initiated a program of training UAS-11 teams in the conduct of indirect fire. In short order the teams of the military intelligence company supporting our brigade were conducting live fire missions accurately. The AN/TAS-6 sight provided much greater range at night than the AN/TAS-4 sight. Terrain features could be discerned and targets picked up at ranges out to six km. We used the UAS-11 teams to augment FOLTs as well as to provide early warning to FOLTs during periods of limited visibility.

Each maneuver company received a four man fire support team (FIST) to plan and coordinate fire support. Motorized organizations do not have 4.2 mortar platoon forward observers. This decision provided space for the creation of FOLTs and supported the desire to keep the division down to approximately 12,800 total strength. The lack of platoon observers rarely impacted on support to maneuver forces. Most operations were conducted as part of company or battalion engagement areas. Additionally, maneuver forces were trained on indirect fire techniques using the observed fire trainer located in garrison. Task organization of FOLTs seemed to provide an adequate number of shooters for each operation I observed.

COMMUNICATE

There was a serious shortage of communications equipment throughout my tour. While the MTOE provided adequate authorizations for most required radio nets, we routinely operated with less than 40% of our long distance radios. Most of the long distance assets were provided to the FOLTs, FISTs, battalion FSEs and firing battery FDCs. Administrative vehicles, commanders' vehicles and staff vehicles often had PRC-77s in lieu of VRC-46s. This was a go-to-war limiter because digital traffic greatly reduces the effective range of any radio, and there were insufficient radios to sustain brigade operations.

The need for long distance radios between the battalion FDC/TOC and the brigade TOC was eliminated by locating the battalion TOC within a couple kilometers of the brigade TOC and laying wire lines for the conduct of digital and voice traffic. More recently a commander experimented with collocating the battalion FDC with the brigade TOC. Additional relief from long-distance radio requirements were met by tying the battalion TOC and the field trains (40-50 km apart) into the PCM network at the brigade TOC and support area, respectively. This provided both voice and digital capability, but often was unavailable due to high usage by other elements of the brigade. When circumstances permitted, the brigade commander would provide the artillery battalion a dedicated line in the PCM network.

The most evolutionary step during my watch was the testing and acceptance of the Lightweight TACFIRE system (LTACFIRE). The last 18 months of my command tour were devoted to evaluating and working with LTACFIRE. This system provided improved mobility, sustainability, flexibility and survivability over the original

TACFIRE. Each FSE was provided a briefcase terminal (BCT) which was capable of conducting tactical fire planning, maintaining battlefield graphics, storing targets and providing communications over four nets, independent of the computers in the battalion TOC. Each of these terminals could communicate directly with the digital message devices of the FOLTs and FISTs and the battery computer systems in the firing battery FDCs. During the later part of my tour we demonstrated the ability to communicate with and pass fire missions down to the newly fielded mortar ballistic computer in the mortar platoon of each maneuver battalion. Each evolution of software provided LTACFIRE with increased capability to conduct the fire missions and fire plans required by motorized forces. The BCTs were capable of providing automatic relay of information updating all BCTs of the battalion simultaneously.

The most significant effect of the fielding of LTACFIRE was the redundancy it provided over original TACFIRE. Any of my FSEs could have assumed tactical digital control of the firing batteries in a degraded mode. No longer did FSOs have to wait hours for the main computer to process fire plans. Training was easier because of the prompting built into the software. Since the BCTs were small, the decision makers could look at the screen, a feat impractical in the narrow confines of the shelter for original TACFIRE. PLL was reduced from 100+ lines to six lines for LTACFIRE. LTACFIRE provided the FSO and maneuver commanders with current information on unit locations (based on FOLT/FIST disposition), fire support coordination measures and visual depiction of targets and fire units. Also available was current status information on fire units to include number of tubes, ammunition and direction of lay. LTACFIRE is not a replacement for the Advanced Field Artillery Tactical Data System (AFATDS), but a healthy interim step toward it.

The battalion was equipped with the division's automated command and control system, Maneuver Control System 2.0 (MCS 2.0). Terminals were present only in the battalion TOC and in the admin/log TOC at the field trains. This layout was caused by limited equipment availability rather than tactical considerations. Much of the information required to be provided via MCS 2.0 was redundant to information available in the LTACFIRE database. MCS 2.0 did provide excellent electronic mail capability when communications existed between the field trains and battalion TOC. Additionally, the brigade could send information to or request information from the battalion in hard copy via MCS 2.0. There is a definite requirement for MCS 2.0 terminals in the combat trains and FSEs if the system is to be useful. Developing an interface between MCS 2.0 and LTACFIRE would eliminate duplication of effort.

SURVIVE

Of greatest concern to me while in command was the survival of my battalion in combat. The towed systems of the battalion offered no protection to the crew in the event of enemy attack. Digging in an M198 is totally impractical, even with engineer support, in motorized operations due to the fluidity of the battle. Aside from the routine digging of survival pits for crew members and use of camouflage, dispersion appeared to be the only practical tactic available to minimize losses.

Firing batteries trained in Yakima Firing Center to disperse across a 600-1000 meter front while maintaining a 400-600 meter depth. The use of multiple aiming circles and the battery computer system to compute gun positions was routine in desert operations. Training at Fort Lewis precluded dispersion due to the small size of the firing points. Dispersion stressed battery communications capability since none of the batteries possessed the small unit transceiver (SUT, AN/PRC-60). Small crew size would also make dispersion impractical if there were risk of ground attack.

Digital communications were emphasized. FDCs and FOLTs were trained in the use of directional antennas, and they were used whenever practical. The last digital link existed between the firing battery FDC and the howitzer. The link at the howitzer is called the gun display unit (GDU). The GDU consists of a control box, a section chief's assembly and visual displays for the gunner and assistant gunner. Unfortunately this system was developed to be permanently installed in self-propelled artillery. Over time we developed a system of brackets, conduit-protected permanently installed wiring on the trails of the M198, and protective boxes for the control unit of the GDU. Eventually our readiness rates for the GDUs improved to 80-90%. Loss of one GDU significantly degrades timeliness of firing since individual piece data must be sent via voice from the FDC to the gun. If more then one GDU is non-operational the battery must rely on terrain gun position corrections (TGPC) to fire accurately in a timely manner. Use of TGPC limits dispersion of the pieces to less than 400 meters.

SUMMARY

Support of motorized forces has not changed the tenants of fire support contained in Field Manual 6-20, <u>Fire Support in Combined Arms Operations</u>. Motorized forces present significant challenges to the fire supporter due to the large frontages, fluid battlefield, vulnerability to enemy armor and fire support, and mobility differences between the field artillery and the maneuver forces.

The superlative command climate, excellent communications between maneuver commanders and their fire support coordinators and willingness to try new concepts have resulted in continual evolution of better techniques. Introduction of LTACFIRE, FOLTs and MLRS makes the 9th Infantry Division Artillery extremely combat capable. Fielding of a self-propelled howitzer, improved thermal sight for the G/VLLD and long-distance radios will make us as potent as any division artillery in the Army.

AIR DEFENSE ARTILLERY

1ST BATTALION, 44TH AIR DEFENSE ARTILLERY REGIMENT

AIR DEFENSE: ESSENCE OF MOTORIZED

GENERAL

Organic air defense artillery capabilities of the motorized division are limited, and focus on defeating low-altitude air threats. The motorized division requires high to medium altitude air defense (HIMAD) coverage and U.S. Air Force counter-air assets for sustained operations. Additional short range air defense (SHORAD) assets from the corps air defense brigade may be required to protect attached or OPCON units.

Two distinct air battles are likely over the motorized division's area of operations. One would be fought along and forward of the FLOT against enemy attack helicopters and ground support fixed wing aircraft. The other air battle would counter heliborne operations and interdiction fighter-bomber aircraft in and around critical fixed assets in the motorized division's rear.

Generally, a Vulcan/Stinger battery provides direct support to one motorized brigade, and the Chaparral/Stinger battery protects assets in the division rear. Platoons or sections of one battery could be detached and employed under the command and control of another to best execute the division commander's air defense priorities. The Vulcan/Stinger systems are employed to protect the battalion task force making the main effort, the brigade command post, and the brigade support area. When Vulcan/Stinger elements are not in support of the motorized brigade, friendly units must rely more heavily on preemptive air defense, self-defense and passive air defense measures for protection.

ADA ALLOCATION GUIDELINES

METT-T, the commander's intent and the location of the main effort are the driving forces for specific allocation and distribution of air defense artillery assets in the motorized division. The air defense battalion organic to the motorized division consists of three Vulcan/Stinger batteries and one Chaparral/Stinger firing battery. Limited dedicated air defense artillery resources make it difficult to provide adequate protection to all division-critical assets.

PROTECTION THE MOTORIZED FORCE

Stinger teams, with mobility compatible to maneuver units, support motorized units with a modified integration overwatch method. This allows the employment of the full Stinger missile range to protect the force. In addition, Stinger crews can position away from the direct fight while continuing to provide air defense protection. The rapid tempo of motorized operations dictates that Stinger teams need to be attached to maneuver companies.

Stinger crews should maneuver with their HMMWV whenever possible. This allows crews to operate with their basic load of missiles. It also enables them to move rapidly and operate with all their communications and fire control equipment. Stinger crews could conduct dismounted operations in support of air assault and air defense ambushes but with significantly less capability.

The towed Vulcan, with more limited mobility, is normally employed in defense of point assets such as the brigade TOC and brigade support area. Although towed Vulcans are most effective against helicopters, they seldom have the opportunity to engage helicopters because of the Vulcan's positioning within the brigade sector. Still, the Vulcan weapon system offers the supported commander a tremendous ground fire capability which can be used either with approval from the division commander or in self-defense. Towed Vulcan primarily engages enemy fighters transiting the brigade sector to conduct deep strike or battlefield air interdiction mission. In many cases a Vulcan platoon conducts a weighted defense rather than a balanced or vital assets defense. This allows for an increased number of engagements against enemy airframes along anticipated ingress routes. Thus, assets are protected while intelligence regarding exact locations of these assets is denied to the enemy.

Vulcan/Stinger batteries are unable to attain any kind of gun/missile mix in forward areas due to the limited mobility of the towed Vulcan. This is a result of the lack of a carrier to give the Vulcan mobility comparable to the maneuver force. Ideally, a new platform for the Vulcan, such as the Vulcan Wheeled Carrier tested extensively in this unit, will be fielded to give the required mobility. During the conduct of a river crossing, a mix of missiles and guns would be used. Stinger systems would support the operation initially from the near-bank because of their greater range. Towed Vulcan could cross the river to the far-bank with the assault forces because of their ability to provide self-defense against ground fires.

Airmobile operations demonstrate the agility, speed, and rapid decision-making ability of the battalion. With either the UH-60 or CH-47D lift helicopters, the prime mover, crew, and air defense weapon system could be airlifted anywhere on the battlefield within minutes. Air defense artillery forces must be sufficiently mobile to enhance their own survivability and mission effectiveness.

PREEMPTIVE AIR DEFENSE

The division must initiate and execute procedures to destroy or reduce the enemy's airpower by destroying aircraft, and destroying or disrupting C3 facilities on the ground. Motorized brigade combat teams demonstrated this ability during OCTOFOIL FOCUS densities, a three week brigade combat team training exercise. They achieved preemptive air defense by exploiting enemy information from maneuver battalions to execute strikes using task force artillery and electronic warfare assets of other services. The division must plan and train for such operations to be able to execute skillfully.

ACTIVE AIR DEFENSE

The Hind helicopter is a greater threat to motorized forces than the Soviet tank. Thin-skinned vehicles of the motorized force are particularly vulnerable to the machine guns and rocket pods mounted on enemy attack helicopters. Small arms air defense is critical to all units in the motorized division. All motorized units and soldiers must understand the vital role small arms air defense plays on the battlefield.

Early warning to air defense fire units and motorized forces is hampered by the extended distances over which the motorized force fights. The eight FAAR radars, mounted on M556 Gamma Goats, are unable to move quickly to provide effective coverage over the extended division sector. A lightweight radar is needed to supplement the heavy FAAR radar. The air battle operations center, which is the collection and distribution cell for early warning information, is also hampered by extended distances. The division early warning FM net is unsuitable for transmitting over extended distances. Once fielded, AM radios will be most suitable for near-real-time early warning transmissions.

An air defense ambush is a concentration of air defense firepower at a decisive place and time. The air defense ambush is used against a lucrative air target in a known low-level air avenue of approach. A detailed intelligence preparation of the battlefield is crucial to the success of air defense ambushes.

If the entire combined arms team is to minimize losses and effectively engage hostile aircraft with available firepower, early warning must be passed to company team level. The command net and operations and intelligence net are the most efficient means to pass air attack warning.

1-44 ADA REGIMENT

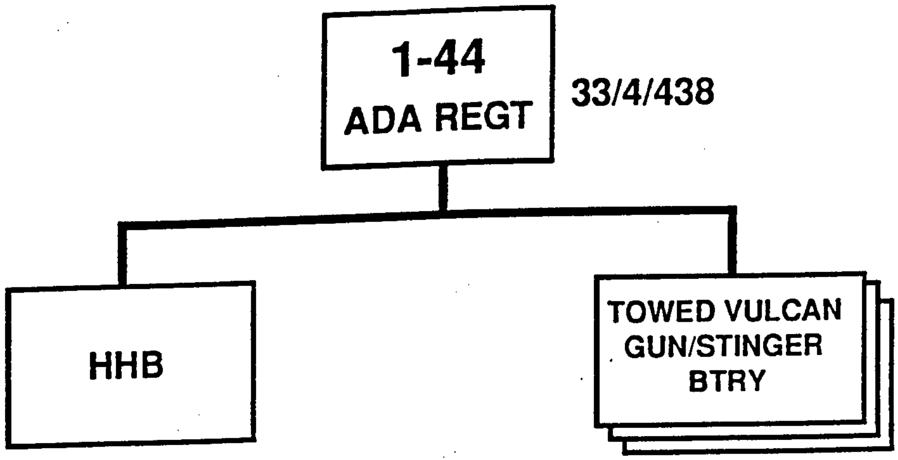


FIGURE 1

1-44 ADA REGIMENT

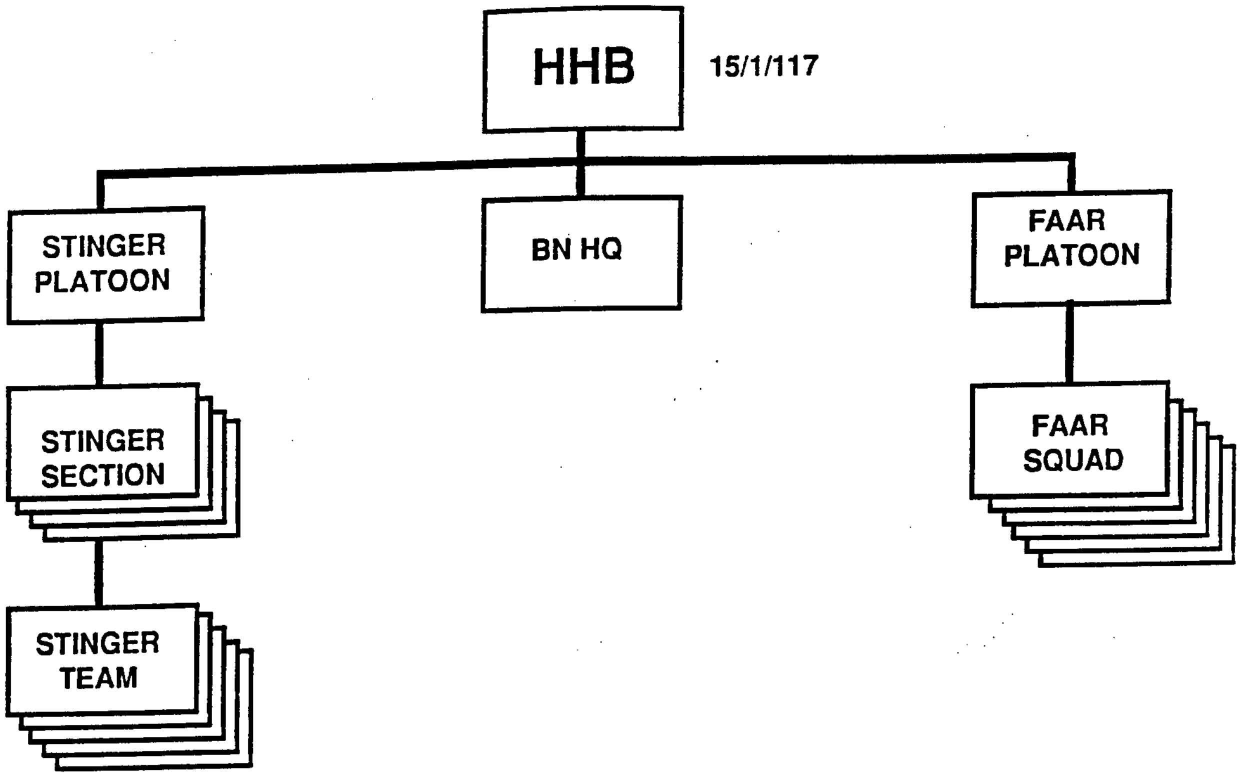


FIGURE 2

1-44 ADA REGIMENT

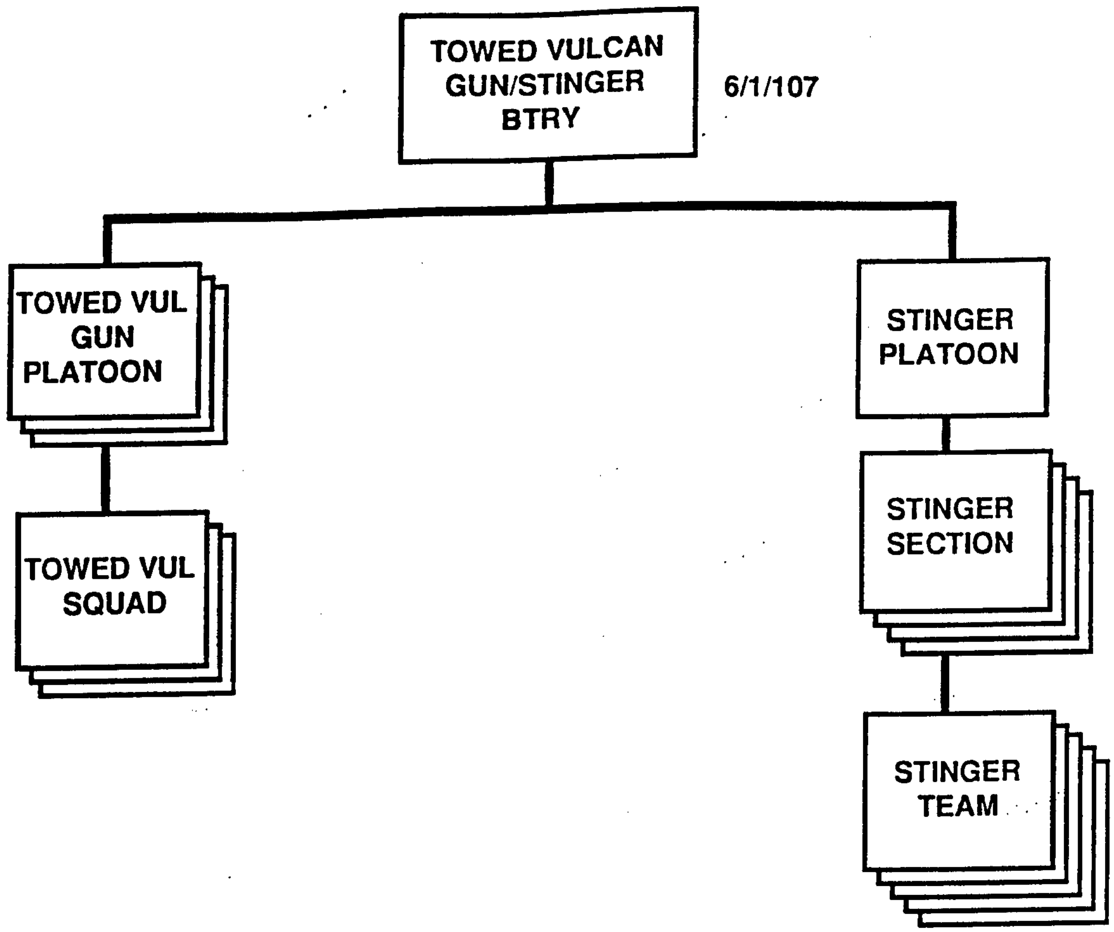


FIGURE 3

TRAINING ASSOCIATION

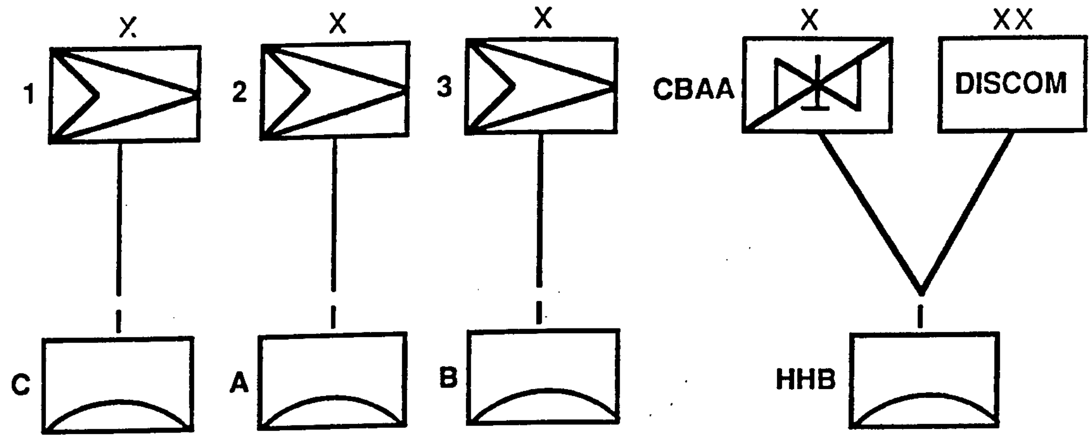


FIGURE 4

COMBAT SUPPORT AVIATION BATTALION

2D BATTALION, 9TH AVIATION REGIMENT

GENERAL SUPPORT AVIATION IN THE MOTORIZED DIVISION

The 2d Battalion, 9th Aviation Regiment, the largest aviation battalion in the Army (with the attached CH47D company), is ideally structured to perform its mission in support of the fast-paced operations of the motorized division. The battalion is extremely flexible in its employment. It can be easily task organized to meet any division requirement. This flexibility is critical for the division to react to fluid combat situations. The battalion has the ability to accept attachment of virtually any type unit and operate as a maneuver headquarters, or can OPCON self-sustaining aviation companies to the maneuver brigades.

The five companies of the battalion have each demonstrated over the past two years responsive support to the division during numerous OCTOFOIL FOCUS exercises, deployments to Utah and Canada, and most recently, a National Training Center rotation. 2-9 Aviation has unique abilities for strategic deployment. Most noteworthy among these was the deployment of a task force from the battalion to Honduras by C5A, while the CH47Ds assigned to the task force self-deployed.

ORGANIZATION

When tactically employed, the battalion operates from a maintenance support base concept. All headquarters and support elements are located in the division rear area. Aircraft, soldiers and equipment are moved forward as needed to support mission requirements. As aircraft become non-mission capable they are returned to the maintenance support base and repaired or replaced.

The combat support aviation companies (CSAC) are fully resourced and do, in fact, routinely operate as the headquarters for deployed aviation assets in support of brigade operations. For command and control of the aviation assets and coordination with the maneuver units, CSACs generally deploy with the capability of running two FM secure nets and one non-secure net. A CSAC POL section has the capability of establishing multiple tactical refueling sites, positioned either by air or ground.

The general support aviation company (GSAC) can simultaneously provide command, control, communications and intelligence to the command group, four brigades, the DivArty and DISCOM. It does this with eight UH1s, six OH58Ds, and two OH58As. This support is provided by aircraft being either attached or OPCON to an aviation task force, or OPCON to a supported brigade. OH58Ds are employed by section (two aircraft), or platoon (six aircraft) to a brigade or the covering force.

Although the CH47D combat aviation company is a corps asset attached to the battalion, it has played a key role in the success of the motorized division. While participating in every OCTOFOIL FOCUS exercise and at the National Training Center rotation, the CH47D has proven its value in the amount of supplies and equipment it can rapidly move. As the only assigned aircraft capable of lifting every weapon system in the division (including the M198 howitzer), it can quickly redistribute combat power throughout the division area.

The CH47D is unequalled in the area of aerial resupply. Thirty-six CH47D sorties per day can logistically sustain a motorized brigade in a high-intensity conflict in Europe. Our crews are highly proficient in aerial resupply operations. However, due to a lack of trained rigging personnel and equipment (10,000 and 25,000 pound slings, A-22 bags and cargo nets) in the supported units, the full potential of CH47D assets has never been realized.

The bulk of the battalion's POL assets are initially located at the maintenance support base. Refuel systems are moved forward as necessary to support mission requirements. The battalion has eight forward area refueling equipment systems, and twenty-six M978 tankers. These two systems give us the flexible and responsive refueling capability required for airmobile operations.

NATIONAL TRAINING CENTER

Team Bravo, the aviation task force formed from 2-9 Aviation to support the 3d Brigade at the National Training Center, is the most recent example of a tailored aviation support package that worked extremely well.

Team Bravo, composed of six UH60s, six OH58As, and two CH47Ds, deployed to the National Training Center during the period 4 thru 23 May 1988 with the mission of providing general and combat aviation support as part of the motorized brigade combat team. Team Bravo was attached to the 1st Battalion, 9th Aviation Regiment for the duration of the deployment and was nominally attached for the purpose of conducting joint training for the 45 day period prior to the actual deployment.

The Team Bravo TOC configuration and communications capabilities made it the natural alternate CP in the event the 1-9 Aviation TOC became unable to function. Moreover, with Team Bravo's organic ability to control aviation assets, it would have been able to function quite effectively with attack helicopters attached if the attack battalion headquarters had been unable to deploy. For this deployment they maintained a secure company command net and monitored the brigade command or O&I as required with the other secure radio. Both CSACs currently possess an organic HF capability and can monitor additional non-secure nets if required. The primary limitation of the CSAC is a shortage of authorized KY-58s and lack of GRID computer communications capability at the company level.

At the National Training Center, the Company B POL section, consisting of 11 soldiers and three M978 tankers, was attached to the 1-9 Aviation Class III/V platoon and was routinely called on to establish a Forward Arming and Refueling Point (FARP) for a duration of six to 24 hours. The POL section would typically be given a mission to insert by air a two point FARP with a 3000 gallon capacity for the purpose of supporting a specific combat operation. Depending on the anticipated mission time, the FARP was often emplaced at last light the day prior to support combat missions beginning at BMNT the following morning. Normally, an aerial emplaced FARP could be operational within one to 1.5 hours. After several planning sessions, and some trial and error, we determined that with the lift resources available, the best combination of assets for insertion of a 3000 gallon FARP was two CH-47 sorties. One Chinook would carry internally all personnel and equipment to include a M1008. The second CH47D would carry six 500 gallon blivets of JP-4. Of course, the tactical situation and fuel requirements would ultimately dictate the aircraft utilized. When as little as 750 gallons and a single point were required forward, two UH-60s were utilized. The comparatively large operational area of the NTC and the pace of mission support placed great demands on the POL assets.

OH-58As were used as observer/controller aircraft and were provided to brigade and battalion commanders for command and control. A main problem was ensuring that the general support aircraft scattered through the depth and width of the battlefield had reliable and consistently updated intelligence information. There were significant improvements here due to aviators aggressively pursuing an intel update from multiple sources rather than waiting for the battalion S-2 to dump the information into their laps. During the battle, the battalion S-2 was overwhelmed and became simply incapable of consistently providing crews with information they needed to know. The sources for information are there, but individual aircrews and air mission commanders (AMC) must actively demand aircraft intelligence even if it means repositioning to come up on the brigade O&I net. Because the battles tended to move very quickly, most aircrews began monitoring the brigade command net as the only reliable way of keeping pace.

CH-47s were used extensively and in exactly the right way. Heavy logistic resupply of Class III, IV, and V was conducted from the DSA to the BSA. Very seldom--and only with due consideration to the tactical situation--was a Chinook sent forward of the BSA. However, the division must improve its ability to move cargo externally. CH-47 missions took entirely too long because of extended ground time required to on-load and off-load heavy internal cargo.

UH-60s were used mostly for resupply operations, primarily from the BSA to the battalion field trains. Emergency medevac and the backhaul of critical damaged equipment from the forward area to the support battalion for immediate repair were also good missions. We routinely placed two Blackhawks OPCON to the brigade S-4 at the BSA where the crews would be in position to respond immediately to the logistical requirements of a rapidly changing battle. This system will work, but we had to be very careful. The brigade S-4 must be a smart guy who understands what the aircraft can do for him and who appreciates the risks of resupplying a battalion in contact. During the course of these missions, an aviation platoon leader must be in a position to analyze intelligently the S-4's request and be able to propose an alternate plan, if necessary. Again, good intel is the key; prior to launch, the air mission commander requires a good update. Usually the BSA was reasonably on top of the tactical situation. However, we had to remind ourselves that the brigade S-4 was usually under pressure to push supplies forward. The only non-resupply tactical mission flown by the UH-60 was the insertion and extraction of scouts or other military intelligence battalion intel-gathering assets. Lifting HMMWVs was not even attempted due to the temperature and density altitude limitations.

OPERATIONS

For every OCTOFOIL FOCUS a task force is formed from 2-9 Aviation to support the exercise. The task force is composed of CH47Ds, UH60s, UH1s, OH58Ds, and OH58As. These exercises are a tremendous training opportunity for both aviation and ground forces. Having an aviation task force OPCON to a brigade during every OCTOFOIL FOCUS forces brigade and battalion commanders and staffs to integrate general support aviation into their brigade combat teams.

The full potential of this battalion is yet to be realized in the motorized division. Realistic aerial resupply operations are seldom conducted. Aerial resupply operations require greater planning and coordination than normal ground resupply. Because of the increased planning requirements, the lack of rigging equipment, and the shortage of trained rigging personnel, aerial resupply operations become too hard for the supported unit. By closing all main supply routes for two or three days during an OCTOFOIL FOCUS exercise, the ground and aviation forces could rapidly determine if they were prepared to conduct aerial resupply operations.

When supporting a battalion-level or higher air assault or air mobile operation, the 2-9 Aviation TAC will move forward and co-locate with the supported unit TOC. This arrangement greatly facilitates the coordination required between the ground and aviation forces for an air assault or airmobile operation. We have done this several times at Yakima, and it has worked well, especially in coordinating last minute mission changes.

Although this battalion routinely conducts air assault operations with infantry platoons, we do not conduct nearly enough battalion and larger unit air assault or airmobile operations for either this battalion or the infantry battalions to remain proficient in planning and execution. In addition, air assault operations with dismounted ground forces are seldom conducted.

2-9 Aviation is ideally suited to become the combat force for rear battle operations. We are located in the division rear area and have the ability to move attached forces rapidly anywhere in the division area. However, except for CPXs, this battalion has never been involved in any rear battle play.

Cross-FLOT operations are another critical shortfall in the division. To cover the distances involved in cross-FLOT operations, this battalion requires better communications capability, HF or SATCOM, for example. To control the operation, a command and control console is needed for the UH60 to replace the UH1 as the command and control aircraft for the division commander. Intelligence provided to aviation units is extremely poor. For a cross-FLOT operation we need some sort of downlink, SOTAS, for example, for real-time intelligence information. Finally, the division needs trained pathfinders to operate with aviation units for cross-FLOT operations.

SUPPORT

Having the aviation support battalion under DISCOM has resulted in major problems for aviation support and readiness in the division.

The division materiel management center (DMMC) does not have a role in the support of aviation maintenance. The materiel manager is not located at the DMMC but in the support section of the aviation support battalion. Thus, there is no reason for 3-9 Aviation to be associated with DISCOM for materiel support.

The repair parts channels for aviation maintenance are different from ground maintenance. DMMC does not have the inherent expertise to conduct liaison with the various agencies across the country. Additionally, the DMMC does not plan, participate, or prepare for the execution of any portion of the aviation resource management survey (ARMS). All units in CBAA plan, participate, and prepare for these types of inspections. The DISCOM focus is not on the ARMS; the CBAA focus is. The emphasis in DISCOM is on general maintenance, supply, and medical support. Aviation maintenance is organic to only one company and is overlooked when it comes to critical support planning. Under CBAA the aviation support battalion's focus would be on the readiness of the division's aviation assets.

In a similar view, aviation personnel cross-leveling is cumbersome under the current support operations structure. DISCOM is not able to cross-level aviation personnel. This is because there is not a "pool" of aviation personnel in DISCOM for them to use. All aviation personnel exchanges must be made by either direct involvement of the division G-1 or the brigade commanders. This is an inefficient system to support the division's aviation programs. Aviation personnel must be continually managed to ensure that all missions can be accomplished both in maintenance and mission support. With all aviation MOSs under CBAA, a better distribution and management plan could be established and maintained.

Moving the aviation support battalion under CBAA makes sense tactically as well. The aviation support battalion, in time of war, will be collocated with the CBAA BSA. Command and control would be more efficient and effective having the support battalion organic to CBAA. Except for a few administrative functions, DISCOM does not provide any command and control during wartime.

Aviation readiness would be greatly improved by placing of the 3d Battalion 9th Aviation Regiment, or the aviation intermediate maintenance (AVIM) company, at a minimum, under CBAA.

CONCLUSION

The 2d Battalion, 9th Aviation Regiment has repeatedly demonstrated its ability to support the many diverse missions required by the 9th Infantry Division (Motorized). From providing command and control aircraft throughout the division to conducting aerial resupply and air assault and airmobile operations, each company in this battalion has filled a critical combat need in the division. By increasing the amount of realistic air assault and airmobile training and emphasizing the importance of aerial resupply, this battalion can realize its full potential in support of the motorized division.

ENGINEER

15TH ENGINEER BATTALION

ENGINEERS AND THE MOTORIZED DIVISION

GENERAL

Engineer support to the Army's only motorized division presented unique challenges. These challenges focused on tailoring engineer operations to provide the support needed by the maneuver commanders as motorized tactics and doctrine developed. On the other hand, new engineer technical doctrine did not have to be developed. The 15th Engineer Battalion (Combat), like all other divisional engineer battalions, was charged with providing mobility, countermobility, survivability, and sustainment engineering support to the division. The battalion also retained the mission to conduct infantry combat missions when required. To this end, the ultimate challenge presented was to mold traditional combat engineer support within the requirements of a motorized division.

ORGANIZATION

The battalion's organization was consistent with providing normally associated engineer units in support of maneuver brigades and battalions. The headquarters and headquarters company is comprised of the command group, the staff, and the company headquarters proper. HHC retained no special operational capabilities that are often found in divisional engineer battalions (i.e. an equipment platoon capable of augmenting the effort of the line companies).

Companies A, B, and C provided support for the three infantry brigades of the division. Each company consists of three engineer platoons, a mobility/countermobility (M/CM) section, and a company headquarters section. The platoons are organized into two eight-man squads and a platoon headquarters. The primary TO&E authorized tools of the squad are a HMMWV squad carrier, the small emplacement excavator (SEE) tractor, squad automatic weapon (SAW), Mark 19 grenade machine gun (MK19 GMG), demolition set, pioneer tool kit and mine detectors. The TO&E of the platoon headquarters provides the mine clearing line charge (MICLIC) towed by a five ton cargo truck, SAW, MK19 GMG, and a platoon carpenters set. The M/CM section, by TO&E, provides the M9 armored combat earthmover (ACE), the VOLCANO (scatterable mine capability), and the light assault bridge (Military Load Class-30, 23 meter gap).

Company D is organized into an engineer platoon, mobility platoon, countermobility platoon and company headquarters. The engineer platoon is the same as companies A, B, and C and primarily supports the ground maneuver units in the Cavalry Brigade (Air Attack). The mobility platoon provides an M9 ACE section and a light assault bridge section. The company countermobility platoon provides a mines section (VOLCANO) and a ditching section, comprised of SEE entrenchers and the tactical explosive system (TEXS).

The battalion is capable of providing an engineer platoon in support of each of the ten divisional ground maneuver battalions--nine infantry battalions and the ground cavalry squadron--plus retain a company in general support as required. Engineer task organization can readily support any division combat task force.

SHORTFALLS

The TO&E organization mandates an austere unit without "nice to have" equipment or personnel. The organization puts a premium on squad and platoon cohesiveness and on the stamina of the individual combat engineer. When all authorized equipment is fielded, the battalion TO&E is incapable of providing total support to the division. As a consequence, non-divisional engineers in support of the division are critical for battlefield success. More importantly in the short-term, the TO&E included many critical force modernization items of which only the MICLIC has been fielded. This provided a significant challenge to engineer support.

Several pieces of engineer equipment are key to the ability of motorized engineer units to fight. Among these are the ACE, SEE, VOLCANO, TEXS, and light assault bridges. The absence of these items seriously degraded the combat capabilities of the battalion. The SEE is the centerpiece for the squad; without it the squad has no organic equipment to support its wartime missions. With approximately 75 percent of engineer battlefield tasks conducted by squads, the absence of the SEE to support divisional combat units is obviously a significant weakness. The SEE, along with the ACE, was designed to provide the engineer equipment with the capability to "keep up" with the high speed maneuver forces. Substitution of aged D7F bulldozers and 2.5 yard bucket loaders (on a less than one for one basis) did not readily provide battlefield flexibility to support adequately a division whose operational concept is based on high mobility. The lack of authorized equipment limited engineer support during offensive operations to "sapper" squads or teams, thus reducing the overall effectiveness of engineer units in defensive operations. The absence of the light assault bridge left the division without organic bridging assets.

The absence of the VOLCANO significantly increased the risk to combat soldiers by not allowing the engineers to emplace minefields rapidly to protect division flanks and to degrade the capability of the enemy to maneuver. As an interim substitute, the battalion employed three Ground Emplaced Mine Scattering Systems (GEMSS). The utility of the GEMSS was proven repeatedly at the National Training Center (NTC) and served to whet the appetite for the full fielding of the more capable VOLCANO. The absence of the ACE, VOLCANO, TEXS, and light assault bridges resulted in 2/3 of Company D not being able to perform its TO&E mission. As a consequence, an interim realignment of Company D into two engineer platoons and an equipment platoon ensued to provide as much combat readiness as possible based on equipment on-hand.

The 15th Engineers focused on close support of maneuver units. It is capable of providing direct combat support to include limited tank ditching, wire and mine obstacles, combat trails, and LZs, breaching of enemy obstacles, and construction of crew-served weapon fighting positions. Large scale neutralization and clearing of enemy obstacles, emplacement of large conventional minefields, bridging of all types, construction and repair of supply routes and airfields, other general engineering construction, and heavy combat support throughout the division area of operations is provided by non-divisional engineer battalions and companies. The integration of an engineer group, comprised of three to five corps combat and combat heavy battalions, into the division task organization is an immeasurably complex undertaking. To date, complete answers have not been developed.

Command and control of, and logistical support for, non-divisional engineers have proven to be a thorny problem. Still, significant progress has been made during division CPXs. Additionally, an actual on-the-ground lash up with a reserve combat heavy engineer battalion was tested during a brigade OCTOFOIL FOCUS. Effective combat support was proven possible despite significant learning curves on the part of the divisional and non-divisional units.

LESSONS LEARNED

The lessons of our experience on how to fight "motorized" are numerous; the key issues are engineer command and control, logistics, and the maneuver commander's intent.

As an outgrowth of the World War II ad hoc command support relationships, engineer command and control remains complex, cumbersome, and easily misinterpreted by engineers and maneuver commanders at all levels. For mission success this battalion found that extensive, detailed planning was necessary to guarantee the communication links, reports, responsibilities, and overall information management were in-place prior to mission start.

Battalion command and control was dramatically improved by our transition from a lower-echelon MCS 2.0 mode to an upper-echelon mode. Additionally, a parallel introduction of MCS engineer software facilitated more responsive staff input for decisions on brigade and higher level engineer support.

Generally, the forward support battalion concept works well for supporting engineer task forces. OCTOFOIL FOCUS and NTC experiences indicate the Class IV and V system may not be responsive to engineer requirements. To streamline logistics the battalion internally resourced "logistics coordinators" in the logistics chain to overwatch engineer logistics and to ensure that needed Class IV and V arrived at the right place and time to enable mission accomplishment. This supplement also included dedicated engineer haul assets using organic equipment.

Task force engineers and staff engineers must totally understand the maneuver commander's intent and need to be among the first battle staff members to be advised of the intent. Early involvement of the engineer is critical to engineer units. Engineer equipment and soldiers are the only combat elements on the ground prior to engagement area execution. Therefore, it is imperative that the engineer be able to begin movement of key equipment and materiel well before final OPORDs are issued. Waiting for information from the final OPORD may not allow the engineer force to do logistical planning and coordination and to schedule work capabilities of squads and machinery correctly . With early knowledge of the intent, all aspects of engineer effort are more likely to be accomplished; without early knowledge only the highest priority missions can be executed. The result may be significant gaps in effective "shaping" of the battlefield.

CONCLUSIONS

Fielding of the total force modernization package to the battalion will significantly enhance its combat capabilities. The "on the horizon" systems are deemed to be critical for motorized operations. These systems allow the 15th Engineer Battalion to be the premier combat multiplier within the division.

MILITARY INTELLIGENCE

109TH MILITARY INTELLIGENCE BATTALION

COMBAT ELECTRONIC WARFARE / INTELLIGENCE AND THE MOTORIZED EXPERIENCE

The mission of the 109th Military Intelligence Battalion (Combat Electronic Warfare/Intelligence) is to deploy and provide multi-source intelligence, electronic warfare, surveillance and deception support to the division and its maneuver brigades in executing motorized tactical operations under varying conditions. It has evolved during the 1980s along with the 9th Infantry Division (Motorized).

EVOLUTION

Under the original high technology light division concept, the division was organized for a Southwest Asia contingency, but remained viable as a NATO follow-on force. For the military intelligence battalion, this resulted in improving battlefield surveillance and target acquisition/development at the expense of reducing the counterintelligence and interrogation of prisoners of war capability. The extended battlefield in the Southwest Asia environment also required the adoption of a forward support concept to support widely dispersed brigade and battalion task force operations fully.

The battalion became the test unit for many intelligence and electronic warfare (IEW) systems using the Commander's Initiative Program or through Army Development and Employment Agency projects. State-of-the-art technology was tested, including computerization, the development of a surrogate unmanned aerial vehicle, long-range electro-optical systems, universal acquisition systems (UAS-11), physical and electronic deception equipment and techniques, as well as product improvements to existing systems.

When the division became motorized in 1985, the battalion shifted from testing new equipment and techniques to refining the organizational and operational concept to best support motorized operations.

ORGANIZATION

The battalion is organized with three forward support companies (FSC), a general support company (GSC), a long range surveillance company (LRSC), a headquarters and headquarters company (HHC), and an operational support detachment (OSD) for battlefield deception. The FSCs consist of an operations platoon, an intelligence and surveillance (I&S) platoon, and an electronic warfare platoon.

The organization of MI assets into FSCs which provide direct support to maneuver brigades is essential to the motorized concept of widely dispersed brigade and battalion-level task force operations. The forward support concept has proven itself in major exercises (TEAM SPIRIT, BORDER STAR, LASER STRIKE among others), in numerous brigade-level exercises (OCTOFOIL FOCUS), and, most recently, in a National Training Center rotation.

Major intelligence/surveillance and electronic warfare systems within the battalion are:

FSC (Intelligence and Surveillance Platoon):

3x long-range electro-optical (LREO) systems--a camera system used for long-range daytime and limited night battlefield surveillance and target acquisition/development.

9x universal acquisition systems (UAS-11)--co-mounted AN/TAS-6 thermal sights with AN/GVS-5 laser range-finders, used for medium-range battlefield surveillance and target acquisition.

FSC (Electronic Warfare Platoon):

9x PRD-10 or PRD-11--man-portable communications intercept and direction finding systems. The PRD-10 can be netted for accurate target location.

9x ULQ-19(V)2s (RACAL)--low-power VHF communications jammer system capable of acquiring and sequentially spot jamming multiple frequencies.

GSC:

3x TRQ-32s (TEAMMATE)--communications intercept and direction finding systems. Can be netted for accurate target location.

3x TLQ-17s (TRAFFIC JAM)--medium-power VHF communications jammers capable of acquiring and jamming multiple frequencies and sequentially spot jamming under a prioritized time-sharing system.

1x ULQ-19(V)3 (HACJAM)--system similar to the RACAL, but mounted in a UH-1H aircraft. Has an independent communications intercept station. Will be replaced by the QUICKFIX flight platoon (3x EH-60 aircraft).

3x MSQ-103B (TEAMPAK)--electronic intelligence intercept and direction finding system. Can be netted for accurate target location.

The battalion has the following operational characteristics:

The long-range surveillance company (LRSC)--composed of 12 five-man patrols and a company base station)--gives the division the ability to maintain continuous coverage up to 50 kilometers into the enemy's rear areas. The LRSC is OPCON to the division G-2 in time of war.

The intelligence and surveillance platoon operates with combined long-range electro-optical and UAS-11 teams, which are normally attached directly to the maneuver brigade or battalion being supported.

The electronic warfare platoon is organized into five-man teams, each with a PRD-10/11 and a RACAL.

All IEW systems have mobility comparable to the maneuver units.

CAPABILITIES

The processing of collected information into combat intelligence is primarily conducted at the battalion operations center/technical control analysis element (BOC/TCAE). However, the FSCs provide combat intelligence directly to the supported maneuver brigades first, then to the BOC/TCAE. The general support company reports directly to the BOC/TCAE.

The battalion has a well-developed target acquisition capability. This is due to the collocation of the TCAE and the BOC, and the large number of systems capable of target discrimination and classification (long-range electro-optical system, LRSC patrols with Steiner binoculars, and UAS-11s).

The division's ability to support close operations is greatly enhanced by the forward support company concept, which gives the brigade commander the ability to conduct precision jamming of voice communications at critical moments. Another benefit of the forward support concept is the ability to conduct field training concurrently with the supported maneuver brigades. Common classes of supply for the FSCs are provided by the maneuver brigade's support battalion.

The battalion has only one counter-intelligence team and a small interrogation of prisoners of war section--a limited capability.

The operational support detachment has tested the effectiveness of physical and electronic deception assets. Much of the technology it has pioneered will be incorporated into other units throughout the Army.

The battalion has a large number of linguists, and the maintenance and improvement of language skills is a high priority.

In addition to opportunities for formal language training (at the Defense Language Institute, or at colleges such as Brigham Young University), the 109th MI Battalion developed an extremely effective battalion-level language training program. It consists of three parts:

- A four week language training program (LTP) taught through the on-post education center, designed to improve general language skills without regard to MOS specific technical requirements.

- A unit-level two week language training program that complements the training cycles of the companies. Program focuses on general as well as MOS specific skills.

- A twelve week technical certification program (TCP) using the TROJAN facility (TROJAN is an in-house facility which provides intelligence collectors an opportunity to conduct live environment (real world) communications intelligence intercept). It consists of a one day per week integration specific language training program that uses a native instructor proficient in both interrogation methodology and general language skills. The program is designed to develop intercept operator and analysis language and MOS technical skills.

LIMITATIONS

The PRD-10 man-portable radio direction finding system was designed to replace the PRD-11, while integrating some automation and the ability to work as a netted system for target location. The PRD-10 has operational constraints which must be corrected before it can replace the PRD-11.

Command and control requires the battalion to realign radios to operate nets that are required by the O&O concept but not supported by TO&E. Company TOCs must operate in four nets (vice two): battalion command , tasking and reporting, IEW staff officer net, and supported brigade command. An EW team has one radio for tasking and reporting, but it is also used for direction finding netting and for company command and control.

The UAS-11 is an outstanding medium range surveillance system. However, it is subject to weather degradation. There are also reliability problems with the thermal sight's cryostat system under prolonged field conditions.

Intelligence units have very limited self-defense capability. This makes them reliant on proximate units for protection, especially those near the forward line of troops. The two major threats to forward intelligence assets are enemy reconnaissance vehicles and attack helicopters.

The battalion is designed to provide direct support intelligence to the maneuver brigades. The Cavalry Brigade (Air Attack) is supported by shifting a FSC from an uncommitted ground maneuver brigade. The detachment of a brigade, along with its FSC as part of the slice, would further increase the need to juggle assets in support of committed forces, losing some of the benefits of the forward support concept.

The large number of low density MOSs within the battalion requires skillful management to ensure optimum benefit from low density MOS training. The battalion consolidates low density training for one half-day each week to focus training resources and chain of command participation.

Criteria for intercept operators is substantially different from that of translators. This requires the battalion to use scarce training resources to train the linguists on mission-essential language skills.

NATIONAL TRAINING CENTER

The forward support company concept works well. From experiences gained under the harsh and demanding conditions of the NTC, several issues stand out.

The long-range electro-optical system (LREO) and UAS-11 teams provide excellent target acquisition. Artillery hits (to include the first COPPERHEAD kills at the NTC) were a record high for a unit on a first rotation. In great part this stems from the efficiency of the long-range electro-optical system and UAS-11 teams and a responsive C^3 system.

PRD-10 system antenna is too sensitive, making it difficult for the operator to distinguish between the desired signal and background clutter noise. An OE-254 antenna was used with the PRD-10, which provided almost all intercept data. However, you cannot conduct direction finding operations off an OE-254 and use of that antenna significantly degrades set-up and tear-down time.

Given the appropriate weapons, such as VIPER, the IEW teams were able to kill a significant number of enemy reconnaissance vehicles and attack helicopters.

Communications jamming teams played a significant role in shutting down the enemy's air defense radio nets in conjunction with suppression of enemy air defense operations.

Deception operations by operational support detachment were successful, especially if the enemy was given enough time to sense and react to the deception.

CONCLUSIONS

The forward support concept works well in supporting motorized operations. It provides rapid response to committed maneuver brigades and decentralizes planning and command and control. As a result, there is better terrain cooperation with the maneuver brigade and better protection of intelligence assets. The intelligence and surveillance assets are better able to meet the brigade and battalion commanders' needs for battlefield surveillance and target acquisition.

Intelligence operations are greatly enhanced when used with fire support collection assets such as artillery, unmanned aerial vehicles, AHIP helicopters, artillery radars, and air defense radars and early warning nets. Integration of intelligence with joint suppression of enemy air defense and air operations (both air attacks and airmobile) is essential. All of this reinforces the need for the intelligence electronic warfare staff officer to work closely with artillery and air defense liaison officers in the brigade TOC.

Rotating three platoons of four patrols each greatly increases the capability and survivability of the long-range surveillance unit. Properly equipped (e.g. with Steiner 8x50 binoculars), the patrols have repeatedly demonstrated increased target acquisition and combat information collection capability. Patrols are also useful in placing sensors and jammers deep across the front line.

PROJECT TROJAN is a valuable asset in the training of analysts and linguists. If possible, each intelligence battalion should have this capability.

The long-range electro-optical and the UAS-11 systems are generally superior to PPS-5 or PPS-15 ground surveillance radars. They have better target discrimination, and the intelligence and surveillance team can also act as another forward observer team for the control of fires. Moreover, the systems are passive and are harder to detect, and the UAS-11 system can detect stationary units and look into woodlines (especially valuable in the attack). However, the systems are subject to obscuration.

Electronic intelligence is a critical mission of the military intelligence battalion. Electronic intelligence provides important indicators of enemy intentions, and is especially critical to successful joint suppression of enemy air defense. The Army also needs some means to attack non-communications nets electronically.

Deception at the intelligence battalion level is directed primarily against the reconnaissance units of the opposing regiment/division/combined arms army. At the division and corps levels, electronic deception will become more important. Tailored electronic deception detachments should be added to the corps-level tactical exploitation battalion. Deception planning must begin with initial operational planning and not be developed as an afterthought "in support of" an impending mission.

SIGNAL

9TH SIGNAL BATTALION

THE MOTORIZED EXPERIENCE

9TH SIGNAL BATTALION

The evolution of motorized tactics did not significantly change the mission or the communications architecture of the 9th Signal Battalion. The nodal concept is employed to provide continuous and reliable communications connectivity to the various headquarters elements within the division.

FIGHTABILITY

The communications operational concept has evolved since the original O&O concept was developed. The wire mission was eliminated, and the wire platoon removed from the MTOE. The AN/TCC-65s were dropped from the MTOE and turned in. Likewise the messenger/courier mission was eliminated. MTOE equipment and personnel authorizations have been adjusted appropriately.

The increase in communications capability and more diverse requirements resulted in a robust system providing numerous alternative communications modes and formats. It has also increased the resiliency of the system in providing communications channels for command and control of the division. Net radio interface drastically increased flexibility by allowing interface between single channel radios and the multichannel systems. Facsimile service became user-owned and operated. It is resident in the various TOCs and immediately available to commanders and staff.

The major tactical challenge to the 9th Signal Battalion is keeping up with the rapid displacement of headquarters elements in a motorized scenario. The strike deep philosophy of the motorized division places great importance on the jump capability of the signal battalion. The rapid movement and extended distances inherent in the motorized concept made timely and detailed coordination essential for the supporting signal unit to provide continuous communications. With timely coordination, a "hot jump" can be made which keeps the command post in continuous communication with the division. Lack of timely coordination results in a "cold jump," leaving the command post with no communications with the rest of the division until the jump is completed and the communications reestablished.

Proper coordination is also critical to ensure that all required logistical support is made available to the supporting communications elements. The extended front of the motorized division makes logistical support of all signal battalion elements by the battalion staff extremely difficult, if not impossible. The supported headquarters must provide all logistical support to the communications element supporting them. Food, fuel, maintenance support, and mail are examples of logistics support that can only be provided by the supported headquarters. This requires close and continuous coordination.

CAPABILITY

From a macro view, the division's communications capability is characterized by robustness and flexibility. Communications means include multichannel, radioteletype, telephone via automatic switchboard, facsimile, FM secure, FM nonsecure, FM retrans, tactical satellite and HF voice. All multichannel, radio teletype and automatic switchboard systems are in the 9th Signal Battalion. The other systems are spread across the division. There are twenty-nine radioteletypes to provide secure hard copy traffic between major headquarters. Commercial facsimile equipment is located at division and brigade-level headquarters, as well as selected battalion-level headquarters. The division has 4,232 single channel FM radios, 65 percent of which were initially secure. Presently, 85 percent of these systems are capable of secure communications. One hundred sixty-three single-channel HF radios provide communications over extended distances. The Division Central Office of Record manages 4,395 communications security devices.

The "test bed" mission of the division made a substantial impact on its communications capability by fielding state-of-the-art systems. The ability to develop, test, field, and utilize the new multichannel, data switching and retransmission assemblages has provided the division with the high-speed flexibility it requires for motorized operations.

The AN/TRC-180 multichannel radio terminal provides excellent communications circuits to carry the high-speed data and voice transmissions of the division and its Maneuver Control System 2.0 (MCS 2.0) computer terminal devices. The 43 AN/TRC-180s replaced the 32 older AN/TRC-145s. This allowed the battalion to operate a jump node providing a greatly enhanced flexibility and robustness in the division communications system. The increase also provided additional flexibility in supporting the various tactical headquarters. The AN/TRC-180 provides digital communications links for both voice and data transmissions. They also increase the channel capacity in the system. Instead of two 12-channel links provided by the AN/TRC-145, the AN/TRC 180 provides three 15-channel links. This capability allows more subscribers to use the system simultaneously.

In addition to the AN/TRC-180, the battalion also has nine AN/TRC-113s which provide relay capability for very long distance multichannel connectivity requirement.

The AN/TSC-123 communications control group (ISPE-Integrated Patching and Switching Equipment) combines an automated computer controlled patching system (which replaces the AN/TSC-76 Patch Panel) with a data switching system (Packet-Switch). The packet-switch provides efficient data switching for the maneuver control system in the division, supporting 140 host computers. A simplified management system provides the facilities to monitor the performance of IPSE, technical control and systems control. The management system also provides the facilities for planning communications system changes to support the rapid movement of the motorized division.

This program has a wide-ranging impact on the division tactical communications network. The IPSE is the hub of the division network. All multichannel circuits, both voice and data, are routed through one or more of the IPSE shelters. The status of the system is monitored by the IPSE operator at his Sun computer work station. Limited remote control of the network is available, allowing the system control (SYSCON) more flexibility in developing the network to meet the needs of the division.

The AN/TRC-183 single channel radio retransmission set provides high and low-power FM, HF, AM, and satellite communications support to key division headquarters. Information can be retransmitted between the various radio systems to provide a tremendously flexible and powerful communications capability to the headquarters. The AN/TRC-183 provides dedicated direct communications between the division's TOCs and redundant communications systems to the multichannel system. These single channel radios provide mobile decision makers with the means of communicating directly with other commanders and staff elements while away from the TOC or when there is insufficient time to use the multichannel system. Additionally, the TACSAT and HF capabilities allow communications when line-of-sight is impossible or the installation of the line-of-sight multichannel system would endanger the mission.

The telephone switchboard, SB-3614A, is a component of the Automatic Telephone Central Office, AN/TTC-41. The SB-3614A switchboard is a 30-terminal automatic switchboard. It provides fully automatic operation with DTMF touch tone subsets using two-wire and four-wire automatic trunks. The basic switchboard may be operated as a 30-terminal single switchboard or may be connected with additional switchboards to form a 60 or 90 line system. The SB-3614A switchboard provides tandem circuit dialing which requires the subscriber to dial only an eight-digit number. The automatic tandem call routing is more efficient and automatically selects the route to the destination required by the caller. The tandem routing also provides automatic primary and alternate trunk routing. The operator monitors, answers, initiates, extends, preempts and releases calls through activation of a four-by-four pushbutton keysender and other functional pushbuttons. The operator can provide call assistance without affecting the normal privileges or restrictions of the calling party.

These capabilities exist nowhere else in the Army. They provide a significant increase in capability to command and control the division. Far greater amounts of information can flow at a much higher rate than would be available with conventional Army systems. But for all the increases in capability, there are additional challenges that must be met to keep the system operational.

TRAINABILITY

Since these systems are unique, there is no training base from which to draw experienced operators, maintainers and planners. Extensive train-up time is needed for soldiers coming into the unit. Various week-long training programs are conducted by the battalion to train new operators and maintainers. Staff planners must be trained as well on the systems to plan implementation of the division communications system properly. This added training load is not compensated for by a decrease in support taskings or other training requirements.

Turnover of personnel has a tremendous impact on the ability of the battalion to provide continuous high quality communications support. All incoming personnel are basically untrained on the equipment they will be using to support the division.

COMPATIBILITY

The uniqueness of the equipment causes compatibility problems when interoperating with other non-divisional units. Instead of communicating directly via multichannel, the circuits must be provided by wire or cable from our multichannel to theirs. The data capability of the MCS 2.0 is useful only within the division system, since non-divisional units do not have the requisite computers and interface units. Communications via the single channel satellite system only work if satellite time is allocated to this division and the distant unit has compatible satellite equipment.

MANAGEABILITY

The high level of technology in the communications equipment changed the focus of management of the system. Management and planning for the system became top-heavy. Even operation of the system became top heavy. For example, operation of the MCS 2.0 terminal devices tended to be assigned to the higher ranking personnel who are trained in computer operation or who demonstrated the capability of learning the system. Only the senior leadership has the educational background to implement the system properly. A solid computer and electrical engineering background is essential to planning and maintaining the system. Departure of a few key personnel has the potential for drastically changing the quality of support to the division.

SUSTAINABILITY

Maintenance support higher than direct support level is assigned to contractor personnel at their plant. General support and depot-level maintenance is limited to a small holding of replacement boards. All actual repair of the circuit cards is done at the contractor's plant. The GS and depot installations merely provide throughput for the components to the contractor and back to the battalion.

CONCLUSION

The 9th Signal Battalion supports the communications needs of the 9th Infantry Division (Motorized) concept of operation. It provides a tremendous capability to transfer data around the battlefield and to support command and control of the division. Very close and timely coordination between headquarters elements and the supporting communications elements is essential. A large training mission continues to challenge the battalion because of the uniqueness of the communications systems. Planning for interoperability with higher and adjacent units continues to be a challenge because of the uniqueness. Management and operation of the systems have moved steadily upward in the chain of command. Retention of key, highly-trained personnel is more important as technology advances. A sustainability gap exists between direct support and contractor support maintenance and must be monitored intensively.

The bottom line is that the 9th Infantry Division (Motorized) has the ability to communicate reliably with its major subordinate units on the battlefield envisioned for employment of the motorized division.

PART IV

MOTORIZED EXPERIENCE OF COMBAT SERVICE SUPPORT UNITS

DIVISION SUPPORT COMMAND
FORWARD SUPPORT BATTALION
AVIATION SUPPORT BATTALION
MAIN SUPPORT BATTALION

DIVISION SUPPORT COMMAND

9TH DIVISION SUPPORT COMMAND

THE DISCOM MOTORIZED EXPERIENCE

PREFACE

Since the birth of the 9th Infantry Division (Motorized) in 1981, the division has been faced with numerous changes. Lessons learned during Army Development and Employment Agency tests, command post exercises, National Training Center rotations and various other deployments are the means by which the Division Support Command (DISCOM) has been able to tailor the original organizational and operational concept (O&O) to evolve into a fully capable combat service support element, able to support the division.

An overview of DISCOM, forward support battalion (FSB), aviation support battalion (ASB) and the main support battalion (MSB) operations is absolutely essential in understanding the many changes and challenges in the 9th Infantry Division Support Command.

OPERATIONS

Command, control, and communications (C3) are facilitated by the MCS 2.0/GRID systems, which rapidly collects, disseminates, and transmits information. The 709th Support Battalion (Main) is designated as the alternate DISCOM TOC in the event of its incapacitation or destruction. Although adequate FM communication assets are not available to support this mission, the use of the MCS 2.0/GRID systems will reduce C3 problems associated with such a change.

Doctrinally, combat service support (CSS) was almost exclusively "fixed base" support from which specific tailoring was accomplished to meet the unique requirements of the task force which was training on the ground. Brigade-level exercises have triggered brigade support area (BSA) displacements which have forced BSAs to deal with the mobility aspects of support operations. This, in addition to the lessons learned during division-level command post exercises, has resulted in considerable amount of discussion on the effects of the fast-moving battle and the issue of CSS mobility.

The full testing of the CSS doctrine has not occurred within the 9th DISCOM. Although the main support battalion has participated in numerous FTXs and CPXs, they have never had the opportunity to deploy fully to support the entire division. Additionally, the DISCOM has never had the opportunity to share the direct relationship with a supporting corps support command while undergoing maneuvers. The doctrine appears sound, and modifications have resulted from lessons learned during various exercises. However, without these two key elements ever being assessed, it is difficult to evaluate truly the effectiveness of this part of the CSS doctrine.

The future of the 9th DISCOM continues to change for the better. Some of the most rewarding changes are those which reduce, shift, or eliminate CSS management and physical operations from frontline soldiers to more specialized CSS elements behind them. The overall CSS goal should be to provide tailored, multi-product packages to combat soldiers in a timely manner. The degree to which combat soldiers do not have to forecast and request their own CSS requirements will measure our ultimate performance as supporters.

SUPPLY OPERATIONS

The headquarters and supply company of the FSB provides command and control to units assigned or attached to the battalion and provides mess and organizational maintenance (less COMSEC and aviation materiel) support to battalion elements. It receives, stores, and issues Class I, II, III, IV, and VII supplies. It also operates an ammunition transfer point (ATP). There are many challenges in supporting the motorized combat brigades; however, many of these challenges are little different than supporting a heavy force. There are many particular problems associated with providing support.

Water purification and distribution is a fairly new mission, and supporters need to resolve some important issues for this mission to be executed effectively. Doctrine attaches water purification teams from the MSB to the FSB as the need dictates. This doctrine appears sound; however, the water distribution and storage assets of the FSB and the units supported by the BSA are inadequate.

Experience during field training exercises suggests that the available soldiers and equipment authorized for the Class II, IIIP, IV, VI, and VII mission were heavily committed to execute the Class I mission. A realistic Class II, IIIP, IV, VI and VII workload requiring ASL storage, transportation, and issue would not be possible with the limited personnel and equipment assets authorized in the FSB today. Another issue in this area is that of ASL stockage. Presently, we can only estimate the stockage of these items based on experience during previous training exercises.

The Class III doctrine directs area resupply distribution from the BSA. This principle works well at times. However, when the pace of the battle increases, it is necessary to incorporate refuel-on-the-move procedures into tactical operations whenever possible. Having a bulk POL handler move forward to an area secured by the brigade will greatly assist the brigade in its ability to continue to maintain or even set the pace of the battle. The drawback of such a support package is the fact that tankers moving forward are very vulnerable. Destruction of tankers would greatly reduce the ability of the Class III section to continue providing effective support. Tanker assets also are a concern whenever an armored unit is OPCON or attached to the maneuver brigade. The limited assets available to support the Class III mission are not adequate to also support the additional armored unit. More tanker assets are required, and they should be planned at a rate of four tankers for each armored battalion (as authorized in the heavy division).

Class IV doctrine seems to be fairly simple. The motorized concept states that corps will send preconfigured barrier sets via throughput distribution; the division has limited responsibilities. However, there are a number of unanswered questions that should be addressed to understand fully this mission. Two key questions are: Who defines the requirements and orders the supplies? Who off-loads, stores and reloads the equipment when it arrives and transports it when the BSA moves? The expertise, manpower, handling and transport equipment are not available to support this mission.

The Class V doctrine to resupply by use of ATPs appears doctrinally sound. The division has not been able to test this system; however, the ammunition handlers within the DISCOM receive adequate training in the Class V arena, and the execution of resupply is one that our soldiers can handle. On the battlefield, ammunition transfer will be quick and accomplished forward of the BSA.

MEDICAL OPERATIONS

Medical support is enhanced through eight soldier trauma treatment teams (TTT) that are deployed forward in combat trains with the maneuver battalions they support. If required, the TTT can immediately reconstitute a battalion aid station. Ambulance squads are also positioned with the TTT to expedite the evacuation of wounded from the battalions' aid stations to the BSA. Although the medical company continues to practice mass casualty exercises, the magnitude of medical operations on the modern battlefield cannot be replicated during field training exercises. There are often key personnel and equipment shortages. Additionally, outmoded equipment is often used as an equipment substitute. These shortcomings, unless rectified prior to battle, will cause substandard medical support. Lessons learned during field training exercises tell us that medical operations must remain highly mobile and must have the ability to provide continuous support. Tailgate medical coverage must be planned for and practiced.

MAINTENANCE OPERATIONS

One of the concepts which has been adopted is that of the logistics release point (LRP), established for a specific time period to service designated customers. This concept, used by the heavy divisions, is tailored to situational requirements but generally includes the establishment of maintenance collection points and the positioning of maintenance contact teams. This concept provides for the continuity of support operations during periods when the BSA is displacing. It also eliminates some of the problems the maintenance company commanders had with decentralized maintenance contact teams. Control of and communication with their soldiers were the most difficult problems associated with positioning the maintenance contact teams forward with the maneuver units. The company commander was unable to consolidate assets at key points to meet the priority needs established by the brigade combat team commander. To resolve this dilemma, the company commander often had to make daily runs forward to maintain contact with unit soldiers--not a realistic battlefield procedure.

Class IX resupply forward of the BSA is directly tied to the brigade combat team's ability to forecast requirements properly and to get those forecasts to the support operations of the FSB. Experience during field exercises has shown that units often go as long as seven days without ordering Class IX supplies. Additionally, daily field requirements never reached 50% of daily garrison requirements. One would expect that the requisitioning rate would increase above that experienced during garrison operations. Class IX doctrine depicts supply point distribution within the BSA; however, modifications to this doctrine have enabled us to resupply directly to maneuver units--a key element in sustaining maximum combat power forward. Whether we will be able to continue this practice in the high-intensity battle is unknown.

AVIATION SUPPORT

The 3rd Battalion, 9th Aviation Regiment is a unique unit that is responsible for division-level logistics support to the 9th Infantry Division's Cavalry Brigade (Air Attack) (CBAA). Additionally, it provides intermediate (forward) logistics support to the CBAA and slice units in the brigade area of operations. The battalion distributes all classes of supply (less Classes I, II, VII and classified maps) through central supply distribution points established by the headquarters and supply company. The battalion also accomplishes intermediate-level maintenance for aircraft, support equipment, vehicles and engineer equipment. It evacuates ground equipment and helicopters. The battalion establishes maintenance collection points and transports equipment from these points to the aviation and ground maintenance companies for repair.

The ground maintenance company provides intermediate support maintenance and Class IX repair parts to the CBAA. The supply support activity serves as a main warehouse for the issue of all Class IX (both common and aviation) repair parts. The greatest challenge the company faces is its tactical deployment plan. The diversity of support required by the brigade necessitates support provided from two separate locations. The bulk of the company is deployed forward in the BSA to provide responsive and timely maintenance and common Class IX repair parts while the Class IX (aviation) ASL remains in the DSA. The current MTOE is not structured to operate two separate ASL's; therefore, the commander must juggle soldiers and equipment to tailor support.

The aircraft maintenance company provides aviation intermediate maintenance (AVIM) support to the CBAA to include engine, structural, hydraulics, electrical, armament, avionics, and recovery. Additionally, it establishes backup aviation unit maintenance (AVUM) to the CBAA. The company accomplishes the full spectrum of aircraft maintenance support to include repair of aeronautical equipment, manufacture of parts, battlefield recovery, maintenance data collection, use of technical directives, and repair of armament sub-systems. Aviation maintenance support may be located in the divisional support area (DSA) or the BSA. Contact teams are made available to provide forward support. The goal of the aircraft maintenance program is to have the maximum number of safe, fully mission-capable aircraft to support CBAA's daily mission requirements. The support operations staff is responsible for complete logistical support to the CBAA. Due to the unique mission of the battalion, the support operations section has an even larger, more critical mission: coordination of all AVIM, as well as support of the division's Class IX (aviation) main DSU and aviation POL operations. The section is structured along two lines; aviation support and ground support. Because of the requirement to support the cavalry brigade's ground maneuver elements in a BSA location and aviation elements out of a DSA location, support operations is able to coordinate complex support requirements across the entire battlefield, from the divisional front to the corps support elements.

THE MAIN SUPPORT BATTALION

The five-company main support battalion (MSB) structure has proven to be flexible and capable of accomplishing the mission. Although very limited unit-distribution capabilities exist, normal resupply within the division is by supply points. In practice, however, the MSB often conducted unit-distribution logistics "pushes" to the brigade combat team and BSA areas. Such logistical pushes have proven to be essential in both maintaining the fast tempo of offensive operations and in not overloading brigade combat teams with logistical concerns. This allowed the brigade commander to concentrate on warfighting. Aerial resupply to forward areas has proven itself invaluable in guaranteeing the maintenance of the offensive tempo at crucial moments. Inherent in the aerial resupply capability is the requirements for aerial pallets, slings and nets, and rigger support. The MSB has a limited supply of these.

The O&O plan recognized that external logistical sources, such as COSCOM and corps support slice, are vital to the sustainment of the motorized division. This is true of the MSB itself, especially in terms of transportation and mobility, and more especially in the Class IX arena. What makes this situation even more crucial to division sustainment is the fact that so much of the Class IX stocked in the MSB's ASL is tailored specifically to the motorized division's needs. Estimates of how many S&P trailers would be required to move the MSB's ASL in one haul range from sixty-five to eighty. Great potential for alleviating this problem exists in the use of Air Force-developed mobility containers and, to some extent, in the use of West German-manufactured, non-developmental Schaefer "flex pallets." One equipment concept highlighted in the O&O plan as essential for the motorized CSS capability is the palletized loading system (PLS). Thoroughly tested by the S&T company of the MSB, the PLS was found to be a great improvement for supply and transportation. The PLS has demonstrated itself as a superb "go-to-war" system that would enhance CSS capabilities as a force multiplier.

One of the most critical missions of the supply and transportation company is its mission of water purification and issue to all division units. Currently, storage capacity of the S&T's water-treatment platoon is limited. Another critical area is the actual water treatment/purification equipment. Fielding of the improved 600-3 ROWPU is expected to resolve many of these deficiencies. Six M45A2 "Erdlator" water purification units round out the MSB's water capabilities. Augmentation of these vehicles is an essential requirement, as is water storage, should the motorized division be deployed to arid climates such as Southwest Asia. The full demand for water in such a scenario has never been actually practiced at a division level.

The medical support company has also validated its design and proven itself capable of achieving the demanding motorized mission. However, several impediments exist in terms of equipment. Delayed fielding of the HMMWV trauma treatment vehicle (TTV) has resulted in forced substitutions, ranging from M718 front line ambulances to 2-1/2 ton cargo trucks as "in lieu of" items. The need for a dedicated medical/MEDEVAC channel and more communications assets in each medical company has been demonstrated on several occasions.

Challenges remain. A dedicated C2 medical net would alleviate or eliminate conflicts between tactical, operational, and medical priority needs. Movement of the Class VIII Division Medical Supply Office (some 26 trailers and three refrigerator vans) is labor and transportation intensive. Actual field testing of MSB reconstitution procedures (both reorganization, the favored mode of reconstitution in an immature or lodgement phase, and regeneration) is desirable.

MSB operations have continued to evolve to meet the needs of the motorized division. Its ability to project combat service support forward at the decisive place and time and its responsiveness in its logistical support is as vital today as it was when the motorized concept was conceived.

FORWARD SUPPORT BATTALION

99TH FORWARD SUPPORT BATTALION
109TH FORWARD SUPPORT BATTALION
209TH FORWARD SUPPORT BATTALION

99TH FORWARD SUPPORT BATTALION

MOTORIZED EXPERIENCE

BACKGROUND

Since 1981 the division has been the Army Development and Employment Agency's partner in an ambitious program to create a division with the anti-armor capability of a heavy division and the deployability of a light division. To meet these seemingly impossible goals, the Chief of Staff, Army issued a challenge in 1981 to capitalize on Yankee ingenuity: identify and expeditiously integrate "high technology" into the Army.

The 9th Infantry Division (Motorized) has evolved into the free world's only motorized division. What makes it "motorized", and what is the impact to those charged with supporting it?

Three unique features define the 9th as a motorized division: its mission, operational concept, and force structure. These features will be examined as they apply to the 3rd Brigade ("GO DEVIL") and its habitually associated combat team.

MISSION AND STRUCTURE

The 3rd Brigade's mission is to "deploy by air and/or sea, occupy a staging area, establish or expand a lodgement, and conduct motorized combat operations to defeat enemy forces ranging from light infantry to motorized and armored." Key elements of the mission statement are the requirements to occupy a staging area, suggesting the brigade's employment as a follow-on force, and establishment of a lodgement, which requires the brigade to fight its way into a hostile contingency area.

FORCE STRUCTURE

To accomplish this mission, the brigade has a core of three maneuver battalions. Two are combined arms battalions (CAB), one light and one heavy, and the third is a light attack battalion (LAB). The CABs are composed of a HHC, a combat support company, and a mixture of light motorized infantry and assault gun companies. These battalions are task organized as part of their MTOE and not when they go to war.

The primary weapon systems of the maneuver battalions are HMMWV-mounted TOWs (as a substitute for the not-yet-developed assault gun system); 107 mm mortars (while awaiting fielding of 120 mm mortars); the squad automatic weapon, and Mark 19s--an automatic weapon that fires 40mm grenades capable of destroying lightly armored vehicles to a range of 2,200 meters.

Another unique system is the squad carrier variant of the HMMWV, which provides motorized mobility to the division's eight-men infantry squads. The brigade becomes a viable combat team when its infantry battalions team up with combat, combat support, and combat service support elements. As in other divisions, these latter units are part of other parent units, such as DivArty and DISCOM, but they habitually support the same brigade. They include an 18-gun (M198 howitzers) artillery battalion, a forward support battalion, and air defense, military intelligence, signal, military police, chemical, and engineer elements.

OPERATIONAL CONCEPT

Operationally, the 3rd Brigade Combat Team operates over broader areas than those of other divisions. Its forward line of troops is much less clearly defined, and it holds ground by exception; execution of engagement areas is its primary means of mission accomplishment. The brigade is suited to conduct infiltrations and brigade-sized "hit and run" operations against high payoff targets, and it may bypass up to company-sized enemy units as a matter of course.

Command and control is assisted by an emerging system that capitalizes on automation, rugged electronics, and videographics. This "pointman" for the Army's developing Maneuver Control System currently extends down through battalion level. Key headquarters graphically display units' status, which leaders weigh as they consider various courses of action, and pass electronic mail.

SUPPORT MISSION

What are the impacts of "motorized" on the brigade combat team's (BCT) direct support-level CSS element, and how does it accommodate them? The remainder of the article addresses these questions.

The brigade's strategic deployability requires a CSS unit that is similarly deployable. The support unit must also be capable of operating at considerable distance from the DISCOM, and planning and directing the BSA's defense. These requirements were met through the fielding of a 326-soldier forward support battalion, composed of a headquarters and supply company, a medical company, and a maintenance company.

The battalion headquarters provides invaluable capabilities to the BSA; it plans and coordinates CSS operations for the BCT as well as BSA defenses. It is authorized adequate communications equipment to perform these functions, including initiating calls for and adjusting indirect fires, and is materially assisted by automation, TACCS and division-unique GRID computers. The FSB has sufficient weapons authorized 47 Mark 19s, to defend itself against threat forces that include tanks. It commonly plans for assistance in its combat operations from the division's attack helicopters, reserve units or contingency anti-tank forces to counter enemy armor forces. The BSA is very vulnerable to complete destruction if weather or higher priority requirements keep such reinforcements from responding.

Medical support is enhanced through eight-soldier trauma treatment teams (TTT) that are deployed forward in combat trains with the maneuver battalions they support. If required, the TTTs can immediately reconstitute a battalion aid station. Ambulance squads are also positioned there to expedite the evacuation of wounded from the battalions' aid stations to the BSA.

Similarly, the maintenance company has TOE-organized maintenance contact teams that accompany the maneuver and artillery battalions. They routinely account for the bulk of the jobs received from supported units. Their placement well forward helps maximize the number of operable weapon systems on line.

The brigade's operational concept and unique force structure also drives the need for knowledgeable CSS leaders and planners who can anticipate CSS needs and satisfy them during any type of mission. Regular CPXs, extended FTXs, CG-led tactics seminars, and a recent NTC rotation have provided excellent training in this regard. Additional skills are gained through battalion staff-level computer staff planning exercises.

Some of the most realistic motorized training takes place during frequent FTXs at the Yakima Firing Center, a desert training area 190 miles southwest of Fort Lewis. During a recent light attack battalion external evaluation, for example, all ammunition resupplies were conducted with realistically simulated ammunition pre-configured packages. ATWESS cartridges were only provided to TOW II gunners when the entire request and distribution system functioned properly. The same process worked for 4.2" mortar ammunition using the TACFIRE system. High resolution training was also conducted very successfully at the National Training Center in May 1988.

Austere forward support battalions require supported units to recognize constraints and clearly prioritize their support requirements. The 3rd Brigade Combat Team has done this through a "Brigade Support Area Day." During a brigade-level FTX, key leaders and those responsible for coordinating CSS support in the combat and combat support units met at the BSA and were briefed by each support battalion section on its multi-functional responsibilities. Participants developed a much more detailed knowledge of support capabilities and limitations.

Given the fast pace of motorized operations, it is even more important that CSS and combat leaders in the 9th Infantry Division (Motorized) understand completely the warfighting implications of the CSS process--to recognize that today's support was planned several days ago, put in motion yesterday, and is, in many cases, difficult to change at the last minute. This outlook is being expressed in automated logistics video displays that are oriented almost exclusively towards the next three day's operations. We must understand the battlefield situation changes rapidly and flexibility is essential.

CONCLUSIONS

The FSB's authorized structure is capable of providing the BCT's CSS requirements during rigorous simulated combat conditions.

The FSB and BSA require anti-tank augmentation to defend against tanks. They are also vulnerable to bypassed combat units.

The battalion headquarters provides an essential command, control, planning, and communications capability to the BSA and CSS structure.

The BCT is capable of conducting realistic combat training within the constraints of CSS; when it does not include these constraints such as ammunition resupply activities, it is not training as it will fight.

When the LAB keeps its mechanics forward of the BSA, its field trains may not be capable of defending themselves unless they are generously assisted by other BSA elements.

The FSB has no DS transportation available to assist supported units; all transportation is used to move DS supplies.

The division requires additional water distribution assets when operating in an arid environment.

Ammunition transfer points are conceptually the same as time-proven ration points; there is no magic about them, and they should be included in training plans.

Pre-configured ammunition packages require additional work at the corps storage area or corps ammunition supply point. Corps MTOEs have not been adjusted to accommodate this increased workload.

FSBs can be trained to support as well as defend themselves.

Automation in the field is practical and significantly enhances users' capabilities to plan, coordinate, and direct CSS and tactical activities.

Women assigned to FSBs during combat will see some of it. Their numbers preclude them from being used exclusively in the BSA (vice in forward-operating teams). Female soldiers are fully capable of performing their technical and tactical tasks to standards during FTXs and NTC rotations; like males, they perform in accordance with their training, leadership, and expectations.

"Motorized" itself has had little impact on CSS procedures; the volume of support (and related equipment and personnel to provide it) is less than that required to sustain a mechanized BCT.

THE FUTURE

Experiments are on-going at the Army Development and Employment Agency and the 9th Infantry Division (Motorized), and they clearly need to continue. Some of the most rewarding are those that reduce, shift, or eliminate CSS management and physical operations from front-line soldiers to more specialized CSS elements behind them. Pre-configured ammunition packaging down to company/team level is an example. The overall CSS goal should be to provide tailored, multi-product packages to combat soldiers on time. The degree to which combat soldiers are relieved of having to forecast and request their own requirements will measure our ultimate expertise as supporters.

The pointman has already taken the field in several of these areas. A first-cut automated program has been developed that provides visibility of key supplies and maintenance status today and projections for several additional days. Coupled with threat, combat mission, and task organization information, a foundation is being laid that will enable CSS staff officers to assume more responsibility for forecasting and directing supplies forward. Moreover, the information will soon be available at headquarters throughout the division, giving the division commander and others much greater access to it.

Physical distribution will be significantly enhanced with the eventual fielding of the palletized loading system, a self-loading truck and pallet combination originally developed by the British and assessed at Fort Lewis. The pallets permit configuration of company/team loads of various classes of supplies; the trucks permit them to be loaded much quicker and without forklifts. The trucks can also be used to haul palletized repair parts bins, thereby solving a long-standing problem with Class IX mobility.

SUMMARY

The kinds and amounts of CSS required in battle are directly related to the types and employment of supported forces. Basic aspects of CSS requirements and resourcing are common across all divisions, but supporters have to accommodate the peculiarities of each type to maximize their capabilities. Simply identifying the unique requirements is a significant challenge; solving them is even more elusive. The whole process is very necessary, though. It focuses attention, stimulates thought, re-examines current methods, and demands solutions. It is continuous, and, despite significant progress in many areas, it always seems like the best combination of solutions is "just around the corner." It is, and always will be, up to those who are not content with the status quo. Wherever the search goes, motorized soldiers will continue to be a part of it.

MOTORIZED EXPERIENCE

109th FORWARD SUPPORT BATTALION

This article highlights experiences of the 109th Forward Support Battalion (FSB) during overseas deployments, brigade field exercises, and CPXs in support of motorized forces. It attempts to illustrate the good and bad of the motorized FSB, contrasting hands-on experience with the Operational Concept Document, dated 1 May 1985, and FM 63-20 dated 19 May 1985. It covers the battalion's functional areas of support and defense.

ORGANIZATIONAL CONCEPT

The battalion is organic to the DISCOM and is composed of three companies: headquarters and supply company, a maintenance company, and a medical company. It is in direct support of the 1st Brigade Combat Team and is located in the brigade support area (BSA).

This is a solid, proven concept. Since it does not differ in design from armor and mechanized units, it has been validated in those divisions as well. The wide dispersion of units on the battlefield and distance between the BSA and division support area (DSA) demand a relatively autonomous decision-making authority for sustaining the brigade. The FSB concept supports the brigade by allowing the FSB commander to control units within the BSA.

The battalion has the capability to support a motorized brigade and slice elements within the division with most classes of supply and services, maintenance, and medical. Area support is also part of the overall mission of the battalion, but our austere structure does not allow us to provide adequately for dissimilarly structured attachments, such as a tank company. In such cases, a support slice must accompany the attached unit, especially maintenance and recovery personnel, repair parts and bulk cargo transportation assets for fuel and ammo.

The forward support battalion commander plans for and directs rear operations against level I and II threats. All soldiers in the BSA must be trained in individual fighting techniques, and leaders must be proficient in their warfighting tasks. Response force soldiers must receive collective training in squad movement, patrolling (mounted and dismounted) and command and control. Radio and wire communications between all units and the battalion tactical operations center must be functional. There must be an emergency warning system within the BSA to alert all units simultaneously of impending danger. The BSA commander presides over a geographical area of approximately two to four square kilometers with a troop strength double that of his battalion. He relies heavily on slice unit commanders to train soldiers in basic warfighting skills. This can be a severe limitation on readiness, necessitating a train-up period to overcome this problem.

SUPPLY

The headquarters and supply company receives, stores, and issues Class I, II, III, IV, V, and VII resupply using supply point distribution in the BSA. Division and corps transportation provides throughput to the BSA and backhauls excess and salvaged items. Supplies are normally off-loaded at the BSA, and transportation assets returned to the rear. Due to the battalion's limited cargo hauling capability, bulk items must be moved to brigade units rapidly to preclude a large buildup of supplies. It is expected that frequent displacements of the BSA would result in the routine destruction of supplies to deny their use to the enemy.

Bulk class III is usually provided to brigade units in the BSA by re-filling tank and pump units (TPU). Retail is accomplished at the battalion level from these TPUs. This battalion used a five-point refuel system (retail) with the organic 5000 gallon tanker to support the brigade. This is positioned forward of the BSA and provides very rapid, high volume retail fuel to combat units preparing for a tactical engagement. Average refuel times for HMMWVs was three to five minutes total with five vehicles refueling simultaneously. This is a good system which deviates from doctrine; it is used as the situation requires. It demands most of the battalion's POL handlers; thus, wholesale bulk POL is significantly degraded in the BSA during this time. Another caveat concerns vulnerability--a large tanker forward of the BSA is a likely target, and its destruction would critically hurt our POL supply capability.

Class IV high-tonnage construction/barrier material is provided by corps to the BSA. It requires long lead times to ensure delivery in time to support the commander's objective. This resupply system has not been tested. Quick response time by corps units is not expected and may not allow the brigade commander sufficient freedom of action to use engineer assets fully. Saving Class IV material in the BSA for future battles is not recommended because of the frequent displacement of the BSA and low cargo hauling capacity of the supply company.

Ammunition is supplied to forward units through an ammunition transfer point (ATP) manned by the supply company. The ATP is simply a temporary location where the corps ammo hauler meets the forward unit and transfers Class V from one large vehicle to many smaller vehicles. It requires detailed coordination between the requesting unit, the supply company, the division ammunition officer and corps. It also requires long lead times and quick, effective communication to the transportation unit in the event of displacement of the BSA. The entire procedure has not been tested. The large variety of ammunition types, the huge volumes required, the large number of requesting units and frequently changing locations make this a very slow, cumbersome system that demands practice to identify the flaws. There will be times when the throughput load does not meet the unit. In these cases, the only options are for the ammo to stay on the delivering vehicle until the unit arrives or return to corps with a full load. Neither option is likely. The option of down-loading Class V cargo in the BSA runs the great risk of having to destroy ammunition in the event of displacement; there is not sufficient cargo capacity organic to the battalion to move excess supplies.

MAINTENANCE

Maintenance support teams (MST) are positioned forward of the BSA and are collocated with combat trains of the respective maneuver battalions. Maneuver battalion commanders, on the recommendation of their battalion motor officers, often mistakenly locate the MSTs in the field trains near the BSA. This is doctrinally incorrect. MSTs placed in the doctrinally suggested location proved to be more effective. Production statistics from OCTOFOIL FOCUS 2-87A revealed that the MST located with the 3-60th Infantry combat trains repaired twice the equipment as that of the MSTs positioned in the field trains of the 2-23 Infantry and 4-23 Infantry. Additionally, the 3-60 Infantry MST was able to maneuver effectively with the combat trains, moving and setting up as many as three times daily without significantly degrading repair effectiveness. The belief that an MST would be unable to keep pace with the combat trains has long been a reason for placing MSTs in the field trains. The key factor here is not that the MST in the combat trains fixed more equipment, but that it fixed equipment much farther forward, returning items to the user more rapidly.

TOW II and Dragon missile repairs are accomplished in the MSTs with the contact support set and in the BSA with the improved contact support set. All repair sites make extensive use of repairable exchange items (RX) and bench and shop stocks. During OCTOFOIL FOCUS 2-87A, RX items were issued from the main support battalion (MSB) to the missile repair shop in the maintenance company prior to the exercise. This resulted in a repair rate appreciably higher than the previous FTX when RX items were not on hand. Additionally, there were no items evacuated for repair to the MSB. The key point is that the brigade's main weapon systems stayed in the brigade area and were fixed and returned to the user faster than in previous exercises.

The MST is critically dependent on several factors for fast diagnosis and repair of equipment: soldier proficiency in battle damage assessment and repair, presence of tools and test equipment; and stockage of appropriate Class IX. The Army has provided excellent guidance through the service schools on battle damage assessment and repair. Tools and test equipment are also on hand, and soldiers are proficient in their use. However, there is no systematic guidance for the formulation of an MST shop stock/bench stock. Presently, a rather small stockage of repair parts is subjectively assembled for each of the commodity areas represented in an MST; this is a somewhat "hit-or-miss" method and does not allow maximum use of the MST's capabilities.

MEDICAL

The medical company is authorized ten M997 HMMWV ambulances and eight M998 HMMWVs configured as trauma treatment vehicles. The unit currently uses twelve M886 ambulances in lieu of the authorized vehicles. With the existing equipment, the unit is capable of fielding all ten ambulance teams, but only two trauma treatment teams. Additionally, the M886 is not capable of rendering the level of support the mission dictates because of its limited cross-country mobility.

The trauma treatment team concept is sound and supports the AirLand Battle doctrine well. A real need still exists for the medical community to resolve the final configuration of the Medical Equipment Sets (MES), however, in order to implement medical support fully.

CONCLUSIONS

The forward support battalion is definitely the solution to the logistical support challenges of the AirLand Battle maneuver brigades. In its present structure, it is fully capable of providing the supply, maintenance, and medical needs of a committed brigade. Due to its austere manning level and severely limited transportation assets, however, the ability of the FSB to sustain the level of intensity required on the modern battlefield is somewhat questionable. Additional personnel in the supply platoon and MSTs would do much to resolve this sustainment problem. With the introduction of the Palletized Loading System (PLS) to the TOE, much of the transportation shortfall will have been met.

COMBAT SERVICE SUPPORT
IN THE MOTORIZED INFANTRY BRIGADE COMBAT TEAM

"TAKE IT TO THE FIGHTERS"
209TH FORWARD SUPPORT BATTALION

INTRODUCTION

An honest appraisal of the effectiveness of combat service support (CSS) doctrine in the motorized division based upon 9th Infantry Division experience is, at best, difficult. During the early motorized years, battalion and brigade exercises at Fort Lewis and at Yakima Firing Center focused almost entirely upon maneuver and tactics. CSS support was almost exclusively "fixed base" support from which specific tailoring was accomplished to meet the unique requirements of the task force/task element which was training on the ground. CSS to the "rapidly" advancing and maneuvering brigade combat team was never really practiced.

During recent years, greater consideration was given, at least conceptually, to the mobility aspects of combat service support particularly in the forward support battalion (FSB). CPXs have resulted in considerable discussion and consideration of CSS. Moreover, brigade-level exercises have caused brigade support area (BSA) displacements which have forced the BSA to deal with the mobility aspects of support operations. However, based partially on limited terrain availability, and partially on the time constraint afforded by limited 17-21 day training exercises, the testing of conceptional CSS to the motorized brigade-level task force was never completed. Additionally, the 9th Infantry Division never fully deployed the main support battalion to a location from which it supported the entire division at one time and never enjoyed a proper field relationship with a supporting corps support command while undergoing maneuvers. It is impossible to assess fairly the effectiveness of supporting CSS doctrines. The purpose of this article is to capture those lessons learned by one FSB commander which may relate to the uniqueness of CSS in motorized concept.

MAINTENANCE OPERATIONS

"Fix forward" is a concept which was not consistently understood through-out the division. Battalion and brigade commanders generally lauded the concept while headquarters company commanders and first sergeants despised it because of limited transportation and communication assets. The M882 series maintenance contact team truck was simply outdated and could not/can not keep pace with the motorized battlefield. Because of insufficient communications gear, maintaining contact with and control over forward deployed maintenance contact teams was, at best, difficult. Forward maintenance company commanders gave the concept mixed reviews, but, clearly, the more experienced they became, the less they liked the concept of positioning maintenance contact teams with maneuvering units. Control was a definite problem as was the ability to keep constant visibility over where the elements were located. Decentralizing the contact teams degraded the company commander's ability to consolidate assets at key points to meet the priority needs established by the brigade task force commander. To compensate, maintenance company commanders developed the questionable daily practice of moving forward to maintain control over deployed contact teams. On an insecure battlefield with both known and unknown bypassed pockets of enemy resistance, the survivability of lone vehicles routinely running forward is questionable.

The 2d Brigade Combat Team developed a compromise policy which met with good success and was moderately well received. Brigade-level logistics release points (LRP), regularly used by both mechanized and armored divisions, were established during specific time periods to service designated units. Support at established LRPs was tailored to situational requirements but generally included the establishment of maintenance collection points (MCP) and the positioning of maintenance contact teams. MCPs became points where direct liaison, to include key Class IX resupply between the maintenance company and maneuver battalions, occurred. Brigade MCPs were easily located, and with consolidated recovery assets, DS maintenance was able to provide responsive parts exchange, controlled substitution, and equipment evacuation. Security of the LRP was coordinated by the brigade and executed jointly by brigade and FSB elements. Maneuver unit maintenance elements gave this procedure favorable marks because they at least knew forward locations to which they could haul downed equipment to receive support, support which was positioned well forward of the BSA. Additionally, this practice provided the continuity of support operations during periods when the entire BSA was displacing.

The discussion of maintenance operations is incomplete without including Class IX resupply. Introductory comments are especially relevant with regards to the resupply of Class IX forward to the BSA. The length of the communication/supply pipeline was obviously greater, but the corps and MSB were never fully employed to gain an appreciation of this supportability problem. Class IX resupply forward of the BSA is directly tied to the brigade combat team's ability to diagnose requirements properly, and then get those requirements to the support operations section of the FSB. During virtually every limited duration field exercise, three to five and even seven-day periods transpired when unit resupply requests were not transmitted to the FSB. Daily field requirements never reached 50 percent of daily garrison requirements. While exercise duration may account for some of the delta, heavy divisions do not experience the same trend. Heavy divisions show a similar one to three day degradation in requisition processing, but subsequently achieve a sustained requisitioning rate above normal garrison operations.

Finally, Class IX doctrine specifies supply point resupply at the BSA. Experience shows that direct resupply of critical Class IX to maneuver units is essential to sustain maximum combat power forward. The FSB and brigade combat team have effectively managed this procedure during field exercises, but there is doubt that this would work smoothly during actual operations.

MEDICAL OPERATIONS

The magnitude of medical operations on the modern battlefield simply cannot be replicated during field training exercises. Additionally, key personnel shortages, equipment shortages, and outmoded equipment substitutes limited the forward medical company's ability to train for the motorized brigade's unique medical support requirements. However, what was clear was that the forward medical company must remain highly mobile and maintain the ability to provide continuous support. "Tailgate" medical coverage must be planned for and practiced, and assets must be consolidated to the maximum extent possible to limit signature and maintain mobility. Medical training must continue to focus on individual lifesaving skills, and units must continually refine battlefield casualty evacuation procedures. FSB doctrine is conceptionally clear; however, the ability to meet the requirement (i.e., the number of casualties to be treated, quality of equipment readily available, number of medical personnel available) is not adequate to meet the requirement as expected.

SUPPLY OPERATIONS

The key challenges in supply operations in a motorized force are little different than a heavy force. Comments relative to motorized doctrine by area are as follows:

Class I: The reintroduction of many previously withdrawn cooks from the motorized MTOE signals a limited Class A preparation capability for soldiers on the battlefield. Field ration handling experience within the FSB is today very limited, and doctrinal changes and MTOE authorizations must change to reflect this situation.

Water purification and distribution to motorized forces is extremely challenging. The doctrine which attaches water purification teams from the MSB to the FSB as the need dictates appears sound. However, the water distribution and water storage assets of the FSB and the units supported by the BSA are inadequate.

Class II, III, IV and VI are prime areas where the training experience of the 9th Infantry Division (Motorized) has neither proved nor disapproved conceptional doctrine. Class II, III, and IV ASL stockages are built on training experience and not wartime projections. While stockage adjustments can be made, the training requirement has never tasked the limited supply section of the FSB. This battalion commander's experience suggests that available soldiers equipment were fully committed during training exercises in which most of the Class II section soldiers pitched in to execute the Class I mission. A real Class II, III, IV and VI workload requiring ASL storage, transportation, and issue would not be possible with the soldiers and equipment authorized in the FSB today. Moreover Class IV doctrine is not very clear as to just what role the FSB commander has. Conceptual corps throughput of preconfigured barrier sets is fine; however, the responsibilities for defining requirements, ordering individual items (i.e., quantity of poles, pins, stakes, rolls of wire), off-loading, storing, and reloading the equipment when it arrives, and transporting the material forward from the BSA, are not clear. What is factual, is that the expertise, manpower, and handling and transporting equipment are not available in the FSB.

Class III doctrine, which requires area resupply from the BSA, has clearly been modified to take Class III forward at least as far as brigade LRPs. Doctrine would have maneuver units routinely resupplying themselves forward using organic assets. Again, this commander's experience with the 2d Brigade Combat Team suggests that this practice should be the exception and not the rule. Certainly during training exercises maneuver units must practice utilizing organic assets to execute "LOGPAK" resupply. However, this practice routinely results in maneuver unit POL bulk haulers being empty and travelling to the BSA on a regular basis. This commander believes that routine bulk Class III resupply should be with the bulk assets of the FSB moving forward to an area secured by the brigade. This LRP then executes rapid refuel resupply of all maneuver unit organic assets, while maintaining the bulk haul capacity of the maneuver unit near capacity in the event that follow-on offensive actions move the maneuver unit beyond the immediate reach of the BSA. Refuel on the move procedures must be incorporated into tactical operations planning wherever possible.

Finally, the FSB needs additional Class III assets whenever there is a motorized-heavy task force either OPCON or attached. If the FSB of the motorized division is to provide Class III support to this type of task force, additional tankers are required. As a reasonable gauge, the FSB of the heavy division is authorized four 5000 gal tankers for each armored battalion it supports.

Class V: The doctrine for Class V resupply to a motorized force appears sound, but again, true battlefield experience has not been replicated. Administrative requirements, soldiers and equipment availability, and ammunition availability have limited training experience. What does appear clear is that on the battlefield, ammunition transfer will need to be done rapidly, forward of the BSA.

Class VII and VIII resupply face the same considerations throughout the Army. Personal experience suggests no uniqueness challenges for a motorized force.

AVIATION SUPPORT BATTALION

3D BATTALION, 9TH AVIATION REGIMENT

AVIATION SUPPORT BATTALION
MOTORIZED EXPERIENCE

This document summarizes the 3d Battalion, 9th Aviation Regiment history during the 9th Infantry Division (Motorized) era, when the battalion evolved into the Army's only true aviation support battalion. It also provides an explanation of the battalion's unique concept of operation and mission.

MISSION

It is appropriate to start with the history and mission of this unique battalion. The battalion was provisionally activated as the 4th Forward Support Battalion (Aviation) and has undergone numerous reconfigurations to meet the requirements of the 9th Cavalry Brigade (Air Attack) as well as the 9th Infantry Division (Motorized). On 1 May 1987, the 4th Support Battalion (Aviation) was redesignated as the 520th Support Battalion (Aviation) and on 17 December 1987 it was incorporated into the 9th Aviation Regiment as 3d Battalion, 9th Aviation Regiment.

The mission of the battalion is unique in that it provides division-level logistic support to the Cavalry Brigade (Air Attack) (CBAA) of the 9th Infantry Division (Motorized). Additionally, it establishes intermediate (forward) logistic support to the CBAA and slice units in the brigade area of operations. It may locate in the brigade support area (BSA) or the division support area (DSA), or both, and provides command and control to other logistics elements that are attached to the brigade. It is responsible for CBAA rear area combat operations. The battalion supports division-level supply in all classes of supply (less classes II, VIII, and classified maps) through central supply distribution points established by the headquarters and supply company. The battalion maintains aircraft, support equipment, and vehicles and engineer equipment at the intermediate level. It also accomplishes evacuation of ground equipment and helicopters. The battalion establishes maintenance collection points and evacuates equipment from these points to the aviation and ground maintenance companies for repair.

HEADQUARTERS AND SUPPLY COMPANY

The headquarters and supply company (HSC) provides command and control to units assigned or attached to the battalion and provides mess and organizational maintenance (less COMSEC and aviation materiel) support to battalion elements. It receives, stores, and issues Class I, III, IV, and VII supplies. It operates an ammunition transfer point (ATP) in support of the CBAA. A general supply (GS) platoon comprised of a Class I section, Class III section, and a Class V section is the workhorse of the company. The Class I section receives, stores, breaks down and issues Class I and VI to CBAA units. The Class III section provides retail fuel to the battalion and bulk fuel to supported units. This section can store 120,000 gallons of fuel in its forward system supply point (FSSP), haul 30,000 gallons in its six 5,000 gallon tankers, and has the capability to store or commit to sling load operations an additional 30,000 gallons through the use of sixty 500 gallon fabric drums. The Class V section coordinates for ammunition with division ammunition operations and receives and transfers ammunition from corps transportation assets to supported unit vehicles.

GROUND MAINTENANCE COMPANY

The ground maintenance company provides intermediate direct support maintenance and Class IX repair parts to the CBAA. Specifically, the unit provides technical advice, assistance, and repair for over 10,000 individual items of equipment to include wheeled vehicles, power generation, construction equipment, communications/electronics equipment, small arms and quartermaster equipment. The Supply Support Activity (SSA) serves as a main warehouse for the issue of all Class IX and Class IX (aviation) repair parts. The common (ground) ASL functions as a forward support unit, providing timely supply support to all Cavalry Brigade units.

The greatest challenge the ground maintenance company faces is its tactical deployment plan. The diversity of support required by the Cavalry Brigade necessitates support provided from two separate locations. The bulk of the company is deployed forward in the BSA to provide responsive and timely maintenance and common Class IX repair parts while the Class IX (aviation) ASL remains in the DSA. The current MTOE is not structured to operate two separate ASLs. Personnel and equipment are configured for a single operation. Therefore to provide tailored support, the commander must make difficult choices, most notably in the allocation of mobility assets. Because the ground DSU is located in the BSA and must be able to maneuver quickly with the rest of the company, virtually all the transportation resources for the two SSAs are dedicated forward, with little or no transportation assets available for the aviation ASL. The split normally leaves the aviation ASL dependent on external transportation for even minimum mobility. Battlefield limitations throughout the company prevent it from keeping up with its "motorized" customers. Fully one-fourth of the assigned personnel cannot be deployed with organic assets, even when only the most critical equipment is loaded. Only with substantial outside support could this unit sustain active operations on the fluid battlefield of the BSA and in the "motorized" DISCOM. This support is in high demand across the spectrum.

The ground maintenance company provides even more responsive support to 1st Squadron, 9th Cavalry in the form of two cavalry support teams (one per troop) who deploy with the squadron. The teams are configured to provide fully mobile, on-site automotive and electronic repair. In practice, the greatest obstacle to effective support has been resupply of repair parts, especially of Class IX major assemblies. When the squadron has deployed independently with the teams, the squadron's organic assets from garrison sources accomplish the resupply mission. However, with the company fully deployed, the scarcity of trucks and trailers can create support constraints, especially as the cavalry troopers move fluidly throughout the battlefield.

AIRCRAFT MAINTENANCE COMPANY

The aircraft maintenance company (AMC) provides aviation intermediate maintenance (AVIM) support to the CBAA to include engine, structural, hydraulics, electrical, armament, avionics, and recovery. Additionally, it provides backup aviation unit maintenance (AVUM) to the CBAA. The company provides the full spectrum of aircraft maintenance support to include repair of aeronautical equipment, manufacture of parts, battlefield recovery, maintenance data collection, use of technical directives, and repair of armament sub-systems. Aviation maintenance support may be provided from locations in the DSA or the BSA. Customer units bring equipment to this point or to a maintenance collection point established by the company for evacuation to the DSA. Contact teams are made available to provide forward support.

The goal of the aircraft maintenance program is to provide the CBAA commander with the maximum number of safe, fully mission-capable aircraft to support the daily mission requirement. The aircraft maintenance company's goal is fast, continuous, and thoroughly reliable aviation maintenance support. As the division's tactical aircraft become more lethal on today's battlefield, the division commander has the ability to use this increased combat power for the accomplishment of his mission. Gone are the days of returning aircraft to combat with a simple wooden patch or a piece of tape. With sophistication comes the necessity of highly developed electronic test equipment and working conditions which approach hospital standards of cleanliness. This need is met through the use of shop sets, specially equipped vans and container-like structures which are organic to the company. These highly capable maintenance facilities are often cumbersome and rely heavily on the scarce transportation assets of the division.

SUPPORT OPERATIONS

The support operation staff is the logistical nerve center of the 3d Battalion, 9th Aviation Regiment. Responsible for providing complete logistical support to the CBAA, the support operations staff is the critical point of contact between supported units and the different commodity-oriented support elements within the battalion. Support operations coordinates for all classes of supply, transportation and ground maintenance, just as a support operations section does in a conventional support battalion. However, due to the unique mission of the battalion, the support operations has an even larger, more critical mission: coordination of all aviation intermediate maintenance (AVIM), as well as support of the division's Class IX (aviation) main DSU and aviation POL operations. Continually pursuing proactive measures to ensure the best possible logistics for the CBAA, support operations has a large and challenging mission.

To accomplish this mission, the section is structured along two lines, aviation support and ground support. With a ground commodity manager, aviation and supply technicians, the section is overseen by an aviation major. Because of the requirement to support the Cavalry Brigade's ground maneuver elements in a BSA location and aviation elements out of a DSA location, support operations is equipped with exceptional command and control capabilities. Utilizing an OH-58 aircraft and a powerful AM radio system, support operations is able to coordinate complex support requirements across the entire battlefield, from the length of the divisional front all the way to the corps support elements. Constantly researching and resolving Cavalry Brigade's support problems, support operations deals at several levels: as the Cavalry Brigade's voice to DMMC, support operations insures that divisional level support is responsive to their needs; as the communicator between the battalion's companies and supported units, support operations is the mediator of support needs against support capabilities; and as a staff section, it serves as the commander's principal advisor in all logistical matters.

SUMMARY

The battalion stands ready to accomplish support plans tailored to any contingency area based on the threat and the employment of the CBAA. Wherever the CBAA deploys, this unique battalion stands prepared. 3d Battalion, 9th Aviation Regiment truly lives up to its motto, "We Support, Anytime, Anywhere!"

MAIN SUPPORT BATTALION

709TH MAIN SUPPORT BATTALION

709TH MAIN SUPPORT BATTALION MOTORIZED EXPERIENCE

As envisioned in the operational concept for the motorized division, the main support battalion (MSB) has proven to be fully capable of providing direct logistics support and health services to the 9th Infantry Division (Motorized). Tested realistically in both command post and field exercise environments, the motorized MSB has evolved into a multi-functional battalion uniquely tailored and trained to provide dynamic combat service support on the motorized battlefield.

Structured distinctly differently from the MSBs of heavy divisions, the motorized MSB, represented in the 9th Infantry Division (MTZ) by the 709th Support Battalion (Main), meets strategic deployment criteria, albeit with certain mission limitations, which will be discussed in detail separately. Unlike the seven companies of the MSB in the heavy division, the 709th is comprised of five companies: a headquarters and light maintenance company, a heavy maintenance company, a missile maintenance support company, a supply and transportation company, and a medical support company. (Note that in the heavy division, there is a separate headquarters and headquarters detachment, transportation motor transport company, supply and service company, and light maintenance company). The five-company MSB structure has proven to be flexible and capable of achieving its mission.

SUPPLY

Under combat service support, the motorized organizational and operational (O&O) plan specifies that normal resupply within the division is by supply point, with very limited unit-distribution capabilities. However, in major field exercises, such as DEVIL STRIKE and RELIABLE STRIKE in 1988 and CELTIC CROSS in 1986, and in CPX simulations, the MSB often conducted unit-distribution logistics "pushes" to brigade combat teams and the brigade support areas (BSA). The classes of supply normally pushed forward were primarily Class I, III (bulk), IV, and IX. Such logistical pushes have proven to be essential in both maintaining the sheer tempo of fast offensive operations and in not fettering brigade combat teams with logistical concerns. This allows the brigade commander to concentrate on warfighting. Aerial resupply to forward areas has proven invaluable in guaranteeing the maintenance of the offense tempo at crucial moments. Inherent in the aerial resupply capability are the requirements for aerial pallets, slings and nets, and rigger support, which are normally unavailable in the MSB.

One of the most critical missions of Company C, the 709th supply and transportation company, is water purification and issue to all division units. Currently, storage capacity of the S&T water-treatment platoon is limited; in arid and desert environments, such purification and storage capabilities would be outstripped by demand. Another critical area is the actual water treatment/purification equipment; currently, Company C has four 600-1 model ROWPU's (reverse-osmosis water purification units), which have experienced a variety of mechanical malfunctions and breakages. Fielding of the improved 600-3 ROWPU is expected to resolve many of these deficiencies. Six M45A2 "Erdlator" water purification units round out the MSB's water capabilities. Augmentation of these vehicles is a vital requirement, as is water storage, should the motorized division be deployed to an arid climate such as Southwest Asia. The full demand for water in such a scenario has never been actually practiced on a division level.

TRANSPORTATION

The O&O plan recognized that external logistical sources, such as COSCOM and corps support slice, are vital to the sustainment of the motorized division. This is true of the MSB itself, especially in terms of transportation and mobility. This requirement is greatest, as was anticipated in the O&O, in the Class IX arena. At any one time, on-hand Class IX assets requiring transportation outstrip on-hand transportation capabilities. What makes this situation even more crucial to division sustainment is that so much of the class IX stocked in the MSB's ASL is tailored to the motorized division's needs--needs which may not be accommodated from a heavy or light division's ASL, should the motorized division deploy with its ASL to follow. Depending on the demands of combat, estimates of the number of trailers required to move the MSB's ASL in one haul range from sixty-five to eighty S&P trailers. With the organic S&T company's transportation assets dedicated to division-level support, the Class IX mobility demand becomes more acute. Great potential for alleviating this problem exists in the use of Air Force-developed mobility containers, and to some extent in the use of West German-manufactured, non-development Schaefer "flex pallets." Corps transportation availability will be vital in a fully-deployed MSB for wholesale movement and redeployment of the ASL.

A key piece of CSS equipment highlighted in the O&O plan is the palletized loading system (PLS). Thoroughly tested by the S&T company of the MSB, the PLS was found to be a great improvement for supply and transportation abilities. The contract for full-scale deployment of the PLS system is underway; the PLS has demonstrated itself as a superb "go-to-war" system that would enhance CSS capabilities as a force multiplier.

MEDICAL

Although the medical support company, Company A, has also validated its design and proven itself capable of executing the demanding motorized missions, several impediments exist in terms of equipment. Delayed fielding of the HMMWV trauma treatment vehicle has resulted in forced substitutions, ranging from M718 front-line ambulances to 2-1/2 ton cargo trucks as "in lieu of" items. Also, differences in size and compatibility of medical sets, kits and outfits by Company A, 709th SB(M) has led to some interoperability problems with FSB medical companies. Division-wide, the need for a dedicated medical/MEDEVAC channel and provision of more communications assets to each medical company has been demonstrated on several occasions. A dedicated command and control medical net would eliminate the conflict between tactical/operational and medical priority needs.

One final medical concern is the lack of a medical company for CBAA. Without a designated medical support company, CBAA must rely on Company A of the MSB for support in the DSA, a situation which may tax MSB medical capacities to the breaking point in actual combat. As is the case with Class IX mobility, movement of the Class VIII Division Medical Supply Office (some 26 trailers and three refrigerator vans) would be transportation and labor-intensive.

OPERATIONS

The maintenance companies of the motorized MSB are geared towards a "fix-forward" approach. Division customers, by O&O, will rely on unit-level maintenance in the lodgement phase of operations. At that time the fully deployed MSB, in conjunction with the forward support battalions, will commence direct support maintenance operations. Missile maintenance, in particular, is achieved largely through forward deployment of missile contact teams. This has worked exceptionally well in practice. The MLRS forward contact team support, critical to division warfighting, has been praised as a strength.

The 709th plays a major role in the DSA in terms of rear battle operations. The size of the fully-deployed MSB provides a lucrative target for infiltrators, raiding teams, and enemy units which by-pass the forward troops in deep-strike operations. As with other DISCOM units, the MSB itself is effectively capable of combatting only level I and II threats. However, the presence of CBAA units in the DSA, and CBAA's standing mission to fight the rear battle as division reserve, is a significant "ace in the hole" in the DSA. Fielding of the 40mm Mark 19 grenade machine gun to the MSB's subordinate companies would also significantly increase combat capability to execute rear area defense. Air defense artillery "slice" support for the MSB and the division support area, depending on the level of the aerial threat, is a must for survival. In terms of sheer numbers of soldiers, the 709th can adequately defend itself against level I threats, and with the required assistance, against level II incursions. These would be increasingly detrimental to the CSS mission.

As the DISCOM element responsible for implementing the bulk of any battalion or larger-sized battlefield reconstitution efforts, the MSB will need significant augmentation or "pusher" help in almost every class of supply--in medical support, in transportation, and in maintenance to accomplish a battalion-sized reconstitution. Although tested in CPXs, actual field testing of MSB reconstitution procedures is needed in both reorganization, the favored mode of reconstitution in an immature or lodgement phase, and regeneration.

For command, control, and communications, the MSB is tied into the division MCS 2.0/GRID system, enabling rapid dissemination of information and maximum collection and transmission of data. MCS/GRID "cards" are located in the MSB; interplay in the MSC net has been routinely practiced on both CPXs and field exercises. The MSB TOC has been designated as the alternate DISCOM TOC in the event of incapacitation or destruction of the latter. Should circumstances arise in which this plan would have to be enacted, however, the MSB communications assets, principally FM communications, would be inadequate to accomplish the mission fully.

CONCLUSION

The experiences of the motorized main support battalion, in both daily garrison operations and field environments, have revealed some changes from the basic O&O plan. As such, MSB operations have continued to evolve to meet needs of the motorized division. Its ability to project combat service forward at the decisive place and time and the responsiveness of the MSB in its logistical support is as vital today as it was when the motorized concept was conceived.

PART V

MOTORIZED EXPERIENCE OF DIVISION STAFF

ASSISTANT CHIEF OF STAFF, G1
ASSISTANT CHIEF OF STAFF, G2
ASSISTANT CHIEF OF STAFF, G3
ASSISTANT CHIEF OF STAFF, G4
ASSISTANT CHIEF OF STAFF, G6

MANNING THE MOTORIZED DIVISION

A G-1 PERSPECTIVE

The transition of the 9th Infantry Division from infantry to motorized had enormous personnel implications. This paper will describe the organizational changes and their impact on personnel service doctrine.

DIVISION REORGANIZATION

Restructuring to a motorized division affected virtually every unit within the division. The division's personnel authorization decreased by more than 2000 soldiers with literally hundreds of MOS and skill level changes. Standard infantry battalions, with over 750 soldiers assigned, were reconfigured to combined arms battalions and light attack battalions with authorizations ranging form 460 to 570. However, the key was the mix of MOSs. For example, 11B authorizations decreased by more than 1000 whereas 11H increased by 500. The combat service and combat service support MOS structure experienced major shifts. The increase in vehicle and communication equipment greatly increased authorizations for support soldiers in MOSs such as 31K, 31V, 63B, 76C, and 77W (now 77F). The loss of 2000 authorizations might be perceived at first glance as a "reduction" which could be accomplished easily. However, the division-wide MOS structural revisions made the transition process extremely complex.

During the transition window, the division also activated a new maneuver battalion, the 3d Battalion, 1st Infantry (Combined Arms Battalion - Heavy). This unit was activated using displaced soldiers (primarily 11B) from other 2d Brigade units along with an infusion of 11H and support soldiers from the replacement stream. 3-1 Infantry, integral to the division's readiness, added to the complexity of manning the division.

The division also lost its only armor battalion as a result of the transition. 1st Battalion, 33d Armor became an I Corps unit. I Corps then attached the tank battalion back to the division which further attached it to the 2d Brigade. However, as an independent tank battalion, it required a heavy maintenance support unit. As a result, I Corps activated the 164th Maintenance Detachment to support the only heavy battalion at Fort Lewis. This unit, also assigned to I Corps and further attached to the division and 2d Brigade, was staffed with soldiers from various installation units.

Unit deployments impacted on the transition process. The 3d Battalion, 60th Infantry deployed to the Sinai in December 1985 for six months in support of the Multi-national Force and Observer mission. Although this unit would later convert to a light attack battalion, which is authorized about 460 soldiers, it was assigned 750 soldiers to perform its Sinai peacekeeping mission. Therefore, many soldiers with MOSs needed in other units remained in 3-60 Infantry until after its redeployment to Fort Lewis in May 1986.

As a result of a Department of the Army decision, the 214th Attack Helicopter Battalion (AHB) moved to Fort Polk, LA, at 65% strength (in virtually every MOS) in the summer of 1986. The personnel management aspects were complicated and impacted primarily on the Cavalry Brigade (Air Attack) (CBAA). Soldiers from CBAA and, to a limited extent, other divisional units were reassigned to the 214th AHB so it could deploy at the directed readiness level.

The division also deployed four COHORT companies to Korea during the transition period. The management efforts to accomplish the deployments, with their associated personnel turbulence, had an additional impact on an already turbulent personnel situation in the division.

Personnel management tools were vital to the motorized transition. The documentation process was not responsive to the personnel managers' needs. The phased restructuring resulted in continuously fluctuating authorization documents. The division created unique MOS "templates" that gave it the capability to assign replacements correctly and to project requirements out six months. The ever changing MTOEs required personnel managers to deal with two time frames, today and three to six months out as units came into their transition windows. The primary focus had to be on the objective design documents.

The division needed to update consistently PERSCOM's Personnel Management Authorizations Document to ensure that PERSCOM agreed with the division's validated MOS requisitions. This was probably the most difficult part of the transition. Without aggressive follow-up by the division to keep PERSCOM branch managers updated, the soldiers needed as a part of the transition would have been delayed. Unit Status Reports served as a key means to keep FORSCOM and PERSCOM aware of the division's personnel needs by providing MOS visibility on a regular basis.

G1/AG COMMUNITY RECONFIGURATION

The division's G1/AG community also reconfigured in conjunction with Army of Excellence personnel service support doctrine. The 9th AG Company inactivated, and its functions and personnel realigned. The G1/AG staff expanded to include a new personnel sustainment branch, directly responsible to the G1/AG activities for all strength accounting, replacement operations, and personnel accounting, such as awards, line of duty investigations, and congressionals. The division recalled its administrative services branch from I Corps, where it had been combined with the corps branch, and re-established its divisional role. The Division Band's authorization was deleted from HHC, 9th Infantry Division and moved to a separate MTOE under G1/AG supervision.

As the 9th AG Company inactivated, certain portions were absorbed into a newly activated 9th Personnel Service Company (9th PSC). The company's primary sections included actions, records, automation, company support and services. However, a new twist occurred in that the 9th PSC was assigned to I Corps for command and control and given a mission of direct support to the division. This initial operating structure caused significant problems and was subsequently modified. The 9th PSC was attached to the DISCOM for support and eventually came under direct supervision of the division G1/AG.

DOCTRINAL CONSIDERATIONS

In general, personnel service support for the motorized division was consistent with existing Army doctrine as outlined in the FM 12 and FM 63 series. However, the division's organizational and operational concepts, coupled with likely employment scenarios, require specialized planning. For example, it was conceivable that the division could be employed in areas with extended lines of communication that could slow overall support. Main supply routes were expected to be limited, constricted, and lengthy, thereby restricting replacement operations and medical evacuation. Ground transportation could not be assumed to be available continuously, so air assets had to be closely monitored.

Monitoring the status of squads, crews, and teams was essential because of the fragile composition of these organizations. Weapon system replacement operations (WSRO) capabilities had to be developed. However, both HMMWV-mounted TOW IIs and MOS 11H soldiers would not necessarily be available at the same time that package replacements were needed because of the division's unique employment.

Commanders had to plan and implement <u>reconstitution</u> to restore units to a desired level of combat effectiveness. Mission requirements and availability of resources had to be considered in determining which option, reorganization or regeneration, was selected. Reorganization, the shifting of internal resources within a degraded unit, proved to be the most expedient means to maintain combat power.

The motorized division organized battalion and brigade task forces for operations. The division had the flexibility and capability to change its task organization quickly over extended distances. As such, the strength accounting system was designed to support task force reporting. However, this was a complicated process that required sustained training to ensure efficiency during tactical situations.

The motorized division was equipped with automation that is not common to every division. The Maneuver Control System allowed commanders and staff to obtain near-real-time information from battalions and brigades. In the personnel function, the linkage provided commanders with screens that showed aggregate officer, warrant officer, and enlisted strength; commander's assessments; and emergency requisition Personnel Requirements Reports. Additionally, the division fielded the Tactical Army Combat Service Support Computer System (TACCS) for personnel management at battalion and separate company levels in 1986. This provided commanders and personnel staff officers enhanced automation and hardware for personnel accounting. The software in the TACCS computer allowed commanders automated Personnel Daily Summary, Personnel Requirement Report, and task force reporting capabilities via SIDPERS data.

INTELLIGENCE IN THE MOTORIZED DIVISION

A G-2 PERSPECTIVE

The 9th Infantry Division (Motorized) evolved from and was based on the concept for the high technology light division. Throughout its history the division was intimately associated with the Army Development and Employment Agency and was ultimately responsible for conceiving, developing, and evaluating literally thousands of equipment items.

Simultaneously, the creation of a motorized division responded to a priority defense need for a rapidly deployable force capable of defeating enemy armorby deploying the division quickly in a lodgement area and subsequently fighting over extended distances, such as desert terrain.

The marriage of high-tech developments and the Southwest Asia contingency drove the development of the division's operational concept. This was equally true in the field of military intelligence. The following five points summarize the intelligence operational concept and form the basis for this paper:

1. Intelligence and electronic warfare (IEW) supports the concept of wide dispersion, extended frontages, and night operations.

2. Intelligence and electronic warfare is tactically mobile to support the motorized concept.

3. Intelligence and electronic warfare is oriented on the destruction of the enemy.

4. Intelligence is exploited rapidly through automated C^3I.

5. Battlefield deception is the key to division operations.

IEW SUPPORT FOR MOTORIZED OPERATIONS

Supporting dispersed forces, perhaps more than any other principle, drove the design of intelligence for the division and its subordinate brigades. If indeed the division was to operate over broad expanses of desert terrain, up to 150km wide, with large gaps between the deployed brigades, then IEW support would have to be vastly different than any previously conceived. Although company teams could be formed and placed forward in accordance with doctrine, the ability to revise task-organized, dispersed IEW assets rapidly would be difficult. Likewise, support and maintenance of the teams would be a challenge. Since the brigades were also widely dispersed, it became imperative for the intelligence community to provide self-sustaining direct support units. This was realized in the form of a TOE-organized forward support military intelligence (MI) company, with an organic complement of maintenance and supply. This organization, while subordinate to the MI battalion, particularly in terms of tactical control and analysis element/signals intelligence (TCAE/SIGINT) management, was never-the-less a direct support package that habitually associated and continuously trained with each maneuver brigade. This was an extremely effective method for the brigades to operate independently in widely dispersed, extended frontages.

This division also needed to operate extensively at night. This was to take advantage of the enemy's lesser ability to see in the dark and to reduce the relative vulnerability of the division's many non-armored vehicles. To this end, military intelligence had to take advantage of technology. Thus, the UAS-11 (an improved TOW sight with laser rangefinder) and the long-range electro-optical systems (LREOS-CONTRAVES version) were developed. It is important to note that ground surveillance radars were deemed to be ineffective for our purposes because intelligence systems used by the division had to be passive, all weather, and provide a visual trace of the battlefield. PPS-5s could not meet these specifications and were therefore replaced by the passive lens systems with greater all-weather capability.

The motorized MI battalion has three forward support companies, each with the following equipment: 3 UAS-11, 1 LREO, 3 PRD-11, and 3 RACAL (off the shelf) jammers. Only the jammers were not passive.

To add to the division's ability to collect information passively, at night, over widely dispersed areas, the division formed a long-range surveillance company. These human intelligence resources, capable of multiple means of insertion deep behind enemy lines, were among the most effective information sources for the division commander. Their ability to give early warning was a particularly critical added dimension. They were truly the "eyes forward" for the G-2.

The division's general support company gave the commander additional SIGINT assets (4xTRQ-32, 3xTLQ-17, helicopter mounted RACAL Jammers-HACJAM) and a five man interrogation of prisoner of war team.

TACTICAL MOBILITY

Inherent in the operational concept are two ideas, that the division was wheeled as opposed to tracked and that all divisional systems should be downsized to fit on the HMMWV. Since rapid strategic deployability was a base-line design requirement, it stood to reason that small and compact were operative words. The division could not afford large bulky MI systems, such as Trailblazer and Teampack. Further, intelligence systems could not be in a tracked configuration. For these reasons, the division sought remedies through ADEA. In fact, several systems were placed on HMMWV platforms to give the MI battalion the required mobility to keep up with the maneuver units. As examples, the TLQ17, RACAL jammers and LREOS were all mounted and highly effective on specially constructed HMMWV beds.

DESTRUCTION OF THE ENEMY

At first a seemingly obvious statement, much more was implied than meets the eye. The fact was that the division was extremely lightly armored. It was highly vulnerable to both enemy direct fire and artillery. Moreover, it had few infantrymen not dedicated to operating its highly potent, vehicle-mounted crew served weapons. The division used "cavalry" tactics to emerge quickly from hide positions, engage the enemy, and defend against oncoming armor from long distances with TOW systems. The division did not have the ability to hold terrain with sustaining heavy losses.

The division could not be terrain oriented; therefore it developed the concept of the engagement area. To make this concept work, enemy intentions had to be identified early and the enemy force engaged with all combat power as it moved into the trap. Subsequently, the division forces would move rapidly to establish other engagement areas. Identification of the enemy by intelligence was an imperative. The entire concept was contingent upon motorized intelligence identifying early and predicting the arrival of enemy forces within the engagement area. The systems and task organization of MI assets described earlier all lent themselves to these missions and became the sole purpose of motorized military intelligence.

AUTOMATED C^3I

The fast-moving motorized environment demanded an ability to process great quantities of information in the quickest manner possible. Computerization was the proposed answer. For command and control purposes, the division developed the Maneuver Control System (MCS); MCS was a C^2 tool for commanders to watch over and maneuver the division. It was not a tool for other staff officers to deal rapidly with the mountain of data being produced in each functional area. This was true for intelligence. To answer the call, the division initially developed the All Source Analysis System Interface Module BRASSBOARD (ABB) to experiment with and evaluate the passing and correlating of massive amounts of raw intelligence data. The available MICROFIXES were linked with a host MICROVAX computer to perform these tasks under the auspices of the Joint Tactical Fusion program management office. However, the computating speed of these systems proved to be too slow and their size too unwieldy for rapid deployment and tactical mobility.

Therefore, the division, in coordination with the Army Development and Employment Agency (ADEA) and Batelle Corporation's Pacific Northwest labs, began to develop a system more suited to the division's mission, the Automated Distributed Intelligence System (ADIS). To begin with, the system had to be operated in a non-special intelligence (SI) environment as accreditation at the SI level would be a very lengthy process. As the division could handle most of its SI materials off-line, few problems were posed for operations. On the other hand, having the automated capability allowed the division to tie all major sensor interface points (TCAE, LRSU company operating base, IPW cage, RPV platoon operations) to the MICROVAX II main frame computer via the Litton digital communications terminals (DCT). The VAX II was netted to five separate Data Corporation 80286 analyst terminals using a local area net for control and hand-off functions, collection management, and target and situation analysis.

Each brigade received its own ADIS subset which interfaced with the division nodes. In turn, the division system interfaced with the corps ABB using once again, the DCTs as the communications medium. Finally, at division level, the ADIS was linked to the MCS and the TACFIRE systems, thus achieving at least a three point connectivity between the five major functional areas of the Army tactical command and control system. Only the lack of automated interface with the MI battalion (except the TCAE) failed to give the division the complete intelligence system needed. It is purely speculation, but had ADEA been given more time, more money, and been able to overcome the challenges of the special intelligence environment, the Army's first complete automated intelligence analysis system could have been in place by FY90.

BATTLEFIELD DECEPTION

To accomplish battlefield deception, the division created a 19-man operational support detachment for deception, which was OPCON to the G-3 for war. The division's mobility, coupled with its decreased survivability in the face of heavy forces, caused it to rely heavily on the use of deception to survive. The division was highly mobile, moved rapidly, worked extensively at night, and, as a result, depended on dispersion, rapid concentration, and stand-off weapons capability to avoid detection. Greater capabilities were needed. For this, deception was intimately integrated into the planning process. To improve survivability, tools such as mock-ups, sound devices, and signals deception were introduced. A key lesson was the need to use real forces as part of a deception plan.

CONCLUSIONS

The five principles of the intelligence operational concept guided reconnaissance, surveillance, target acquisition, and intelligence operations throughout the existence of the motorized force. Important lessons were learned and passed on to the Army.

The motorized division devised the concept of the forward support company, a self-supporting entity in direct support of a maneuver brigade. As yet, this concept has not been given universal acceptance within the Army. However, several other units are moving towards the concept within the constraints of their TOEs. This concept should be doctrine; manpower and equipment increases must be programmed.

In terms of new organizations, the motorized concept gave birth to the long-range surveillance unit and operational support detachment. Both organizations have been adopted in the Army. Each division will receive a long-range surveillance detachment and each corps a company sized unit. Every division will also receive a 19-man deception detachment modeled on the 9th Infantry Division unit.

In terms of equipment, the division has been instrumental in testing, fielding, and evaluating a multitude of systems beneficial to the entire Army. The concept of downsizing intelligence systems has been recognized as the wave of the future. Work is currently ongoing to package many of our systems in even smaller form. The 9th Infantry Division (Motorized) paved the way in this effort with the S-250 shelter-mounted TRQ-32 and the HMMWV-mounted TLQ-17, RACAL jammer and PRD-11. Passive, all weather optical devices, such as the UAS-11 dismounted TOW sight with laser range-finder and the LREOS, are now being fielded throughout the Army.

The employment of the Mercury Green Airborne Surveillance System Equipment Testbed by the unmanned aerial vehicle (UAV) platoon of the 109th MI battalion added invaluable knowledge to the Army. These efforts have proven time and again the value of the statement "a picture is worth a thousand words." The 109th MI Battalion has shown the intrinsic worth of UAV systems to the battlefield commander. It is a capability that, in spite of past frustrations, must be adopted by the Army.

Finally, the division's automation initiatives have been worthwhile. Experimentation with the ABB and ADIS will expand in value to the Army as the division continues work with the Army Tactical Command and Control System Experimentation Site to complete integration of multiple intelligence systems. The ADIS, named as the surrogate system for the All Source Analysis System (ASAS), will continue to furnish lessons for inclusion in the objective systems. Experiments already conducted, in both interfacing and integration with brigade and corps echelons and with other functional nodes, will reap benefits for the final fielding of an ASAS. In addition, experiments conducted by the division in the field of artificial intelligence with the Mitre Corporation using the Symbolics System have demonstrated the inherent capacity of the ADIS to handle knowledge-based programming. The division continues to build for the Army of the future.

The high technology test bed has inactivated and the motorized concept is evolving with a heavy force complement, but the division is still pointed towards the future. It remains dedicated to providing the best to our soldiers as a fully capable combat ready division.

THE MOTORIZED EXPERIENCE

A G3'S PERSPECTIVE

Critical aspects of the motorized experience of the 9th Infantry Division came under the purview of the G3. The G3 was integral to the development of the force--what the force would be and how it would be equipped. The G3 shared force structure responsibilities with a locally-created staff section designated G6, which focused on force integration for the division. Along with the design of the motorized division, the doctrinal concepts had to be formulated and tested. Finally, the G3 directed the development and execution of training programs to allow the division to attain combat readiness. As the 9th Infantry Division transitioned to the Army's only motorized division, it faced and overcame the challenges in all these areas.

CREATING A MOTORIZED FORCE

In the years of the motorized experiment, the force structure never reached maturity. The various reasons for this included lack of time, lack of specific items of equipment and changes in Army priorities. When the decision was made to make 9th Infantry Division a motorized force, the division was light, with one brigade serving as a test bed for developing new technology for light forces. No other motorized force existed, so the division had to be built from the ground up. Equipment for the division had to be chosen; in many cases, no equipment existed that was suitable for a motorized force, so many items had to be developed solely for the division.

All possible sources were tapped for equipment that could be adapted for the motorized force. The Navy had the Mark 19 Grenade Machine Gun; developers of the motorized force saw that as a tremendous weapon against dismounted infantry. It became one of the two key weapons in the division. Unfortunately, only a handful of the required 1,005 Mark 19s have ever reached the division, and those were not production models.

For fighting enemy tanks, the division was designed around an armored gun system capable of fighting and defeating tanks. The armored gun concept was a low-silhouette chassis, possibly with an externally mounted gun. Two or three soldiers would ride in the hull; the main gun was to be loaded automatically. Although several prototypes were manufactured, the armored gun system never got off the ground, primarily because of budgetary constraints. For the interim, the division was given TOW missile launchers to be mounted on High Mobility Multipurpose Wheeled Vehicles (HMMWV). Differences between the TOW system and the armored gun design caused planners to provide almost twice as many TOW launchers (20) in lieu of assault gun systems (12) for the armored gun company in the combined arms battalion. Thus, the personnel structure remained skewed from the objective design.

Another decision compromised the effectiveness of the motorized division; the decision to support the maneuver forces with towed artillery. Towed artillery, with its five-ton trucks, could never keep up with the HMMWVs. Much thought and effort went into artillery employment, but no truly acceptable solution presented itself. The best idea kept a significant number of artillery pieces traveling at all times with the maneuver forces. This reduced the number of pieces available to fire at any given time, but placed at least some artillery far enough forward to range beyond the forward line of troops.

Another force structure design issue unique to the 9th Infantry Division was the Cavalry Brigade (Air Attack), formed as a fourth brigade-level maneuver headquarters. The additional headquarters represents added flexibility for the division commander, especially if he added maneuver units to the CBAA.

By 1987, Army priorities changed, and the decision was made to cancel the armored gun system. That decision effectively ended the further development of the motorized design.

DEVELOPING MOTORIZED DOCTRINE

Concurrently with the creation and fielding of "motorized" equipment, the 9th Infantry Division was deeply involved in writing doctrine for the employment of such a force. Doctrine was based on the charter given by the Chief of Staff, Army when he initiated the program: develop a middle-weight force that can be 100 percent deployed by air, fight and win against armored forces, and maintain high mobility in desert-type warfare.

Without the armored gun system, the motorized unit had to survive through rapid and frequent moves. This ruled out static defense, and led to heavy emphasis on engagement areas as the primary means of destroying enemy forces. Forces and obstacles were arrayed in a way to cause a significant number of enemy troops and vehicles to enter a selected area. All direct and indirect fires were then brought to bear on the forces trapped in the engagement area. Thus, motorized doctrine emphasized defense in depth, despite much verbiage about deep strikes. Even offensive operations by motorized forces depended upon a weak and disorganized enemy, or one moving that could be drawn into engagement areas. The major difference between motorized offensive and defensive tactics became the direction the major forces moved after an engagement.

One mission, often described as the primary one for motorized forces, required the establishment and expansion of a lodgement.

The scenario anticipated employment in CENTCOM's area of responsibility. The concept of the operation had Marines or other forces seize and hold a beachhead/bridgehead for the employment of the motorized division. The 9th Infantry Division then planned to have time available to move forward against only light resistance, gain defensible terrain, and prepare for the enemy. The plan counted on the motorized division getting into the lodgement early enough and with enough firepower to hold until heavier forces could arrive in the operational area.

TRAINING THE MOTORIZED FORCE

New structure and new doctrine demanded some creativity in training motorized units. The major training development resulting from motorization has been the creation of a gunnery program. Gunnery for all crew-served anti-tank weapons became the centerpiece of 9th Infantry Division training. As in tank gunnery, master gunners were trained, certified, and assigned to units. Also as in tank gunnery, firing tables were developed that could evaluate capabilities from the individual crewman to company teams. Ranges have been built to accommodate the gunnery program. A thorough program of instruction was developed and made available to the entire division.

Perhaps more than any other combat division in the U.S. Army, training emphasis concentrated on combined arms and all forms of combat support. With the vulnerabilities of the HMMWV clear, total integration of all means of engagement is required for the very survival, not to mention success, of motorized forces.

CONCLUSION

Much effort and thought were given to creating a motorized division and to making it work. Although the 9th Infantry Division has already begun conversion to a heavy division, many of the concepts and training innovations are being incorporated into training and doctrine throughout the Army. For example, the Infantry School adopted virtually all of the TOW gunnery program. The division also led the Army in automating command and control communications, giving the commander more complete and timely information to make decisions.

Given the relatively small size of the active Army, "motorizing" an entire division was probably too ambitious. The interim motorized division's capabilities are too specialized to be adapted to the various contingencies for which it was designated in the war plans. If the Army ever is called upon to fight in Southwest Asia, significant preparation has been made to allow the rapid organization and employment of motorized forces.

LOGISTICALLY SUPPORTING A SYNERGISTIC MAELSTROM
THE 9TH INFANTRY DIVISION (MOTORIZED)

INTRODUCTION

I spent many a dust-caked moment in the deserts of Washington, California and Texas gathering background information for this paper. At the time, I never realized the opportunity would arise to publish my observations and experiences. From April 1983 to June 1986 I served as a forward support battalion commander and Division Support Command executive officer. I subsequently was reassigned to the 9th Infantry Division (Motorized) as the division G4 after spending a year at the US Army War College at Carlisle, Pennsylvania. During my current tenure I have had an opportunity to participate in the untimely demise of this warfighting combat multiplier.

The story of the 9th Infantry Division (Motorized) logistical support concept has yet to be told. Critics do not fully understand its capabilities. The motorized division presents the best of both worlds--combining the austere structure of the light division with the mobility and firepower of the heavy division. The motorized organization is best suited for executing AirLand Battle doctrine. I will present a brief historical background of the logistics organization structure, unique commodity support concepts, command and control enhancements and my recommendations and conclusions on refining logistics operations--Army-wide.

There are many questions to be answered in regard to the motorized infantry division--US type. Is it a viable concept? Can it be fielded? Is it supportable/sustainable? The answer to these questions is unequivocally, yes! Where did it all begin?

HISTORICAL BACKGROUND

In 1981 General Meyer, then Chief of Staff of the Army, created the High Technology Test Bed and initiated testing of a high technology light division. His successor, General Wickham, pursued the original vision of fielding a division with the deployability and sustainability of a light infantry division--and with the firepower and survivability of a heavy division. In just four years, the 9th Infantry Division developed into that force. This is a relatively short period of time, considering the normal life-cycle of designing, organizing, approving and fielding a divisional unit. Many shortcuts were taken in research, development and acquisition. Surrogates were tested, such as the fast attack vehicle (dune buggies), based solely upon brilliant initiatives from battalion commanders. Nowhere else in the Army could ideas be conceived, developed, tested and, if merited, adopted rapidly into the organizational structure.

But what a logistics nightmare! How do you support such a fast moving deep strike unit? I will address this issue in a macro overview of the "how to" of logistical support for a synergistic maneuver division, such as the 9th Infantry Division (Motorized). The motorized division evolved specifically from the strategic concepts of Airland Battle Doctrine and draft futures concepts such as Army 21. It represents the Army of the planned future. How did it evolve?

The 9th Infantry Division (Motorized) was organized as a rapidly deployable, highly mobile, lethal force capable of executing its wartime mission in any part of the globe (Figure 1). Understandably, some areas of the world are far more desirable for deployment of this mobile force than others. Additionally, a manpower ceiling of 13,600 soldiers was placed on the division. It was to be deployed as part of a US corps or provided extensive host nation support until corps support arrives. Units operating out of sector were to be accompanied by a supporting slice. This support concept can be easily executed within the division and will be explained later in the text. The division-approved design structure (Figure 2) is composed of three combat brigades--with a maneuver mix of five heavy combined arms battalions, two light combined arms battalions and two light attack battalions; one combat cavalry brigade (air attack), including a ground cavalry element; a division artillery brigade including a light artillery and rocket battalion; a division support command; and various division troop units.

CONCEPT

This division is unique in that it has as much firepower in one brigade as some other divisions in their entirety, which was a real support nightmare. The goal--to insure the greatest amount of firepower operational at all times--requires that maintenance be performed as far forward as possible. The technique of performing rapid battle damage assessments and mission essential maintenance is critical to the success of the division. Why waste time rebuilding parts? Many items of equipment can be replaced through crossleveling or cannibalization. The Division Support Command (DISCOM) requires a supply point distribution system basically the same as any other DISCOM. The distribution points are located in the brigade support area (BSA). Each has a very limited capability--within the austere DISCOM organization--to push unit supplies forward or meet at designated rendezvous points. The cache system of distribution is also a viable option for providing supplies forward to support a deep strike mission. The division relies heavily on corps elements to provide essential backup support.

To pare the division down to its objective manpower constraints, all fat was carved away and some of the service support muscle was sliced away without a corresponding reduction in maneuver or firepower resources. Except for artillery ammunition and potable water, the division is capable of operating independently for up to 72 hours without backup corps or host nation support. Maneuver units have an added advantage because they do not have to go outside the BSA to get direct support. The maneuver units' field trains are usually collocated with the supporting DISCOM units in the BSA. These trains push supplies to the combat trains located well forward in the battle area. The combat trains then deliver supplies to the logistics release points behind the first terrain feature from the forward line of troops. The synergistic movement and attack capabilities of this division require an austere but efficient logistical unit. Thus, logistical supporting units must be highly mobile, flexible and capable of rapid task organization. Such support capability places the greatest force forward at the right time and place to fight and win.

LOGISTICS ORGANIZATIONAL STRUCTURE

How is the motorized division support command organized to accomplish this intricate support mission? The DISCOM headquarters is organized in much the same manner as other divisions with some important exceptions. First, an organic rear area combat operations cell contributes to command and control. Second, the headquarters is combined with the materiel management center to form one company, greatly reducing the administrative overhead required in manning two company headquarters. Third, forward support battalions habitually support the maneuver brigades. Fourth, an aviation support battalion aligns with the Cavalry Brigade (Air Attack). Finally, a main support battalion supports the division rear area and, as required, lends backup support to the forward support battalions.

The DISCOM command section is organized in much the same way as in other divisions. The division depends greatly on a small, fully-manned rear area combat operations cell to plan rear battles and to assist with the handoff of the planning to a rear area operations center once it is activated and deployed from the reserve forces. Combining the DMMC and DISCOM headquarters company into one company conforms with the Army of Excellence (AOE) guidance on reducing administrative headquarters positions. The division should be considered a model organization, since it was tested for supportability and validated two years prior to the other combat divisions. The support battalions of the division have been organized and functioning for more than six years.

The division material management center (DMMC) is a complex organization--so much so that a diagram of its organizational structure has been included (Figure 3). The materiel management center monitors all classes of supply except personal demand, aviation, medical items and classified maps. Management responsibilities are primarily concerned with exception items--since each support battalion has a support operations section or a mini-brigade materiel management center, both of which interface with the brigade and DMMC. The property book sections are routinely deployed with the brigade in both garrison and combat. This organizational structure fully supports the train-as-you-fight concept advocated in today's Army.

There are three forward support battalions (FSB), aligned with each maneuver brigade and its supporting slice. The FSBs each have a headquarters and supply company, intermediate-level direct support maintenance company and a medical company. Their support functions will not be fully presented, but I will highlight them, noting where peculiarities exist in the methods of providing support.

Many critics question the merit of the forward support battalion. Anyone who has been supported under this concept or who has had the privilege to command this type unit will agree without reservation that it is far superior to the forward area support team. No other unit, past or present, has been more capable than the support battalion of keeping pace with and distributing service support assets to maneuver units at the critical time and place. A report made to the US Army Logistics Center after evaluation of the forward support battalion versus the FAST concept in September 1983 fully substantiates the capability of the support battalion. Simply stated it says:

> The FSB concept constitutes a significant improvement. The advantages of the FSB so outweighed the FAST approach that a grave error would be made by abolishing the FSB concept and returning to the 'former way of doing business'.... Further, there is every indication that CSS under the FSB results in higher supported unit operational readiness rates and a faster recognition and response to support requirements. This stems mainly from the dedicated nature of the FSB and its greatly improved command and control compared to that of a FASCO orchestrating the efforts of CSS units detached from DISCOM functional battalions. The FSB provides the Brigade Commander with a 'full time' logistician and staff for CSS advice and support. This actually increases Brigade Command Group awareness of logistical issues, constraints and capabilities.

Despite this finding, many professionals still oppose the FSB. At such time that they gain firsthand experience with the concept, they, too, will become converts to the FSB.

The aviation support battalion is a one-of-a-kind unit in the Army and has withstood numerous attempts at eliminating it from the force structure. It provides intermediate-level aviation maintenance, direct support ground maintenance and supply support functions to the Cavalry Brigade (Air Attack) and its supporting slice units. The aviation support battalion has a headquarters and headquarters company, ground maintenance and supply company, and an aircraft maintenance company.

The main support battalion (MSB) is the granddaddy of all support battalions. It provides the backup logistical support (less aviation maintenance) for the forward and aviation support battalions. Additionally, the MSB provides dedicated support to the units deployed in the division rear area (DRA). It consists of a headquarters and light maintenance company, heavy maintenance company, supply and transportation company, missile support company and medical support company. Combining headquarters and company maintenance functions resulted in reduced administrative overhead with no decline in support. Two consolidated maintenance sections provide organizational maintenance support to the battalion.

AREA OF OPERATIONS

What is the area of operations that the DISCOM supports? It is quite large. The lines of communications are long--requiring intensive management to insure that combat service support is provided at the critical time and place on the battlefield. The division operates on a front of approximately 150 kilometers (km) with a depth of 200 km for a Southwest Asia scenario (Figure 4). Each brigade has up to a 50 km front, but these distances vary. CBAA routinely is a fourth maneuver brigade, located in an assembly area in the division rear area. Engagement areas and battle positions are determined more by terrain than by frontage distances. Routinely, small pockets of resistance are bypassed enroute to attacking the soft underbelly of the enemy forces. That action leaves the DISCOM's corresponding soft target support units vulnerable to enemy attacks or sabotage. The austere structuring of the DISCOM forward units enhance its ability to move rapidly, hide and provide continuous support. Logistic units move over multiple routes in echelon to insure reliable support is provided throughout the operation.

The forward support battalion exercises command and control over the brigade support area (BSA). It fights the rear battle in the BSA and usually has a string on a maneuver unit and a military police platoon to assist in the operation. The support battalion's early warning and weapons systems have been upgraded to provide for a more adequate defensive posture. Because of this organization, some different logistical support concepts were developed.

Class I--subsistence. Tray rations and meals ready to eat (MRE) are stocked at echelons above the division. These rations are forwarded to the brigade support area in 30 man preconfigured packages, including paperware, utensils and condiments. Units are not required to submit rations requests; they are subject only to combat accountability. The computations for the number of rations required by each unit is based upon the automated personnel system daily strength reports. Ration requests are then adjusted by exception from the consuming unit. The division maintains five days of supply: three at each unit; one at each of the forward and aviation support battalions; and one at the main support battalion. Rations are received and issued daily.

Class II--general supplies. These are issued on a "push/pull" system. Items essential for housekeeping and administrative requirements are broken out in unit sets and pushed forward to distribution points located in each brigade support area. Other items, such as NBC defense clothing and common military clothing are configured in 25/50/100 man sets and requisitioned as required. Common hand tools are requested as needed by the using unit.

Class IV--barrier material. This is maintained by each unit as part of a basic load; all other construction and barrier material is pushed forward by echelons above division to the project work site to minimize handling.

Major end items of equipment or weapons systems are issued through weapons systems replacement operations. This is a relatively unpracticed and unknown system. The concept calls for the pieces of equipment to be pushed forward to the division support area where it will be placed into service and armed, if required, by the DISCOM. Qualified crews are married up from the manpower replacement pool. Entire combat ready systems are sent forward to the combat units. This system will be enhanced by the palletized loading system.

Class III--bulk petroleum. This is pushed forward on a trailer exchange basis. An empty fuel pod or refueler constitutes a requisition, thereby eliminating unnecessary administrative burdens in combat. A combination of 5,000 gallon tankers, forward area refueling equipment with 5,000 gallon inflatable containers, fuel service supply points, and flexible containers with gravity or pressure feed are used to distribute fuel forward of the brigade rear boundary. This system insures a continuous forward flow of bulk petroleum. Property managers' concern for accountability inhibits this procedure in peacetime training, but this would not be a problem in actual combat. Additionally, fifteen days of packaged oil and lubricants are carried by each unit with an additional fifteen days stocked by the main support battalion and aviation support battalion.

Class V--ammunition. This is probably the biggest concern of all. Maneuver units play the key role by preparing and entering input data to a stand-alone computer, which generates ammunition predictions for companies, teams and separate platoons. These predictions are sent through the division ammunition office. Requests are reviewed and modified based on command guidance, such as a controlled supply rate. Ammunition is automatically prepared to be pushed forward; exception requests are forwarded to the supporting corps. The corps breaks out ammunition into pure company/battery level packages and pushes it forward to the supporting ammunition transfer point (ATP). The ATP is operated by a support battalion and includes an on-site DAO representative. Ammunition is shipped forward from corps storage areas on corps transportation and transferred to trucks from using units for direct delivery to the using units. External supportability tests have indicated each ATP can handle 450-700 short tons per day. The palletized loading system (PLS) or demountable rack offload and pickup system (DROPS), currently under evaluation, will greatly increase the amount of ammunition that can be handled through each servicing ATP. Recovery and evacuation capabilities will be greatly enhanced through these technological and doctrinal improvements.

Medical. Repair and maintenance is not only applicable to equipment but also to our soldiers. The antiquated medical support system has probably undergone the greatest facelift. The newly developed mobile modular medical support system has been integrated into the division. These highly mobile teams enhance task organizing, weighting the main battle area with essential medical support, and rapidly reconstituting forward medical teams that have been totally or partially destroyed. These modular plugs are identical from the front line combat units to the corps support area. Non-divisional air and ground ambulances can reduce the strain on limited medical assets by evacuating front line casualties promptly. Medical supplies are pushed forward in preconfigured packages. Two types of packages, consisting of a disease nonbattle or return-to-duty set and a trauma treatment set, are pushed forward daily for the maneuver treatment squads and every third day for the support battalion medical company. These packages are handled through the ration distribution point--one stop service. Controlled drugs/narcotics are distributed on an as-required basis through medical channels as they always have been. This system provides a qualitative leap in medical treatment on the battlefield.

Direct support maintenance system. Intermediate level maintenance is provided well forward through the use of dedicated maintenance support teams. Each maneuver and artillery battalion will be supported by one of these teams. Missile maintenance support for land combat systems has been enhanced through the allocation of the improved combat support set in each FSB. All other missile support is provided by the missile company of the main support battalion. Limited recovery capabilities are available at the direct support level in the division; this requires the establishment of unserviceable equipment rally points at the using unit level and maintenance collection points at the intermediate level. Unserviceable equipment is consolidated at these locations for further evacuation to the rear. Base decision guidelines for evacuation are: equipment repairable in one to four hours, remain in battle position and repaired onsite; equipment repairable in four to six hours, retain at forward maintenance support team levels; and equipment not repairable in six hours, evacuate to support battalion or maintenance collection point. The item must be repairable in 24-36 hours at the FSB; if not, it will be further evacuated to the main support battalion in the division rear area.

Class IX--repair parts. Parts are stocked in the forward areas based on two criteria: mission essentiality and mobility. The forward support unit must be capable of uploading and hauling all of its supporting repair parts in one lift. Notwithstanding, a mandatory stockage list for thirty days has been developed for each support battalion. The overriding limitation is mobility. This supply system is fully automated, so only exception items are managed off-line. The main and aviation support battalions will haul their mandatory stockage list items in two lifts--based on fifty percent mobility and a backup thirty day supply of common, missile and aviation repair parts. The forward stocks are replenished from the main support battalion or on an item-unique basis by direct throughput from echelons above the division.

COMMAND AND CONTROL ENHANCEMENTS

Perhaps the most important part of any support system has yet to be discussed--command and control. The division developed a unique combat multiplier in the division distributive command and control and maneuver control systems. From a logistics perspective, many interfaces enhance combat command decisions and insure concentration of combat service support at the critical time and place to influence the battle best. The division has a series of automated computer interfaces that provide near-real-time logistics status to the integrated command posts. This enables the commander at the proper level to have the critical data for ensuring successful accomplishment of the tactical mission. The data is pictorially displayed in the command center to provide a rapid read-out of capabilities and requirements. Combat battalions can provide the non-mission capable report in digital bursts to their dedicated support battalion. Likewise, a division roll-up is available at the highest level to show--as one example of the capabilities--the status of fuel to accomplish mission requirements (Figure 5). Additionally, a review of the main supply routes can be called up to determine the best routes for supplying forward units.

This reporting system is sophisticated to the point that if the commanding general desired, he could cause maneuver graphics and critical logistics data to be displayed before him on his console, in a series of screens, to provide him the decision-making input to win the battle. This also provides the command post with rapid information for relocating resources, task organizing, and applying command guidance. This is a broad brush of the command and control and logistics support systems for the 9th Infantry Division (Motorized). Now I will take a look at some of the system fixes still needed to refine this warfighting machine.

OBSERVATIONS AND RECOMMENDATIONS

My recommendations should stimulate thought about this division and the Army force structure in general. These fixes could vastly improve the division's warfighting capabilities while increasing combat strengths in the foxhole, Army-wide. Let me list some problems and fixes as I see them.

Recovery--We must enhance recovery assets on the battlefield through the use of flat racks off-loaded and recovered by a palletized loading system. The demountable rack off-load and pickup system must be rapidly integrated into the inventory as a combat multiplier. A howitzer and its basic load of ammunition can be dropped off at the gun site of an artillery unit; at the same time a previously dropped flat rack that has been uploaded with a nonoperational piece of equipment can be evacuated to the rear. This is a superb system.

Medical--The brigade surgeon should be on the support battalion staff to provide the best overall support to the brigade. The support operation section of the support battalion has a validated need for a medical operator. The medical operations section of the DISCOM headquarters should be approximately seven strong and rolled up under the auspices of the DISCOM operations officer. This would greatly reduce the duplication of administrative requirements currently existing with a separate surgeon section. The division's surgeon section is a small functional unit that has been fully validated. The Army of Excellence organization, by comparison, has a surgeon's section as large as the commodity-oriented medical battalion staff.

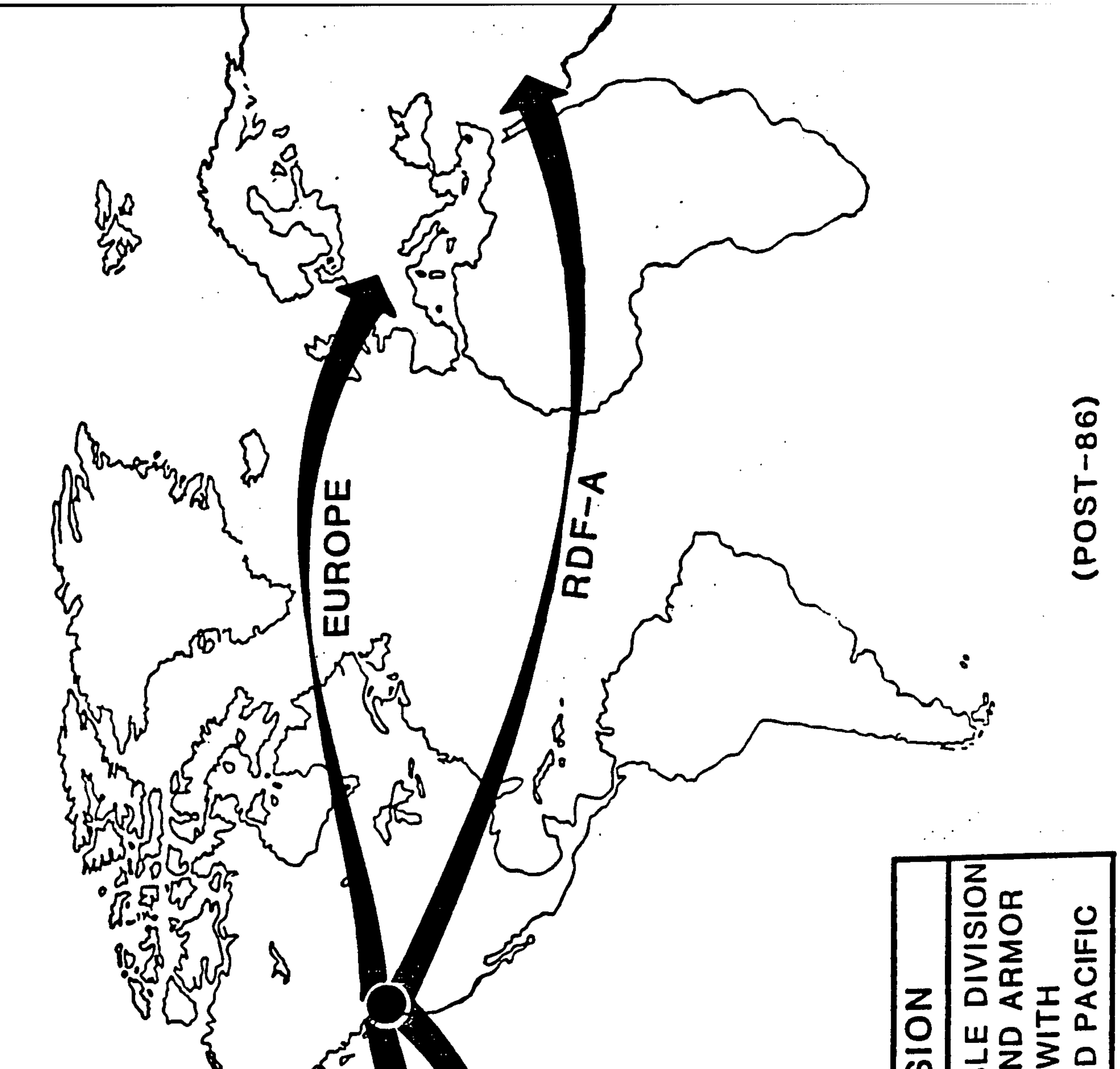
Brigade S4 sections--The brigade commander has a logistics battalion commander with a complete staff to coordinate the sustainment functions. The supply functions of the brigade logistics section can be rolled up under the support operations section of the brigade's dedicated support battalion. The property book/management asset team can then be moved forward with the support battalion. This would eliminate administrative overhead and provide more responsive support.

Division G4 Section/MMC--Doctrine regarding logistics planning in US Army divisions is seriously out-of-date, remaining virtually unchanged for the past four decades. The doctrine concerning staff responsibilities holds that the G4 is charged with establishing policy and accomplishing the planning necessary to insure that combat service support is provided in a timely, adequate manner. However, the G4 section in today's division lacks the necessary personnel to accomplish the doctrinal tasks assigned.

Given today's organizational structure and communications systems, it would be both more efficient and resource effective if the G4 were dual-hatted as the DMMC chief. This would allow for a reduction in the materiel management center white elephant. This should be a management by exception organization, with the thrust of routine management at the support battalion support operations center. Through the creation of exception-only management at the DMMC, the support operations sections of the FSB could be beefed up to handle any additional requirement--while the bulk of the spaces saved could enhance the warfighting capability. This is in line with the AOE initiatives to reduce headquarters elements.

CONCLUSION

In summary, the 9th Infantry Division (Motorized) is the epitome of a division capable of executing AirLand Battle doctrine. It is fast moving and highly mobile, with the firepower to defeat threat heavy divisions. The austere-but-efficient logistics system enables the division to execute its deep strike mission. The swirling maelstrom of this synergistic division enables it--through high technology advances--to be many places in the main battle area creating confusion and mayhem among the enemy. The division is ready. Its readiness has been demonstrated. The division soldiers are vigilantly poised and ready now to support the Total Army in any contingency.



MISSION
EUROPE
RDF–A
NE ASIA
PACIFIC
(POST–86)
DESIGN MISSION
13.6K(–)AIR DEPLOYABLE DIVISION
OPTIMIZED FOR MTZ AND ARMOR
THREAT IN SWA, BUT WITH
UTILITY IN EUROPE AND PACIFIC

FIGURE 1

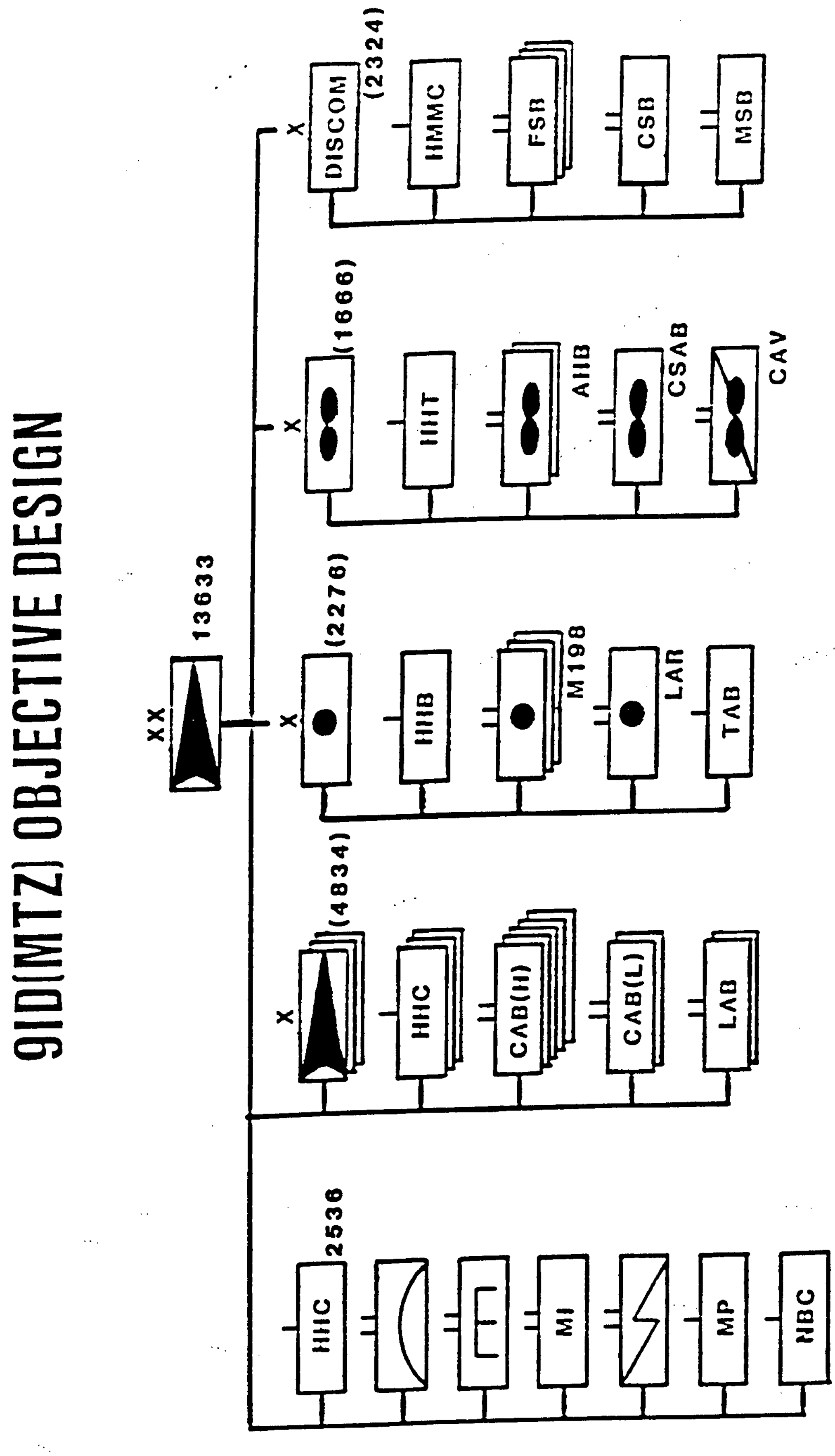

9ID(MTZ) OBJECTIVE DESIGN
XX
13633
X
(4834)
HHC
CAB(H)
CAB(L)
LAB
X
(2276)
HHB
M198
LAR
TAB
X
(1666)
HHT
AHB
CSAB
CAV
X
DISCOM
(2324)
HMMC
FSB
CSB
MSB
2536
HHC
MI
MP
NBC

FIGURE 2

DIVISION MATERIAL MANAGEMENT CENTER

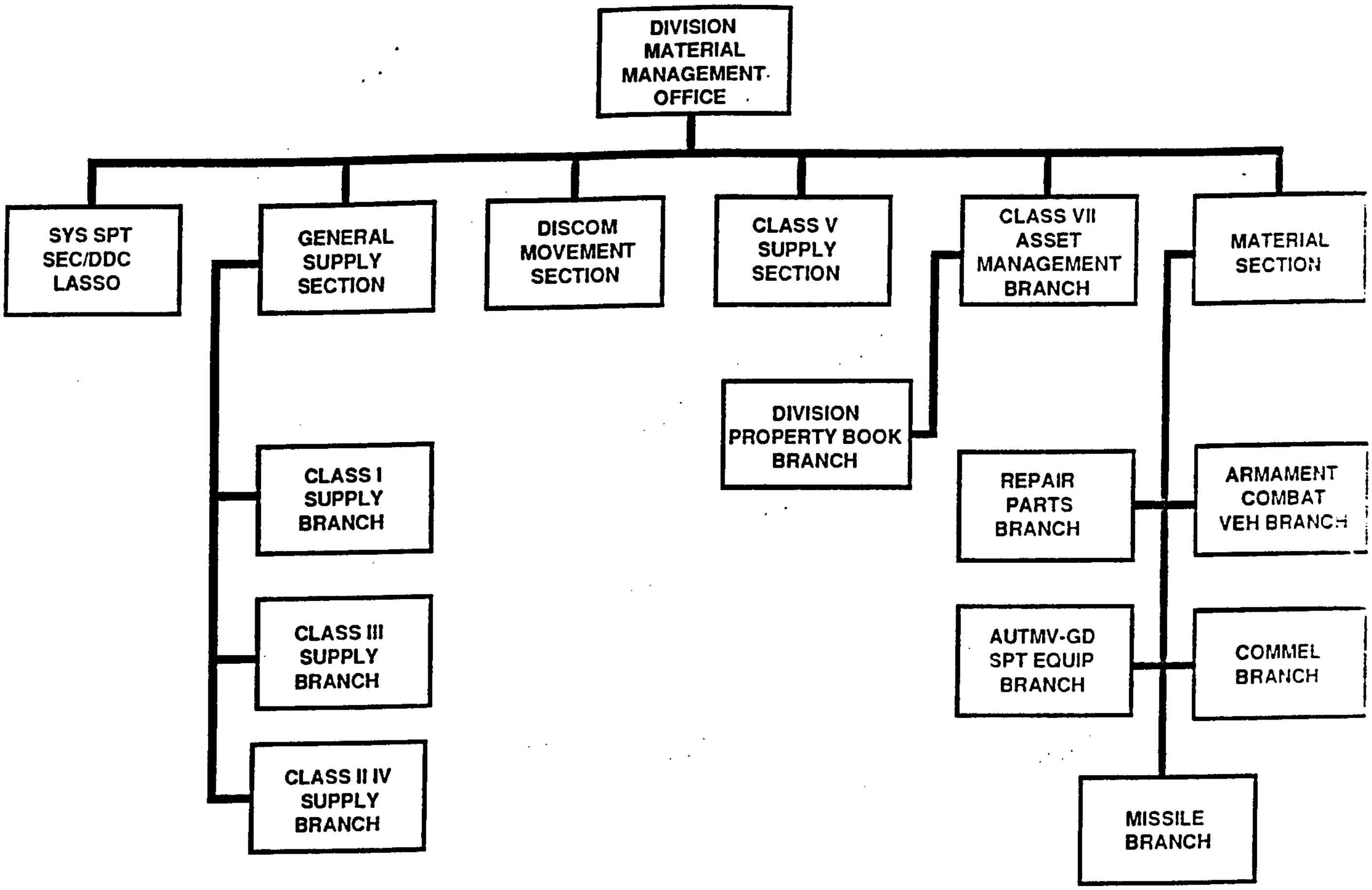


FIGURE 3

AREA OF OPERATIONS

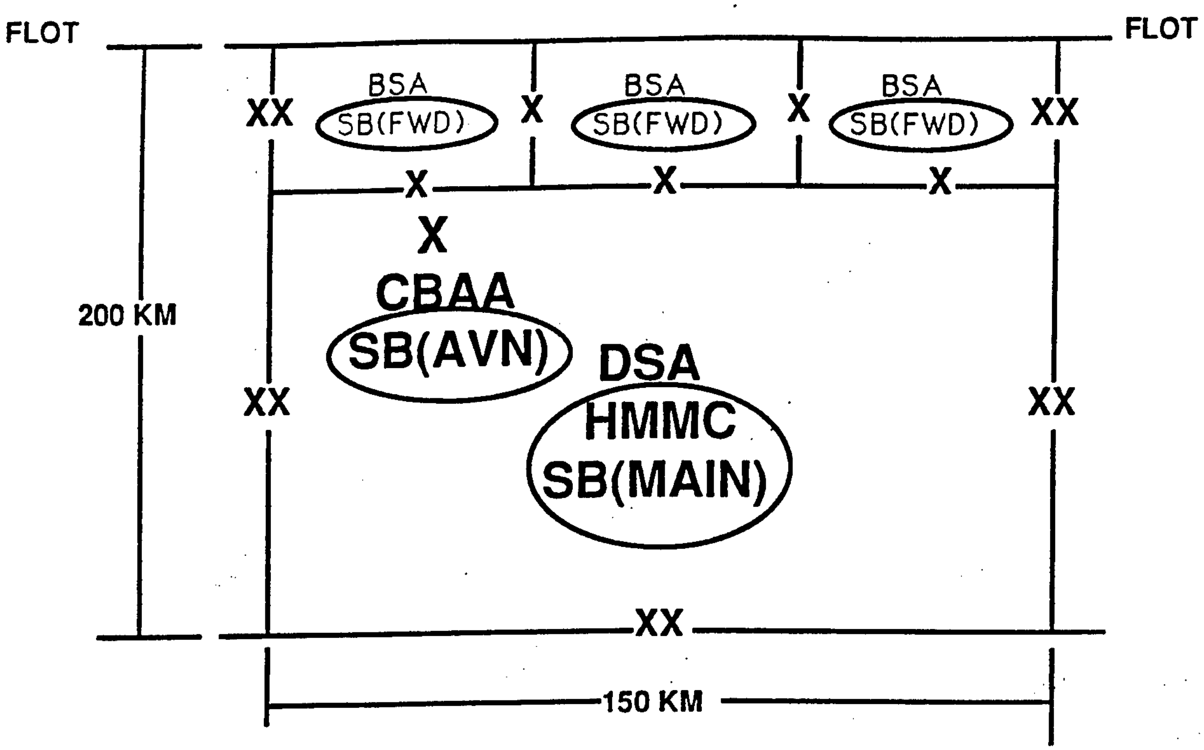


FIGURE 4

SIMULATED MANEUVER CONTROL SYSTEM
LOGISTICS SCREEN

CLASS III — MOGAS / DIESEL / AVN

UNIT	20 40 60 80 100		MR	% RESERVES	REMARKS
1ST BDE 080030	GREEN GREEN	MOGAS DIESEL	50 KM 50 KM	75 KM 75 KM	
2ND BDE 080600	AMBER RED	MOGAS DIESEL	40 KM 20 KM	75 KM 50 KM	RESUPPLY ETA 081200
3RD BDE 081010	AMBER RED	MOGAS DIESEL	45 KM 35 KM	75 KM 55 KM	RESUPPLY ETA 081030
DIV ARTY 080030	GREEN GREEN	MOGAS DIESEL	50 KM 50 KM	75 KM 75 KM	
CBAA 080030	 GREEN GREEN	MOGAS DIESEL JP4	50 KM 50 KM 75 KM	75 KM 75 KM 100 KM	ADDITIONAL FUEL NEED IN SPT OF 3D BDE ATK
DISCOM 080030	GREEN GREEN	MOGAS DIESEL	50 KM 50 KM	75 KM 75 KM	
DIV TRPS 080030	GREEN GREEN	MOGAS DIESEL	55 KM 50 KM	60 KM 75 KM	
DIV RES 081200	GREEN GREEN GREEN	MOGAS DIESEL JP4	50 KM 60 KM 75 KM	75 KM 90 KM 95 KM	

REQUIREMENTS (100%) ALL VEHICLES TOPPED OFF WITH 5,000 GALLON TANKERS ON HAND

GREEN AMBER RED MR - MISSION REQUIREMENTS

FIGURE 5

FORCE INTEGRATION IN THE MOTORIZED DIVISION

The concept for a motorized division evolved out of the High Technology Light Division studies. Because of this lineage, force integration and modernization have always been part of the division staff. The key to the success of the motorized concept was to use high technology-equipped small units that executed a doctrine emphasizing deep operations and flank and rear attacks. Much of the turmoil and many of the unresolved problems in the division structure were caused by an inability to match on-the-ground capabilities with the operational concept.

FORCE STRUCTURE

The motorized mission was to conduct combat operations in contingency theaters. The division was to deploy rapidly to a contingency area of operations with a mission of establishing and expanding a lodgement for heavy forces or to reinforce NATO.

This mission evolved because of a recognized need for a rapidly deployable division. While armored and mechanized divisions are organized to defeat tank and mechanized infantry, they are not rapidly deployable. Light, airborne and air assault divisions could deploy quickly, but did not have the anti-armor capability needed in the Southwest Asian and European scenarios. To have a unit that could be rapidly deployed and possessed an anti-armor capability, the Army designed the motorized division. The division structure was built around deployability, personnel strength, firepower and tactical mobility parameters.

Deployability. The Chief of Staff, Army (CSA) guidance was that the division should be deployable in C-141B aircraft with a design goal of 1000 sorties. Tactical deployability by C-130 aircraft was to be assured by eliminating out-sized equipment from the division. The transportation infra-structure in many countries would be poor, and deployed forces would have to travel long distances from the debarkation points in theater to their final tactical positions. All equipment within the motorized division was designed or selected to be lifted by helicopter. Equipment was capable of traveling long distances under its own power.

Personnel Strength. The final personnel strength was the product of a series of incremental reductions from an original strength of 16,000. To meet Army end strength requirements, the division strength objective was set at 14,500 with design goal of 13,000. The motorized design approached the CSA goal and freed 2700 spaces for other critical Army requirements. Reduction of personnel spaces was one of the major constraints in structuring the division.

Firepower. No quantified firepower goal was established for the motorized division. However, it was clearly the CSA's intent to provided a strong anti-armor capability in a deployable division. Much of this capability came from the application of new technology. Technology allowed the division to work within the deployability and personnel strength limitations. Although the motorized division had less firepower than heavy divisions, it had far more firepower than any light division.

While the division had to limit the total number of weapons systems, it increased its capability by using systems with greater potency. The use of MLRS instead of 8" howitzers, Stingers instead of Redeye and additional Vulcans gave definite increases in combat power. The use of the improved TOW, armored gun system and an experimental ground launched HELLFIRE system in the design gave the division a tremendous anti-armor capability. In terms of effective and responsive combat systems, the division was ideally suited for maneuver warfare, the tenets of AirLand Battle doctrine and the requirements for fighting on varied terrain.

Tactical Mobility. Southwest Asia was the division's primary area of deployment. This required the ability to operate on a 150km by 200km area. A primary design consideration was optimization with mobility characteristics that permitted maneuver warfare in expansive areas such as desert and arid mountains. Threat force projection in anticipated theaters suggested the use of the division's rapid tactical mobility for reserve, area defense and counterattack missions.

Tactical mobility was a key for the division design. While tactical vehicles of heavy divisions have mobility comparable to motorized in cross-country movement, tracked vehicles cannot compete with motorized vehicles in the other dimensions of tactical mobility, such as helicopters and fixed wing. Thus, the motorized commander had numerous options for rapid repositioning of forces.

FORCE MODERNIZATION

While the design of the division fulfilled many of the Army's warfighting requirements, much of its ability was based on new systems and technology that were not standard systems or were in the initial design phase. This caused tremendous problems as the division was faced with equipping units with surrogates, in-lieu-of-items, and equipment still being tested, while maintaining a warfighting capability.

Although the establishment of Army Development and Employment Agency aided in the fielding of equipment to the division, the Army procurement system was unable to support these rapid changes in procedures. Because of this, many critical systems, such as the armored gun system, were never fielded. However, other systems, such as ground launched HELLFIRE, were initially successful because the division was able to demonstrate the system's battlefield capabilities and provide feedback to weapon designers on the tactical employment of the weapon. A discussion of these systems will show how the force modernization system operated.

Armored Gun System (AGS). The concept for the AGS was to provide motorized forces with a strategically deployable, tactically air transportable, mobile, rapid fire, kinetic energy tank killer. It would give the motorized divisions and other light forces (e.g. airborne) an anti tank system capable of defeating enemy armor. The lethal rapid fire capability of the AGS would complement the chemical energy tank killers (TOW and Dragon) of the division. Although this had been an Army desire for many years, it had never gone past the development of a requirements document.

The original AGS program called for a unique system with only 400 total vehicles. Development of this small number of systems would prove costly on a unit price basis and became economically infeasible. One proposal considered was to tie the AGS to other requirements for weapon systems to develop a larger production base. This slowed the development process because the AGS had to meet multiple missions and additional requirements.

A surrogate for the AGS was sought using either the M1 main battle tank or the M551 armored reconnaissance/airborne assault vehicle. The M1 was too large and could not meet any of the deployability or intra-theater mobility requirements of the division. The M551, designed to support airborne forces and still in use in the Army, did not meet the requirements for a rapid fire kinetic energy anti tank system. In a meeting held at Ft. Knox in January 1985, the M551 proved to be logistically unsupportable. Despite efforts to field a surrogate system, the AGS program failed. This can be attributed somewhat to the inability of the procurement system to react quickly to recognized requirements,to a lack of off-the-shelf technology capable of meeting all the requirements, and most importantly, to budget constraints. Other solutions were sought which were inadequate and only delayed the program.

Ground Launched HELLFIRE (GLH). GLH was designed to meet the requirement for a long-range, precision guided antitank missile for the ground maneuver commander. It would replace the TOWs in the battalion anti-armor platoon. Target acquisition and designation would be done by laser designators in the platoon, the artillery forward observation and lasing teams (FOLTs) or helicopters, such as the OH-58D. Because it used non-developmental items of equipment, GLH could be fielded quickly and at a relatively low expense. Non-developmental items do not have the research and development cost of newly designed equipment.

The GLH concept was evaluated by the division during October and November 1982, at Yakima Firing Center. The evaluation consisted of tactical experimentation, an FTX and live fire exercise. Further testing was conducted as part of the Infantry Smart Anti-armor Munitions Study and during Joint Tactical Exercise BORDER STAR in March 1985. As a result of this successful 1982-1985 effort, the GLH program showed its potential for successful fielding and employment. Because the division structure could absorb and employ a test item, the operational concepts and equipment requirements could be resolved prior to actual purchase and fielding. This proved to be a tremendous contributor to the program's initial success. The Army decided, however, that using HELLFIRE in a ground launched role was not economically feasible and directed the division to terminate the program. Only in 1988 did the program start again as a result of direct Congressional funding action.

CONCLUSION

The motorized concept has proven to be a good idea that the force integration system could only partially support. The division was unable to receive the force modernization items needed to implement the operational concept fully. Deprived of the major weapons systems around which the division was designed, it had to make do with surrogate and interim solutions which failed to meet the requirements. When the system worked, dramatic increases in combat power were seen. The inability of the division to perform to its specification is not a failure of the concept, but rather an inability of the system to support the needs of the field in a time of rapidly changing requirements and greatly reduced budgets.

PART VI

CONCLUSIONS

CONCLUSIONS

INTRODUCTION

The motorized experience is not completely unique to the Army. Since the end of World War II, the Army has experimented in each decade with new organizations in anticipation of future threat capabilities. In that sense, the motorized division shares with the air assault division of the 1960's, and the triple capability (TRI-CAP) division of the 1970's, in a precedent set by the pentomic division of the 1950's. Two factors, however, set the motorized experience apart from the others. The motorized division derived from a rapidly evolving strategic reassessment brought about by the degenerating situation in the Middle East and Southwest Asia. This was a major factor in determining the urgency with which the design and fielding were completed. Secondly, the motorized division was given the charter to design, test, and field itself.

Because of the uniqueness of the motorized experience, it is impossible to conclude this review with a short, succinct list of things done well and lessons learned. Too many complex issues arise from the ten years of its existence. Much of the story is evolutionary, flowing in a consistent line--easy to trace, but sometimes remarkably different from point to point. Other portions of the experience can appear completely inconsistent--easy to misinterpret once beyond the context of the time of occurrence. The usefulness of conclusions drawn from the division's history depends greatly upon an appreciation for the situation and pressures of the particular period from which they spring. Therefore, it is worth quickly resetting that context before beginning a final statement on the history of the 9th Infantry Division (Motorized).

The motorized experience can be viewed in several distinct phases: the birth of the original concept; an initial design and procurement period; testing of the objective design; employment of the division under an interim design short of the objective model; and, finally, the current period of challenge to the wisdom and affordability of a one-of-a-kind division in a resource constrained force.

General E.C. Meyer, Chief of Staff, Army, began the motorized story in 1980. The national leadership recognized the military's inability to project forces swiftly to trouble-spots in the world with the capability of defeating armored forces of the Soviet Union or its surrogates. At the time, this exposed a serious vulnerability in the Middle East and Southwest Asia. In response, General Meyer ordered the development of a concept for a "middle-weight" division: lightweight strategic and operational mobility and yet a heavyweight tactical punch. He specified building the division from the emerging Infantry Division 86 design, adding advanced technology to lend the firepower to defeat armor. His guidance remained intentionally limited to cultivate experimentation and innovation. For similar reasons, he by-passed normal developmental channels, imposing responsibility directly on the 9th Infantry Division--field soldiers--to design and test the equipment and operational concepts with which they would be later expected to fight. Implied in the tasking was the need to leap ahead of the normal developmental process, fielding the new organization in time to serve as a near-term deterrent. This subtle but extremely important dimension of the mission given to 9ID was not clearly understood by many in the Army developmental community.

By 1982, system design and operational concepts for the new-style infantry division were in full swing. Attempts to capitalize on state-of-the-art technology earned the title High Technology Light Division (HTLD). An out-of-hide staff cell set up to steer the design process grew into a fully resourced activity, the High Technology Test Bed (HTTB), with the mission to lead in design and testing of the HTLD. General Meyer also chartered the HTTB to explore ways of shortening the traditional developmental cycle. The interface between HTTB and other Army developmental agencies was not well defined, compounding the potential for friction.

As the HTLD design matured, agility emerged as the most prominent tactical capability. Technology would enhance firepower, but not decisively. The true edge offered by technology would be an ability to see the battlefield more clearly, then react more quickly to exploit that advantage through maneuver. The division's designers were able consciously to apply the emerging AirLand Battle doctrine, then being written at Fort Leavenworth, to structure a force whose combat capability would be tightly anchored to the doctrinal tenants of agility, depth, synchronization, and initiative. To recognize the significance of the division's design built around tactical mobility and to make clear the distinction between it and the evolving Light Infantry Division, the Department of the Army redesignated the HTLD first as the High Technology Motorized Division, then finally as the 9th Infantry Division (Motorized).

In pace with this evolution, the HTTB became a field operating agency of DA DCSOPS with liaison elements from TRADOC doctrine development and testing agencies, as well as AMC. It was redesignated the Army Development and Employment Agency (ADEA). Even with these attempts to clarify responsibilities, overlap, underlap, and confusion of roles in the developmental community continued. Moreover, despite designation of ADEA as an Army Staff activity, its commander was the Commanding General of the 9ID. ADEA's focus increasingly turned from design to validating the operational concepts of the motorized division. Gaps in the procurement of equipment forced the use of surrogate items. To the extent feasible, testing was modeled to replicate projected capabilities of the objective design systems, not the actual capabilities of the surrogates. The testing phase extended through 1985.

By 1 October 1986, the motorized division was a reality, but a reality that departed in significant ways from the original concept. Though not fully fielded, it was soon troop-listed against five war plans. Despite the original impetus of the division's design, none of these war plans called for air deployment of the division and its equipment. Nor was the division's planning priority either Southwest Asia or the Middle East. Tensions had eased somewhat by then in those parts of the world. Additionally light infantry divisions, under parallel development, were now given preference as a rapid response force by strategic planners. As a result, the division was not to be employed in a manner which optimized its capabilities.

Major gaps in procurement still existed, introducing complex challenges for the division. On one hand, the division had to continue testing, refining and fielding the objective design systems and concepts. On the other hand, it had to be ready for the possibility of immediate commitment using whatever mix of equipment it had on hand. Operational concepts were revised from the objective O&O to support the reduced capabilities of currently fielded equipment. Then training programs were begun to develop and implement the techniques and procedures required to fight under the revised operational concepts. In some cases the items of on-hand equipment were surrogates used during the testing phase of the division. In other cases surrogates were replaced to permit more affordable or more standard lines of equipment to serve as substitutes. This period became known as the interim design phase of the motorized experience.

The current phase of the experience began in 1988. In February of that year, the decision to stand down the division's 2d Brigade Combat Team was announced. Budget reductions drove the Army leadership to cut part of the force structure. They chose the 9th Infantry Division to bear the brunt of the cuts. By September, the 2d Brigade Combat Team was gone. Though less visible, the decision by the Army leadership to stop development of the armored gun system, also in February, was even more crippling. The armored gun system was to have been the centerpiece of the division's offensive capability. Without this system, the division had little hope of reaching objective design capability. Without a fast-firing, kinetic energy weapons system, the division would be relegated to secondary, supporting missions in a high-intensity conflict against a well equipped and trained armor threat.

Many saw these decisions as evidence of erosion of support for the motorized concept among the Army's leadership. Doubts raised by some of the Army major commands concerning the motorized experiment were never effectively satisfied. Two challenges were most telling: first, the wisdom of occupying one of the Army's 18 combat divisions in experimentation and development, and second, the limited flexibility of a division-sized force with completely unique equipment and an organizational design heavily optimized for operations in wide-open desert terrain. Regardless, dollars rather than in-house disagreements have driven the decisions now shaping the fate of the 9th Infantry Division. Roadblocks in the procurement system simply prevented the division from maturing before the money ran out. Since 1987, combat readiness, with current manning and equipment, not innovation, has been the norm.

At present, the focus of the division has turned to developing and training on operational concepts for integrating motorized and heavy forces. The mission is to be prepared for war today, in whatever force configuration the division finds itself. Meanwhile, decisions about the long-term shape of the division are pending review by the Army's highest decision makers.

Having set the context for assessing the motorized story--in an admittedly abbreviated fashion--the framework is now established for addressing the object lessons that may be taken from the experience. The varying parts of the experience have entirely different lessons to share. Experiences from the early phases of the experiment capture the excitement of successful innovation--doing something new and important and doing it well. This period, developing and testing the objective design, also best captures the possibilities of the motorized concept. Beyond that, its lessons include designing and testing systems with continuing Army-wide application; pioneering new methods of training to breed the initiative, agility, and the ability to synchronize dispersed elements; and finally, introducing a developmental process that will allow the fielding of new systems in a near-term cycle. This latter point is particularly significant for an army basing its advantage on technology. The current developmental cycle of 6-to-10 years will simply not support fielding advanced technology before it has already become obsolete.

More recent experience is not quite so upbeat. Most of the appended unit and staff section articles stem from this period. Contributions from authors who have been associated with the motorized experience for many years are often marked by the frustration of resourcing shortfalls that precluded the realization of a concept they believed to be not only feasible, but revolutionary. Those from recent arrivals to the division tend to reflect a lack of context--attributing shortfalls of the interim design to motorized capability as a whole. Still, the lessons of this period are also important. They capture much diligent work within the division to develop the tactics, leaders, and soldiers needed to wrest from the substitute organizations and equipment of the interim structure a combat capability this structure was not designed to provide.

Using the framework of the seven battlefield operating systems, the conclusions will aim to synthesize lessons learned from the motorized experience. Within each system, this section will identify the unique motorized operational concepts, along with the equipment and training that are prerequisites to executing the concept, then conclude with an assessment of the conditions and limitations disclosed in eight years of testing and training on these concepts.

Before beginning it is worth reflecting on the issue of context one last time. Many of the items of equipment and concepts for operations and training expressed within the record of the motorized experience now seem routine. They were not so common in 1981. Much work on the motorized concept pre-dates AirLand Battle doctrine. In fact, one affirmation of the value of the experiment is the very proliferation of these pioneer efforts throughout the Army. These efforts will be underscored in the presentation of the conclusions--not to claim credit as much as to document the value to the Army of underwriting the freedom for a cell of free-thinking but practically-minded soldiers to develop and field their own organization in a relatively unconstrained environment.

INTELLIGENCE

Quality intelligence is key to the effectiveness of any combat operation. However, it was an absolute cornerstone of the motorized concept. Only good and timely intelligence allowed precise maneuver, the ability to avoid the enemy's strength and to strike decisively against high value targets in his flanks and rear. Good intelligence was also a prerequisite for the division's unique inventory of long-range fire power systems to bring accurate, continuous fires on the enemy and to shatter his combat effectiveness well before he could close within the effective range of his own weapons.

The operational concept for intelligence gathering of such quality called for finding and then continuously tracking the enemy at the deepest possible ranges. Further, it specified the ability to cover a division frontage of up to 150 kilometers and to exploit information rapidly down to lowest unit levels through state-of-the-art automation. Finally, it required reducing the enemy's opportunity to target division operations by utilizing passive collection systems with night proficiency and tightly integrated deception measures.

Several unique organizations, built around some vital nonstandard equipment, were designed to execute the concept. Highly mobile, composite forward support intelligence companies would support the semi-autonomous operations of widely dispersed maneuver brigades. They were to collect information with the UAS-11 and LREOS, passive long-range day and night observation sights (see Appendix D, Equipment Summary for details). An unmanned aerial vehicle platoon, to be equipped with a remotely piloted vehicle (RPV), and an airborne long-range surveillance unit (LRSU) were to provide longer range collection under division control. An all source analysis system (ASAS) would allow high-tech centralized data distribution for collection from multiple sources, computer-assisted analysis, and rapid dissemination of processed intelligence throughout the battlefield. Finally, an operations support detachment (OSD), a deception unit to be equipped with mock-ups, sound devices, and signals deception, would be an integral component of the division counter-intelligence capability.

Several training programs proved important to realize the operational concept. Foremost was habitual association of forward support intelligence companies with maneuver brigades. Additionally, division-controlled collection sources were frequently down-linked directly to maneuver brigades. Near real-time intelligence data from deep beyond the FLOT could then be transmitted through the maneuver control system (MCS) to all forward committed units.

In practice, the concept has proven viable. The collection capability was generally well-balanced despite its emphasis on passive means. Testing of the LRSU, LREO, and OSD was so successful that these systems are now being exported Army-wide. The OSD seemed to work best at division-level rather than brigade. At any level, sufficient time must be given to coordinate planning, integrate the supporting actions of real units, and allow the enemy to react to the deception. In order to resource the newer capabilities, less counter-intelligence and IPW structure existed in the MI battalion than was common to most divisions.

MERCURY GREEN was a manned surrogate system for the RPV. While lacking some of the RPV's design capabilities, it proved to be extremely functional and reliable. The system was dropped without replacement after the testing period ended. Off-the-shelf RPV systems are available now which would greatly expand the capabilities already proven sound by MERCURY GREEN. Although highly important to the motorized force, the RPV offers a much broader potential for use throughout the Army. Clearly, some form of an unmanned aerial reconnaissance vehicle needs to be in the Army inventory.

The density of Army aircraft and forward observation and lasing teams (FOLT) in the division offered a significant potential windfall to the intelligence collection effort. However, effectively harnessing that potential depended greatly on the quality of the IPB. As indicated earlier, motorized success required the clearest possible picture of the battlefield. This picture began with the pre-battle IPB. The IPB also produced both priority intelligence requirements (PIR) and the intelligence collection plan. Thus it served as the prime means for synchronizing the diverse elements of the collection capability. Tightly coordinating the collection elements--both internal and external to the intelligence community--allowed the changing enemy situation to be closely tracked as the battle unfolded. Early in the motorized experience, division units discovered the need for an integrated, comprehensive IPB-type process as the prelude to effective operations.

MANEUVER

Under the O&O, several concepts were central to motorized operations. First among these was to position and move as widely dispersed units, concentrating combat power rapidly at critical points and times. Another base concept was expanding the fight to the limits of the zone of operations, hitting the enemy over the longest possible range with well integrated long-range direct and indirect fires for the longest possible time. The enemy would be attrited and disorganized before he could close to the range of his own direct fire weapons systems, then defeated in detail. Motorized forces would maneuver away from enemy strength, attacking the enemy on his flanks, in his rear, and from the air simultaneously, thus shattering the coherence of his operation. Essential characteristics were agility in planning and execution, as well as synchronization. The division was also expected to be capable of containing enemy strength while shaping conditions for more decisive attacks to the flanks and rear.

Mobility and initiative were also essential characteristics of such a concept. The division had to be able to move with precision widely dispersed along multiple avenues. Typically, these moves would be at night or during periods of limited visibility. Deception would be used to gain surprise. Further, the division needed to be able to fight in depth on a non-linear battlefield. It would routinely operate deep in the enemy rear using stay-behind, infiltration, or air assault tactics to destroy artillery, command posts, and critical logistics. It must also be capable of withstanding combat in its own rear, protecting critical bases and continuing the flow of services and supplies forward. Finally, the division was to be capable of complementing heavy forces: conducting deep operations, defending the rear, or executing a covering force, while heavier, less agile forces prepared for the fight in the main battle area.

Again, execution of the concept depended on uniquely designed organizations and equipment. Light attack battalions (LAB), equipped with fast attack vehicles (FAV), would guide the attack of brigade combat teams away from strongpoints and into the flanks and rear of heavier enemy forces. LABs were also to be able to maneuver deep into the enemy rear, then close with and destroy high value soft-skinned targets with rapid-fire MK-19 40mm machine guns and TOW anti-armor missiles. Combined arms battalions (CAB), consisting of motorized infantry companies and anti-armor companies equipped with a kinetic energy, rapid-firing armored gun system, would contain enemy strength while shaping the conditions for more advantageous attacks to the flanks and rear. CABs would also be the force finally to close with and destroy heavy enemy units in detail, once the fight in depth had appropriately disrupted the coherence of enemy operations.

An air cavalry brigade with a high density of all-weather, night-capable attack helicopters, combat support helicopters, an air/ground cavalry squadron, and an organic combat battalion would serve as a fourth maneuver brigade. Its typical focus would be cavalry, deep, and rear defense operations. The cavalry brigade would additionally coordinate the air dimension for all motorized operations. Two attack helicopter battalions would be a vital complement to ground forces in containing, then destroying, heavy forces, as well as destroying high value targets in the enemy rear. A combat support aviation battalion would provide the lift for air assaults.

All maneuver elements would be fully equipped with night vision devices and position location reporting systems (PLRS) to facilitate coordinated moves at night over dispersed routes. Additionally, maneuver battalions would be given precision guided anti-tank missile (PGATM) platoons, capable of killing armor from a distance in excess of eight kilometers. PGATM would give all combat battalions a highly accurate indirect means for killing armor without disclosing forward positions.

Several initiatives became instrumental in training-up to execute the maneuver concept. Early emphasis on combined arms training was perhaps the most significant innovation. Combined arms training in the division had two key tenets. First was total integration of the planning, execution and evaluation of training between maneuver brigades and the units providing their habitual combat support and combat service support. Second were tri-annual priority training cycles during which each brigade combat team (and a representative slice of general support elements) could train without distraction. Based on funding reductions, priority cycles were later reduced to twice a year. These cycles, termed OCTOFOIL FOCUS densities, typically consisted of a 21 day training period at Yakima Firing Center with ground and air deployments.

Additionally, professional development of leaders at all levels was crucial. Army-level training manuals on motorized operations did not exist. Nor was the concept taught in TRADOC schools. In short, the division had to school itself entirely. Given the motorized concept's dependence on initiative, breeding junior leaders with the skills, confidence, and discipline to operate independently--but within the framework of the overall operation--became an important subset of leader development. Multi-echelon seminars were conducted throughout the division both to share in learning and to evolve the tactics and procedures required to fight motorized units effectively. By directive, junior leader training was tightly focused on warfighting and the nurturing and control of small unit initiative. Furthermore, the division underwrote frequent small unit deployments to the National Training Center (NTC) as round-outs to the rotations of other divisions.

The division was also responsible for innovative work on the engagement area concept as a tool for training engineers, fire supporters, and maneuver elements in the synchronization of obstacles and fires, both direct and indirect. Finally, the division introduced a concept for centralized management of TOW gunnery. Gunnery scores improved so markedly that the program has subsequently been adopted by the Infantry School for implementation throughout the Army.

The lessons learned from the maneuver of motorized units differ remarkably between the period in which the objective design was simulated and later under the interim design. In a series of internal and external evaluations extending from February 1983 to March 1985, the operational and organizational concepts in the objective design proved consistently sound. Some specific findings were particularly encouraging. Motorized forces were highly survivable from direct and indirect fires when dispersed and mobile. In fact, in all tests in which the category was measured, motorized units suffered fewer artillery kills than heavy forces. More importantly, motorized forces truly could attack and defeat a heavy force by leveraging agility. Attack helicopter units also proved highly effective as a maneuver arm. The motorized concept of massing attack helicopters in thoroughly planned attacks gave greater survivability and higher kill ratios. Finally, the PGATM was an accurate, effective method for extending the fight, a prime system for enabling attacks on the enemy throughout the battlefield.

Despite the overall success of the objective design, some shortfalls and limitations were recorded. If ever fixed, motorized forces clearly could not withstand artillery barrage. The counter-recon battle, a tactic not emphasized in the operational concept, turned out to be as important to survivability of motorized forces as mobility, dispersion and deception. The organizational design was optimized for, and tested only, in semi-arid, wide-open terrain. Intuitively, the capability would be reduced in a more confined setting. Deep operations were restricted by the poor cross-FLOT survivability of utility helicopters. To some extent, this could stem from the inability to replicate the effects of SEAD in a training environment. The division's anti-armor punch and ability to fight in depth were dramatically constrained in weather or visibility conditions grounding helicopters.

Furthermore, the organizational design of the LAB--quick and light to support advance guard and deep attack missions, but lacking infantry and the armored gun system--restricted the flexibility of the brigade combat team in more basic attack and defense missions during the May 1988 NTC rotation. The LAB's objective design called for the FAV as the battalion's primary combat system. Addition of some infantry and armored gun systems to the design could expand its capabilities to support the Brigade Combat Team in more traditional and necessary missions. Finally, the CAB lacked sufficient infantry to hold ground, attack prepared defenses, fight in built-up areas, clear obstacles, or even protect key weapons systems from enemy dismounted infantry. The optimum design might be a balanced combined arms battalion--two companies equipped with the armored gun system and two of motorized infantry.

Experience during the application of the interim design was still upbeat, but not so uniformly successful. With aggressive leadership and disciplined execution, units could approach objective design capabilities in many areas. Some notable results came from the 3d Brigade's NTC rotation in May 1988. The synergy of tightly synchronized combat power was demonstrated repeatedly. Units were able to concentrate fires rapidly at critical times and places from weapons systems broadly dispersed over the battlefield. TOW gunnery scores were superb; the system proved accurate and the crews well-trained. Additionally, though not as agile as the FAV, the HMMWV turned out to be a more survivable weapons platform than initially expected. Threat artillery kill rates in the 3d Brigade rotation were reported to be among the lowest ever experienced at the NTC.

Still, shortfalls in other areas were compelling. The HMMWV could not replicate the capability of the fast attack vehicle. Admittedly, disciplined execution of motorized tactics allowed the HMMWV to survive artillery, but not at a level comparable to the FAV. More importantly, it was considerably more vulnerable to direct fire targeting. The HMMWV's slower cross-terrain speed and larger silhouette did not lend equivalent ability to close with the enemy when attacking and conversely forced earlier withdrawals when on the defense. Because of its slowness and greater visibility, the timing of engagement area trigger and withdrawal lines needed to be much more precise--and because of that was less certain to be realized on a chaotic battlefield. Stated simply, a HMMWV-mounted force--though more tactically mobile than APC-mounted or foot infantry--was still more easily fixed and destroyed than a force mounted in FAVs. Finally, the larger, heavier chassis of the HMMWV more than doubled the lift support required to air assault the LAB into the enemy rear.

Additional shortfalls were the elimination of the PGATM and one battalion of attack helicopters. These cuts blunted the division's anti-armor capability and sharply reduced the ability to fight in depth. But the most severe constraint in the interim design came from imposing the TOW as the division's primary weapons system in lieu of a kinetic energy, rapid-firing armored gun system.

The TOW was an unacceptable substitute for an armored gun system. It would destroy targets accurately, but slowly. It could neither fire on the move, nor address multiple or close targets. It possessed slow missile flight time (eighteen seconds over its maximum range) and required nearly three minutes to recollimate sights after each displacement. Moreover, terrain does not always afford the line-of-sight shots needed to realize the full benefit of its 3750 meter effective range. The net effect of these constraints make the TOW a sluggish weapon system for supporting the highly mobile offensive operations envisioned in the motorized concept.

The TOW system's slow rate of fire and minimum distance arming range prevented the massing of high rates of close-in fire. This produced two effects--armed with TOWs, motorized forces would have difficulty in containing enemy strength and thus shaping the battle to allow more decisive maneuver to the enemy's flanks and rear. Further, motorized forces supported by TOWs had less capability to close on the enemy's flanks and rear and destroy sufficient numbers of the enemy to defeat him before he could react to the new situation.

The TOW forced major realignment of the operational concept. Offensive tactics were revised to accommodate a "stand-off" form of attack. Engagement areas, previously an important means for containing enemy strength to shape more decisive close combat in the flanks and rear of the enemy, became the sole expression of the offensive. The implications of this shift are far-reaching. The TOW is simply unable to provide the rapid kill ratios necessary to shatter the coherence of enemy operations. Thus, the ability to set conditions for motorized forces to exploit initial tactical success into defeat and destruction of a heavier force is reduced. Motorized forces armed with TOW can complement other forces with a highly mobile anti-tank capability. However, the TOW restricts the ability to conduct independent operations against a well trained and equipped armored threat.

FIRE SUPPORT

The O&O concept for fire support required routine direct support to four maneuver brigades. DS units would focus heavily on destroying enemy armor. The concept also called for acquiring targets and providing fires throughout a battlefield greatly expanded in width and depth. Too, artillery units would be sufficiently mobile to keep up with the fluid pace of motorized maneuver elements. Artillery must also contribute to the survivability of motorized forces with precise counter-battery fires. Finally, state-of-the-art automation would allow targets to be processed and fires initiated and adjusted with exceptional quickness, offering a highly agile response capability.

All objective design equipment for the Division Artillery was fielded in time for the testing phase of the division and remained intact through the interim period. Three M198 155mm howitzer battalions for direct support were the core of the organizational design. The towed howitzers were light enough for rapid strategic deployment, yet they also possessed an armor-killing capability in the COPPERHEAD. Additionally, they could be repositioned quickly anywhere on the battlefield by CH-47 aircraft. The design also included a light artillery and rocket (LAR) battalion. Two of the LAR batteries were to give direct support to CBAA, the fourth maneuver brigade. They were equipped with the M102 105mm howitzer. The 105mm was light enough to be transported by UH-60 aircraft for swift repositioning in support of both deep and rear operations. The third LAR battery was equipped with the multiple launch rocket system (MLRS) and was designated the division's general support artillery.

Artillery organizations also included a target acquisition battery, with three Q36 counter-mortar radars, two Q37 counter-battery radars, and a counter-fire processing element. Combat observation and lasing teams (COLT) were reduced from doctrinal staffing levels to resource an expanded forward observation and lasing capability. A total of 47 teams were fielded to provide effective coverage of the division's immense frontage. Because their structure differed from the doctrinal COLTs, the division termed these teams "FOLTs" (forward observation and lasing teams). FOLTs were a vital part of the division's capacity to keep the enemy under continuous attack throughout the depth of the battlefield.

Automated fire control was exercised by the Lightweight TACFIRE system, a down-sized version of the standard Army TACFIRE, and the maneuver control system (MCS). LTACFIRE gave the same data processing capability as the standard model, but unlike heavy TACFIRE, was based on distributed processors mountable in HMMWV shelters. Finally, the artillery organization was structured to field separate fire support elements for each of the four maneuver brigades and the division rear.

Not all areas of fire support fared as well as artillery in fielding objective design systems. The design called for a 120mm mobile heavy mortar in the maneuver battalion combat support companies. The mortar would be mounted on and fired from a trailer pulled by the HMMWV. It was never fielded. Instead, the 4.2 inch mortar served as a surrogate during the testing era, and became the operative system during the interim design period. The 4.2 mortar was transported in a HMMWV, but required dismounting and set up to fire.

Per division SOP, the cannon battalions routinely trained and were evaluated with the maneuver brigade they habitually supported. Additionally, DivArty introduced several innovative programs to advance FOLT proficiency. FOLTs were centrally trained, then tested and formally certified on competence in key tasks. Additionally, DivArty used the Battle Simulations Anti-Armor Theater to develop and then institutionalize FOLT training on a technique termed "footprinting." The technique taught consolidating several laser patterns at a chokepoint in a major mobility corridor. This trapped concentrations of threat armor in thickly lased, pre-planned kill zones rather than forcing individual FOLTs to request unplanned fires while attempting to paint single tanks charging about the battlefield. The footprinting technique yielded the first-ever COPPERHEAD kills at the NTC during the division's May 1988 rotation. Finally, DivArty conducted live exercises of the complete vertical fire support chain semiannually--from FOLT through DivArty TOC.

Tight control of FOLTs to focus attacks on armor and high value targets was a key lesson learned. FOLTs were found to be most productive when controlled no lower than task force-level. The battalion FSO was best situated to ensure comprehensive coverage of priority targeted areas of interest (TAIs)--both in the initial positioning of FOLTs and in their precise, timely relocation. He was also most able to guarantee the swift initiation and adjustment of fires once FOLT targets were acquired. FOLTs tended to suffer high mortality. Accordingly, they were frequently paired to assure redundant coverage of TAIs. Finally, linking FOLTs with dedicated COPPERHEAD firing units and communication nets offered the most rapid response against high value targets.

Whatever the relative merits of objective versus interim maneuver systems, the record is clear on the inadequacy of the M198, a system chosen for its strategic deployability on C141-type aircraft. The battlefield was simply too dispersed and operations too fluid for the range and displacement capability of this towed howitzer. In most exercises, maneuver commanders outran their artillery coverage, particularly in cross-terrain movement. The responsiveness of the M198 was even more severely constrained in motorized operations by its limited traverse and slowness in shifting from one azimuth of fire to another.

Still, valuable lessons sprang from the diligent work to compensate for this shortfall. Given the likelihood of gaps in the artillery range fan, tightly integrating the movement of maneuver forces, artillery repositioning, and coverage from other fire support systems became crucial. The maneuver commander had to factor the weaknesses of his fire support coverage into the operational scheme, planning to accept this risk when it was least detrimental. Artillery repositioning had to be carefully sequenced with maneuver to reduce vulnerabilities as much as possible. Finally, supplemental fire support means had to be programmed for windows when the artillery coverage was at an ebb.

Two procedural fixes were introduced to help achieve the required integration of fire support and maneuver. First was an artillery movement matrix, an event-driven schedule carefully coordinating the repositioning of firing units with the maneuver scheme. Second was collocating the DS artillery battalion TOC with that of its supported maneuver brigade. This routinized both the immediate exchange of information and concurrent planning.

These initiatives reduced, but could not offset, the vulnerabilities of coverage by the M198. The division has requested replacing the M198 with the M109A2 SP 155mm howitzer, the only feasible near-term solution. However, should there be new interest in rapid strategic and operational mobility for artillery, the Army should press its concepts based requirements system to produce either a lighter self-propelled artillery system or a towed system that overcomes the defects of the M198.

The poor integration of heavy mortars adds another lesson from the record of motorized fire support. In large part this stemmed from the slow emplacement/displacement time hinted at above. It was difficult to keep the mortars in the fight when they had to be dismounted to fire, then remounted to move. Two other factors contributed. The division lacked mortar FOs. They too were a bill-payer for the expanded FOLT capability. More importantly, the heavy mortar platoons were linked to neither LTACFIRE nor the maneuver control system. Thus, they could only be managed off-line, by exception. Given the pace and fluidity of motorized operations, too often the heavy mortars instead were ignored. The requirement for a mobile heavy mortar still exists. Further, they need to be included in future generations of automated fire control nets.

Finally, the anticipated expansion of division zones in motorized operations forced rethinking of MLRS command and control. With the distances planned between the widely dispersed platoons, the battery would be unable to control fires responsively. Accordingly, direct fire control links were established from DivArty TOC to MLRS platoons, with battery headquarters used to relay to more distant elements. This solution is currently unique to 9ID, because it alone was fielded with independent fire direction computers in each MLRS platoon. This capability should be fielded Army-wide.

AIR DEFENSE

The O&O concept required organic air defense assets for very low and low altitude air defense. The ADA battalion was expected to coordinate short range air defense (SHORAD) augmentation, high to medium air defense (HIMAD), and counter-air coverage from echelons of command above the division (EAD). It was also organized to collect, coordinate and disseminate intelligence on enemy air activity, as well as pass weapons control status updates throughout the division.

To execute motorized air defense operations as defined by the O&O, the battalion would be given three light air defense system (LADS)/Stinger batteries for forward air defense, one Stinger battery to protect the rear area, and a headquarters and headquarters battery (HHB). The LADS/Stinger batteries were to be equipped with the LADS, the Stinger manportable air defense system (MANPADS), and the tactical defense alert radar (TDAR). The Stinger battery would be equipped with Stinger MANPADS and TDAR. The HHB contained an early warning section with eight forward air alerting radars (FAAR). The battalion also would be given a distributed data air defense command and control system compatible with the division's maneuver control system.

The LADS candidates, the vulcan wheeled carrier (VWC) and pedestal mounted Stinger (PMS), were never fielded. However, ADEA tests on prototypes and surrogates replicating objective design capabilities offer valid insights on the effectiveness of these systems. One system temporarily fielded was the towed Chaparral. Late in the testing phase of the objective design, a battery of towed Chaparrals replaced the pure Stinger battery to increase the range and effectiveness of air defense missile protection in the rear. However, the Stinger battery was restored on the interim design MTOE.

As for other support units, the major training challenge for motorized air defense was sustaining coverage of widely scattered, rapidly shifting maneuver units. An emphasis throughout the division on small arms for air defense (SAFAD) was an important method for augmenting the air defense coverage. To help keep pace with maneuver forces, Stinger teams were habitually attached down to maneuver company level. Whenever the tactical situation allowed, the battalion also centrally positioned TDARs to fill gaps in the FAAR coverage created by the division's broad dispersion. Finally, the battalion trained aggressively with EAD air defense controlling and reporting centers to initiate the relationships that will ease the significant early warning and HIMAD support the division needs in war to augment its limited organic capability.

In exercises, gaps in the FAAR coverage were in fact off-set successfully by careful positioning of TDARs and close coordination with external tracking systems. Moreover, the current trend toward joint-service distributed data processing systems, with theater-wide real-time distribution of threat air activity, will further lessen the impact of this shortfall. Another lesson gained from exercises was the importance of including very detailed air threat analysis and projected coverage in the IPB. Maneuver commanders making decisions on positioning, movement, and relative allowable degrees of dispersion for lightly protected motorized forces had to carefully weigh the air threat.

Use of the PMS during the testing phase, though limited, still confirmed it as an extremely effective short-range missile system. It was highly mobile and able to address multiple targets. It was selected to become the SHORAD system for all light forces and is currently undergoing Army-wide fielding. During the testing phase, the VWC also served as a prototype for the LADS. The VWC demonstrated the capability for a light, self-propelled air defense gun able to maintain the tempo of motorized operations. However, neither the PMS nor the VWC were available to the interim design motorized division. Instead the interim design division has been plagued by the less responsive towed Vulcan system. The limited mobility and slow emplacement time of the towed Vulcan has virtually prevented its use in any role but point defense of rear area assets. The VWC, or a similar system, would offer an affordable and more capable alternative for the interim design division until the final fielding of PMS.

Under the objective O&O concept, the division engineers would support forward with organic assets to focus on mobility--particularly obstacle breaching, assault gap crossings, and limited construction of combat trails. Within limited capabilities they would also build obstacles for forward units preparing engagement areas. Additionally, division engineers would coordinate for and then control EAD assets attached or OPCON to upgrade main supply routes and airfields, emplace or clear major barriers and obstacles, cross rivers, or dig in key logistics and command and control elements.

To execute the concept, the design provided an engineer battalion with three forward support companies and a heavy engineer company. Equipment intended for the forward companies included the small emplacement excavator (SEE), armored combat earth mover (ACE), VOLCANO (a truck-mounted scatterable mine emplacement system), light assault bridge, and trailer-mounted mine clearing line charge (MICLIC). The heavy engineer company had a general support platoon equipped similarly to the forward support companies. Its primary mission was engineer support for the ground maneuver forces assigned to CBAA. Additionally, the heavy engineer company had mobility and counter-mobility platoons to assist in weighting the battle. The mobility platoon would have ACEs and light assault bridges. The counter-mobility platoon would have a VOLCANO section and a ditching section with SEE entrenchers and the tactical explosive system (TEXS).

Fielding of engineer systems fell well short of the objective design. The SEE was the only objective system provided in either the testing or interim design phase. Shortly after the testing phase, all "SEEs" on hand were sent to the 7th ID to support its certification. Although new SEEs are now being fielded in the division, this system was not available during much of the period of the interim design. The D7 bulldozer served as a surrogate system for the ACE. It remained as interim fill after the testing phase. Even though it was able to replicate some of the engineer capability of the ACE, it could not begin to approach its tactical mobility. This measurably reduced the agility of counter-mobility and survivability support and, to some extent, mobility support as well.

No credible surrogates were offered for any other engineer system during the testing phase. In 1986, the ground emplaced mine scattering system (GEMSS) was issued as interim fill for the VOLCANO. Division engineers did have a corps ribbon bridge company attached on a semi-permanent basis, but this is not the same as an assault gap capability. For the most part, motorized engineers supporting forward simply coped with HMMWV squad carriers, demolitions, pioneer tools, and dozers hauled about the battlefield on low-boys.

The motorized engineers trained hard to squeeze as much capability as possible from the sparse equipment list. Pending fill of key equipment, the heavy engineer company was reorganized into two combat support platoons and one mobility/counter-mobility platoon. Engineers joined scout and reconnaissance elements to uncover ways to by-pass rather than breach threat obstacles. When forced to breach, the prime methods became picks and shovels, bolt-cutters, grappling hooks, demolitions, and soldier initiative. The MICLIC, while a technically proven means of breaching minefields, was neither mobile nor survivable enough in the trailer-mounted mode. Employment of scatterable mines was exercised extensively as a flexible, agile means to emplace obstacles. Despite equipment limitations, preparing engagement areas became a science. Obstacles were carefully crafted to canalize the enemy into kill zones, then choke and delay his exit while turning his flanks at critical points, exposing them to TOW shots from distant hide positions. Finally, strong training relationships were established with corps engineers to draft the plans, refine procedures, and exercise the control relationships needed to integrate critical EAD engineer support in war.

Engineers proved a vital asset during all the tests and exercises in which the motorized force played. Nonetheless, the lack of objective design equipment, or even acceptable surrogates, greatly restricts meaningful assessment of that measure of engineer support uniquely built into the motorized design. The SEE was available during the testing period, and performed well. The GEMSS, although not available during testing and certification, proved to be a major combat multiplier during May 1988 and March 1989 NTC rotations, whetting appetites for full fielding of the more capable VOLCANO. Still, due to the lack of most objective design engineer equipment, the full potential for the mobility and survivability of motorized units has yet to be measured.

COMBAT SERVICE SUPPORT

The O&O concept for combat service support was shaped by three factors. First was the push to be strategically "light," yet still maintain tactical staying power. Second was the need to provide forward support to semi-autonomous, highly mobile maneuver brigades operating on a widely dispersed battlefield. Third was a requirement to support a fourth maneuver brigade, comprised of both ground and air maneuver components. Major innovations were necessary to meet these demands.

The base tenent was that the division be capable of logistically supporting itself through an extended battle. The design called for 72 hours of independent operation with the exception of artillery Class V and water. It also required maintenance support forward, focusing on essential repairs only. Cross-leveling and cannibalization would be used generously to return systems quickly to battle. To the fullest extent possible, supply distribution would be throughput to the brigade support area (BSA). From there distribution would be supply point. The cache system would be the preferred means of supplying deep attack forces. Personnel replacement would emphasize unit or weapons crew system replacement. Support organizations would be both flexible and mobile to keep pace with the speed of motorized operations and with frequent changes to the task organization characteristic of a motorized force.

The logistics organizations and equipment of the motorized force were extremely innovative. Three forward support battalions (FSB) would provide "one stop shopping" for ground maneuver brigades and their supporting slice units. These were fully mobile composite battalions, organized in peacetime exactly as they would support in war. CBAA, the fourth maneuver brigade, would be supported by an aviation support battalion (ASB). The ASB was designed with an intermediate level aviation maintenance company and DS supply and ground maintenance companies. Though named an aviation support battalion, it needed to be fully capable of supporting both air and ground units. A main support battalion (MSB) would give DS support to units in the rear and GS support to the entire division. Neither the ASB nor MSB were organically 100% mobile.

Unique equipment included the palletized loading system (PLS), high mobility materiel handling equipment (HMMHE), company level field feeding kit (CLFFK) and the tactical army combat service support computer system (TACCS). All key equipment was available during the testing phase. Some items, like PLS and HMMHE, were prototype models only and were withdrawn after testing, pending Army-wide fielding of production versions.

The most important training concept for executing the design was full integration of training and logistic support between the ASB and the FSBs with their habitually associated maneuver brigade. Training on the LOGPAK concept was also heavily emphasized--consolidating and standardizing resupply activity forward of the BSA and making deliveries only in night convoys. When done correctly, the LOGPAK system helped to reduce signature, increase security and minimize the log planning workload for supported units. Maneuver and fire support unit field trains, colocated with the BSA, carried out the LOGPAK operations. They passed supplies directly on to maneuver companies and fire support batteries at logistic release points (LRP).

Tailoring support forward was another training challenge. The FSB would aim for continuous positioning of maintenance support teams (MST), ambulance squads, and medical trauma treatment teams (TTT) with maneuver unit combat trains. Additionally, ammunition transfer points would be designated at convenient points forward for throughput of Class V from corps directly to the brigade support area (BSA), which included the task force and fire support field trains. As required, support could go further down. For example, MST members would go on-site to fix equipment repairable in less the six hours.

The logistic concept in the O&O worked very well in all tests. It was given a particularly thorough analysis in FTX CABER TOSS, September 1983, including an external evaluation by the Army Logistics Center with very encouraging reviews. A further testament to the degree of its success is given by decisions to introduce the FSB, ASB, PLS, HMMHE, TACCS, and night LOGPAK system across the Army.

The division initially tested the Army Area Feeding concept using two mobile kitchen trailers (MKT) to provide a greater feeding capacity. Mermites were used to distribute one hot "B" ration per day to all units operating in the brigade rear area. This system proved viable, but refinement was needed to be able to get hot rations to soldiers dispersed at more remote or forward locations. The need for a company level feeding system was identified. The 9th ID was tasked to develop what became known as the company level field feeding kit (CLFFK). It, coupled with tray rations, provided all commanders the flexibility to feed at dispersed locations in synchronization with the tempo of combat operations.

Despite technological innovations, shortages of organic haul capability at maneuver battalion-level and lower made all resupply to dispersed elements difficult. It could be done, but it was always a challenge.

The division was also highly dependent on an efficient personnel replacement system. This stemmed from its austere manpower structure. To meet imposed strength ceilings and to add capability in other areas, crew strength was reduced on all key weapons systems. Therefore, the loss of one or two soldiers--if not immediately replaced--could deadline a TOW, MK 19, UAS-11, FOLT, or even howitzer.

Two areas of concern arose with the FSB. Without an accompanying support slice, including maintenance and classes III, V, and IX, the FSB was not able to support armor or mechanized attachments. Additionally, during the interim design period, the tendency developed to allow supplies to stockpile in the BSA. To keep the FSB fully mobile, resupply had to be programmed accurately and moved forward rapidly to prevent build-ups.

Finally, some debate surfaced within the division over the best control headquarters for the ASB: DISCOM or CBAA. Arguments favoring CBAA tended to focus heavily on the aviation mission of the ASB, discounting its versatility to support ground forces as well. Furthermore, a core element of the motorized logistics support concept was maintaining flexibility to adjust swiftly to changes in the task organization. Under DISCOM central control resources can be shifted easily among FSBs, the MSB, and the ASB in reaction to changes in the tactical situation. Placing the ASB under CBAA would severely restrict that flexibility. Therefore, the Army has decided to structure the ASB under DISCOM control in Army-wide fielding.

COMMAND AND CONTROL

The O&O concept for command and control focuses heavily on mission orders to allow subordinate initiative within the framework of the operational intent. Furthermore, the concept stressed rapid decision/action cycles to exploit opportunity faster than the enemy could adjust his plans. Additionally, the division would field redundant command posts, displacing frequently to increase survivability. Finally, the latest technology would be used to net broadly dispersed units, ease the burdens of reporting, and speed and expand the analysis of information and dissemination of intelligence and orders.

The design provided for three continuously operational division-level command posts: the tactical command post (TAC), MAIN, and REAR. The TAC was a small single cell structure to be shifted with the changing priority of the battle. It depended on passive measures for security. The REAR and MAIN were dispersed into nodes. The MAIN was divided into three cells: plans, operations, and the all source production center. It was positioned by itself and supported by the division headquarters and headquarters company from a proximately located life support area. The MAIN secured itself with assistance from the band and one MP platoon. The REAR CP was collocated with the DISCOM command post in the division support area (DSA) and depended on the DISCOM for security and life support. The REAR command post was not a stand-alone activity. The division staff formed an administrative and logistics node, the admin/logistics operations center (ALOC). A small operations and fire support nucleus for the REAR was built into the structures of DISCOM and DivArty respectively. Staff for remaining functional areas in the REAR operations cell came "out-of-hide" from DISCOM, CBAA, the ADA and engineer battalions, the MPs, and others. The REAR operations cell was appended to the DISCOM TOC.

The Assistant Division Commander (Maneuver) typically operated from the TAC to control close operations. The Assistant Division Commander (Support) overwatched the division rear area (DRA). The nodes for all the CPs were housed in the integrated command post system (ICPS). This was a standardized TOC support package with key equipment such as the shelter, canvas expanders, camouflage, map-boards, power and lighting built-in. It appended to a variety of vehicles, allowing rapid set-up and displacement.

The keystone of the command and control system was to be the integrated maneuver control system (MCS). MCS would allow distributed data processing of plans, orders, and intelligence--both down from the division and also from the brigades back up.

Put another way, the commanding general would be able to track the operation of any subordinate unit from his battle command center, or gain full access to his staff from any subordinate headquarters CP plugged into the MCS. Its software included text, graphs, spreadsheets, electronic mail, and automatic data base query and reporting. It also had a video graphics capability allowing adjustments of objectives, boundaries, and other control measures to be inputted easily and quickly by laser pen, then immediately transmitted throughout the division. Transmissions were by digital burst over wire or FM radio. MCS came in two models, a more sophisticated but less durable upper echelon for the division net and a simpler, more sturdy lower echelon for brigade nets.

The design also provided a robust, flexible communication system based on a multi-channel system with extensive relays and sophisticated rapid switching characteristics. Additional signal support included commercial quality facsimile, TACSAT, and a large number of AM radios. All major nodes were sheltered in the tactical command and control vehicle (TC3V) for swift displacement. Finally, the design called for a position location reporting system (PLRS). PLRS was a computer-based radio direction finding system allowing automatic tracking of key stations to a master station. It would also give a query capability for a user location, or the location of other lateral stations in the net. It used frequency hopping to protect against detection.

All systems were available for the testing phase. The interim designed retained all but the PLRS. PLRS was a prototype system only and was withdrawn after testing.

Several training programs were instrumental in making the objective concept work. The complexity and importance of MCS absolutely dictated a centralized training program for operators. CPXs were run quarterly for the division control structure and all subordinate commands. These CPXs periodically required multiple displacements to stretch control systems over the broad range of the division's conceptual zone of operations and to test the speed with which the division could displace command posts and signal nodes. Finally, monthly tactical seminars were hosted for senior staff and commanders to build the common view toward tactics that would bind the dispersed division elements into coherent operations even while operating under the broad guidance which is characteristic of mission orders.

MCS showed tremendous promise throughout the motorized experience. Still, it never fully met its design intent, providing the ability to make and pass decisions faster than the enemy could adjust his plans. The generations of MCS tested by the division were hard to work. Shortfalls in MCS capability and in the level of its distribution forced two sets of "books." To maintain an accurate data base, MCS had to be continuously manually updated as units moved, resources were attrited, or the situation changed. Moreover, the situation and orders could not be briefed from MCS displays; critical battlefield operating systems could not be tracked in MCS; and companies and batteries were not tied into the lower echelon system. Because of these shortfalls, TOCs at all levels had to maintain map/overlay systems in addition to MCS. In short, even though MCS hinted at the potential for comprehensive, efficient, battlefield management through modern technology, it generally fell short of the objective design intent.

Several changes could fix MCS. An improved "situation" data base must be added with a terrain/map file which includes overlay options for terrain analysis and threat templates. Analysis tools must be integrated (with the capability for default adjustments) to calculate time/distance, combat ratios, and consumption and attrition for quicker, more detailed and more accurate planning. For similar reasons, combat support capability factors and range templates could be added. MCS also needs a more sophisticated, precise tactical graphics capability. This should include wide-screen display for TOC briefs and data-base distribution down to company level--or at minimum, the capacity to print accurate overlays for variable-sized mapsheets from the computerized TOC display. Finally, the system needs greater reliability. Throughout the entire record period, MCS never survived a major CPX or FTX without frequent contract maintenance intervention.

PLRS was a huge success. It proved to be a major factor in allowing motorized units to move dispersed, in periods of limited visibility, yet still fully under parent unit control. PLRS was also a tremendous assist in more precise intelligence collection and targeting. The system should be fielded at the earliest opportunity. The ICPS was sufficient for division-level and rear command post support. Forward units needed something even more mobile and offering greater protection.

Communication capability in the Cavalry Brigade was a shortfall. CBAA units stretch the entire width and depth of the division zone. The current FM-based system is inadequate to control forces with such dispersal. More AM systems are needed, as well as the possible integration of single channel TACSAT for key control nodes.

Finally, innovative work was done in the division on developing and institutionalizing the techniques and procedures for controlling rear operations and defending the rear. Despite the ad hoc nature imposed on it by limited resources, in multiple exercises the REAR CP proved an ability to position elements in the rear, control movement, and defend against all ranges of enemy rear threats. A rear CP is clearly an invaluable supplement to division command and control. Still, there is much yet to do in term of allocating appropriate resources among various command posts to truly integrate command and control of the entire battlefield.

FINAL THOUGHTS

Throughout time, success in war has turned on leaders who build and effectively fight combat organizations with the right blend of mobility, firepower, and protection. The cycle of history has shown a tendency for the relationship among the three to unbalance periodically, most often emphasizing protection over mobility. This introduces the chance for a lighter force to defeat a heavier force through the use of maneuver warfare. The essence of maneuver warfare is advantaging mobility to unhinge the enemy from his plans, then rapidly exploit with high tempo, tightly synchronized offensive operations before he can reposition his less agile forces. The US Army's Airland Battle doctrine is the most recent--and arguably the most comprehensive ever--expression of maneuver warfare. In a like manner, the motorized experiment was the most comprehensive test of Airland Battle doctrine yet undertaken by the Army.

Admittedly, this was not the primary intent of the motorized experiment. The purpose of the motorized division was to deter Soviet aggression by posing the near-term threat of a credible armor-defeating force with rapid strategic deployability. To meet deployment criteria, the leaders of the 9th Infantry Division had to craft an organization light enough to deploy fully anywhere in the world in twelve days. Early in the experiment, it became clear that technology would not lend a firepower advantage to this "middleweight" force sufficient to defeat heavy forces in a toe-to-toe slugfest. Therefore, the 9ID quickly adopted the emerging tenets of AirLand Battle as the basis for their operational concept--attacking widely dispersed along multiple air and ground avenues, avoiding enemy strong points to concentrate decisively on his flanks and in his rear. Thus the process of developing and testing the motorized division also offers direct testimony to the viability of the Army's core doctrine.

How did the experiment fare? Clearly, testing under the objective design showed great promise for the ability of a middleweight division to defeat armored forces using maneuver warfare. Additionally, the numerous systems produced in the near term and now undergoing Army-wide fielding confirm the plausibility of "leaping ahead" of the standard evolutionary cycle. Still, many questions remain as yet unanswered.

Certain key items, such as the AGS, could not be procured and fielded during the testing period of the objective design. Reasons for this ranged from the lack of existing off-the-shelf technology to untimely response from the Army's traditional developmental process--with which the ADEA system was not well integrated, but upon which the division ultimately had to rely for prototype development and final fielding for all systems and organizations. The result was the objective design division was tested without having many of its vital components, thus clouding the ability to derive firm conclusions about objective capabilities.

Analysis of the objective design also suffered from the lack of objective, fully instrumented tests. While the components of the motorized division received extensive testing, much of it instrumented, there was never a totally objective measurement of task forces and brigade combat teams in simulated combat. Costs for such testing were prohibitive in a period in which the Army budget was again shrinking. The result was a failure to record objectively the synergy of the combined arms action which is the essence of the motorized O&O. Because of this lack of instrumentation, the analysis as it currently stands is not only incomplete, but also too easy for skeptics to dismiss. Future tests must be more rigorous--thoroughly instrumented and externally imposed.

Even the interim design division should not be lightly dismissed from the Army force structure. While the lack of a rapid-firing, kinetic energy tank killing system limits the interim division's ability for independent operations against highly trained, well-equipped armored forces, it still has great utility. It can be deployed strategically by air rapidly. It can similarly be shifted swiftly across the theater using C-130s and cargo helicopters, thus offering the theater commander tremendous operational agility. Most significant, once deployed tactically, it can operate independently on the ground and in the air with tremendous mobility and respectable firepower. In sum, the division as equipped today can be employed either by itself against light or Soviet surrogate heavy forces, or as a complement to friendly heavy forces against Soviet armor. More importantly, it offers a bridge for continued development and testing of a middleweight concept.

After a decade of developing and testing, General Meyer's 1979 vision still appears sound. Fiscal reality had precluded full realization of that vision. Nonetheless, the concept of a middleweight division retains great value. The lessons derived from the motorized experience must be analyzed and transferred to the heavy force, whenever applicable, to reinforce the Army's concept of maneuver warfare. Army decision-makers must carefully consider the affordability issues associated with the middleweight division in a period of constrained budgets. The middleweight division, while more expensive then a light division, is far less costly to train, maintain, or fight then a heavy division. Additionally, the middleweight division is suited for rapid strategic deployment around the globe and subsequent employment across the spectrum of conflict. Furthermore, it offers operational and tactical mobility not found anywhere else in the U.S. Army. Portions, at least, of the middleweight force should be retained in the force structure to continue striving toward attainment of the objective design that still holds so much promise. Perhaps the future of the motorized concept lies in a carefully crafted marriage between motorized and light forces. Such a structure would give the Army a rapidly deployable force with the firepower and mobility currently lacking in the light divisions and the additional infantry required by the motorized force. Thus the Army would field a division capable of responding worldwide across the spectrum of conflict.

APPENDICIES

A - CHRONOLOGY
B - DIVISION OPERATIONAL CONCEPT
C - ORGANIZATIONAL CHARTS
D - EQUIPMENT SUMMARY
E - GLOSSARY

APPENDIX A

CHRONOLOGY

CHRONOLOGY OF THE MOTORIZED EXPERIENCE

1978

	Army 86 Study begins to define future Army divisions.

1979

	Combined Arms Center begins Infantry Division 86 study to define future infantry divisions.
22 June	General E.C. Meyer becomes Chief of Staff, Army.

1980

May	Army Science Board forms study group focusing on high technology for the 9th Infantry Division.
June	Department of the Army directs formation of the High Technology Test Bed at Fort Lewis.
October	FORSCOM, TRADOC, DARCOM, 9ID sign High Technology Test Bed Memorandum of Understanding.

1981

April	Defense Science Board begins study of application of high technology to ground operations.
30 July	General Meyer directs more emphasis on concepts rather than equipment testing, and establishes FY85 as the fielding date for division.
11 August	MG Robert Elton replaces MG Howard Stone as 9th Infantry Division Commander.
13 November	General Meyer approves the High Technology Light Division (HTLD) mission.

1982

March	Organizational and Operational (O&O) Concept for HTLD developed at Alderbrook Conference.
29 April	General Meyer approves O&O Concept and resources to test HTLD.
April-May	Exercises GOLDEN BOW and GOLDEN BLADE test HTLD.

1 July	3d Brigade reorganizes as test brigade.

1983

February	Defense Science Board publishes results of study on application of high technology to ground operations.
25 April	HTTB reorganizes as Provisional Army Development and Employment Agency (ADEA).
May	Exercise LASER MACE conducted at Yakima Firing Center to test division design.
27 May	MG Robert W. RisCassi assumes command of 9th Infantry Division.
23 June	General John Wickham becomes Chief of Staff, Army.
September	General Wickham approves concept of combined arms battalions.
September	Exercise CABER TOSS conducted at Yakima Firing Center to test HTLD combat service support concept.
1 October	ADEA established as a field operating agency of ODCSOPS.
November	TRADOC initiates an external subjective assessment of the High Technology Motorized Division.

1984

June	TRADOC assesses light attack battalion during Exercise LASER SHARP at the National Training Center.
July	OCTOFOIL FOCUS Training Density at Yakima Firing Center trains test brigade on the O&O Concept and surrogate equipment.
August	Exercise LASER STRIKE certifies division O&O Concept at Yakima Firing Center; TRADOC external subjective assessment completed.
20 December	General Wickham approves final design; determines that interim division will be operational by 1 October 1986.

1985

18 Mar-6 Apr	Joint Readiness Exercise BORDER STAR against 3d Armored Cavalry Regiment at Fort Bliss demonstrates motorized capabilities.
30 May	MG Donald S. Pihl assumes command of 9th Infantry Division.
28 September	General Wickham approves interim design based on HMMWV TOW II system.
November	3d Battalion, 60th Infantry deploys to Sinai for six months as part of the Multi-national Force and Observer mission, requiring an additional 300 soldiers above the 460 authorized for a light attack battalion.

1986

March	3d Battalion, 1st Infantry activated as seventh combined arms battalion in the division (two other light attack battalions also exist).
March-April	3d Brigade headquarters and 2d Battalion, 1st Infantry participate in Exercise TEAM SPIRIT 86.
May	Division transfers 214th Attack Helicopter Battalion, one of its two attack helicopter battalions, to 5th Infantry Division (Mech) at Fort Polk, LA.
October	Interim motorized division is fully operational. 2d Battalion, 77th Armor transfers to I Corps.

1987

10 June	MG John M. Shalikashvili assumes command of 9th Infantry Division.
23 June	General Carl Vuono becomes Chief of Staff, Army.
July	Under Secretary of the Army approves Required Operational Concept for the Armored Gun System.

1988

January	The Army conducts the first Battle Command Training Program, Exercise WARFIGHTER, at Fort Lewis with the 9th Infantry Division.

16 February	Armored Gun System cancelled.
February	HQDA decides to inactivate a brigade from 9th Infantry Division.
March-April	1st Brigade headquarters and 3d Battalion, 60th Infantry (LAB) participate in Exercise TEAM SPIRIT 88.
April	3d Battalion, 47th Infantry deploys to Sinai for six months as part of Multi-national Force and Observer mission.
May	3d Brigade conducts first motorized National Training Center rotation.
July	Division conducts CPX CABER JOUST in Washington and Oregon to test C3 systems over realistic distances.
July	81st Separate Infantry Brigade (Washington National Guard) becomes roundout to the division.
August	1st Battalion, 33rd Armor (formerly 2d Battalion, 77th Armor) transfers to 9th Infantry Division.
15 September	2d Brigade inactivates.

1989

January	1st Brigade conducts Exercise RELIABLE STRIKE II against a mechanized battalion task force from the 4th Infantry Division (Mechanized) at Yakima Firing Center in preparation for a National Training Center rotation.
March-April	1st Brigade conducts a National Training Center rotation as motorized-heavy combat team.

APPENDIX B

DIVISION OPERATIONAL CONCEPT

OPERATIONAL CONCEPT FOR AN INFANTRY DIVISION (MOTORIZED)*

* Extracted from Army Development and Employment Agency, Operational Concept For an Infantry Division (Motorized), (Fort Lewis, Army Development and Employment Agency, 1 Feb 85), pp 1-9.

1. PURPOSE. To provide the operational concept for a US Army Infantry Division (Motorized) - ID(MTZ). (It provides a conceptual focus for the development of requirements, organizations, doctrine, and training in accordance with TRADOC Reg 11-7; it is not a statement of existing capability.)

2. GENERAL.

a. The Army faces a variety of challenges for the remainder of the 1980's and beyond. It may have to fight in a mid-to-high intensity environment on a sophisticated battlefield against well equipped heavy forces or in a low-intensity environment against enemy forces that range from insurgent guerrillas to Soviet surrogates. As Army modernization efforts continue, emphasis is placed on developing flexible, combat-ready forces capable of deterring aggression and, should deterrence fail, of defeating the enemy across the full conflict spectrum.

b. The Army 86 effort to modernize heavy forces to meet the Soviet threat in the armor-dominated central European arena has produced sound fighting organizations to meet that challenge. However, the magnitude of the threat to NATO has not lessened the Army's requirement to respond to worldwide contingencies. The Army of Excellence (AOE) efforts were designed to provide a total force capable of responding to those worldwide contingencies but remaining within realistic resource constraints. The airborne, air assault, and light infantry divisions are specialized forces of great value when employed to maximize their special design characteristics. However, their employment in conflicts or scenarios inappropriate to their design characteristics diverts scarce strategic assets in a time of crisis.

c. To improve the Army's capability to meet the security demands of a dynamic and potentially volatile international environment, the requirement exists for a highly flexible, strategically responsive, lethal motorized division to provide a credible capability to act in conjunction with heavy, airborne, air assault, or light infantry forces across the spectrum of conflict. The ID(MTZ) is organized, equipped, and trained to respond to a broad spectrum of conflict environments and a wide array of contingencies. The division is optimized for combat in desert and arid mountainous areas but retains utility to respond to appropriate missions in NATO or to provide increased mobility and firepower in a low-intensity conflict.

3. LIMITATIONS.

a. The ID(MTZ) normally operates as part of a larger force-a corps or joint task force. However, when operating as an independent force, it must be provided with appropriate support for echelons above division (EAD).

b. Deployment of the ID(MTZ) to a location without secure landing areas or ports requires the establishment of local air superiority and the provision of airborne or amphibious assault forces.

c. For operations in close or urban terrain against a predominantly dismounted infantry threat, the division must be augmented with additional infantry forces.

4. OPERATIONAL CONCEPT.

a. General. The ID(MTZ) is a lethal, flexible, and versatile fighting force capable of responding quickly to crisis situations. The division is organized for responsive deployment, immediate combat operations upon arrival in any conflict environment, and quick retrieval from the operational area after the mission is completed. To meet a worst case armored threat, the division is organized around combined arms battalions equipped with a substantial number of long range anti-armor weapons. These weapons can be maneuvered quickly about the integrated battlefield using organic air and ground mobility. The division capitalizes on technological advances to enhance its performance and reduce the manpower required to perform essential battlefield tasks.

(1) The division develops its own intelligence to augment that received from higher echelons and monitors enemy forces within its area of interest. It maintains the capability to see far enough into the battlefield to execute operations and influence the AirLand Battle. Its forces are then maneuvered to provide momentum in the attack and elasticity in defense.

(2) The division employs tactics to enhance its own strengths while reducing its vulnerabilities. It achieves maximum combat effectiveness, including survivability, through force mobility, system agility, distributed command and control, and force oriented tactics emphasizing indirect approaches and stand-off attacks. To ensure survivability, the division habitually operates widely dispersed and relies on deception to mask its locations and intentions. Such dispersion and the nature of the maneuver battle requires that motorized units be organized on a combined arms basis. Further advantage is gained by equipping and training the division to operate routinely under the cover of darkness and during periods of low visibility. The division seeks to avoid rather than withstand enemy fires. Required destructive effects are gained through concentrated conventional fires or the employment of nuclear weapons if their use has been authorized.

(3) The division can be deployed in conjunction with heavy divisions and may be employed in an economy of force role, thereby freeing heavy units to conduct other missions. The division can also accept air assault, airborne, infantry or armor units with appropriate Combat Support (CS) and Combat Service Support (CSS) slices. This additional capability provides heavy/light flexibility within the overall scheme of maneuver.

(4) The division is fully capable of operating on a nuclear or chemical battlefield. Its units seek to locate and avoid areas of contamination whenever possible and protect themselves from both the initial and residual effects of nuclear and chemical weapons.

(5) The division has the essential CSS capabilities to operate for up to 72 hours, except water in arid environments and Class V (Artillery) in high intensity conflicts.

b. Mission. To rapidly deploy to a contingency area, establish or expand a lodgement, and defeat enemy forces ranging from light infantry to tank and motorized forces; to rapidly reinforce NATO.

(1) In pursuance of this mission the division conducts offensive, defensive and retrograde operations (FM 101-5-1).

(2) Against light enemy forces in all types of terrain, the division:

(a) Attacks to destroy enemy forces and, when mission essential, to seize terrain.

(b) Defends in depth to destroy enemy forces and, when mission essential, to hold terrain.

(c) Delays to disrupt enemy forces and trade space for time.

(3) Against heavy/motorized forces in close or mixed terrain, the division:

(a) Attacks to destroy enemy forces.

(b) Defends in depth to destroy enemy forces and, when mission essential, to hold terrain.

(c) Delays to disrupt enemy forces and trade space for time.

(4) Against heavy forces in open terrain, the division:

(a) Attacks to destroy enemy forces.

(b) Defends in depth to destroy enemy forces.

(c) Delays to disrupt enemy forces and trade space for time.

c. Contingency Operations.

(1) The ID(MTZ) is specifically configured to respond to situations requiring the rapid build-up of offensive combat power. It is optimized for combat in desert and arid mountainous areas. Desert or similar open terrain provides greater opportunities to maneuver, exploit particular situations, mass forces, or rapidly change the direction of movement. Often, enemy flanks are exposed to envelopment or infiltration. Frequent movement, dispersion, deception, and night operations are routine. In arid mountainous areas, corridors and cross-compartments surround lines of communications. In such areas, forces are required to maneuver over large distances to conduct decisive combat actions.

(2) The division deploys quickly to conduct operations in areas where there may be no US or allied bases. Air support is critical for success in these areas. Efficient use of available airlift to rapidly deploy the division is essential. To conduct extended operations, the ID(MTZ) requires CS and CSS augmentation from EAD.

(3) TRADOC Pam 525-14, Contingency Corps Operations, describes the phasing of the deployment to, and conduct of operations in, a contingency area from the corps perspective. The actual phasing of an operation will be commensurate with the situation. The following subparagraphs describe the phasing of a contingency operation from this perspective.

(a) Phase I - Deployment. Contingency operations normally commence with movement by air or sea of the division's assault elements into the operational area.

(1) In some contingencies, where the entry point is secure, strategic movement may be directly into the operational theater. Such movements occurred with the deployment of the 82d Airborne Division to the Dominican Republic and the French reinforcement of the forces of Chad.

(2) Other contingencies may have vague enemy situations or have defended positions at the proposed entry point (Airhead or Beachhead) into the operational theater. This will require movement from CONUS to a Forward Operating Base from which a tactical assault is made to secure a lodgement. Tactical assaults are conducted by amphibious or airborne forces attached to the joint force. Following the seizure of the lodgement, the division's assault force is introduced into the contingency area and secures the lodgement from enemy direct fire and observed indirect fire. Reconnaissance and security elements operate beyond the lodgement to gain enemy information, provide early warning and facilitate planning for future operations.

(b) Phase II - Lodgement. The lodgement phase for the division begins with the arrival of the follow-on forces of the task organized brigade conducting the assault. These initial follow-on forces are employed to fill out the maneuver, CS, and CSS elements task organized to the brigade. They reinforce the assault force, establish the lodgement area, and assist in expanding the area of influence out to the range of organic artillery weapons. Division units will continue to arrive, sequenced according to the situation. The remaining maneuver brigades (including CBAA), DIVARTY, and DISCOM all close prior to the end of the Lodgement Phase. As the buildup of the lodgement logistic base begins, the ID (MTZ) mobile ground and air maneuver forces operate in the area of influence to destroy or disrupt enemy forces threatening the lodgement. Continued support is provided by available Air Force and Naval firepower. Battlefield air interdiction and joint electronic warfare operations are mounted to enhance the security of the lodgement. Reconnaissance and surveillance systems operate throughout the area of interest to identify enemy intentions. Combat forces deploy to exploit enemy weaknesses as they are identified.

(c) Phase III - Expansion of Logistic Base and Buildup of Forces. Once the lodgement is established and the situation in the security area is stabilized, corps or JTF troops, supporting echelons, and elements of additional combat divisions will arrive. The corps or JTF expands the logistics base and support facilities for additional combat forces. Offensive action to meet and defeat enemy forces is initiated or continued. The division conducts combat operations at extended distances from the lodgement area. Acquisition and target attack systems are concentrated on critical high value targets to disrupt enemy plans and to create opportunities for offensive action. Deep air interdiction operations and timely close air support missions enhance the division's ability to seize and maintain the initiative.

(d) Phase IV - Termination of Conflict or Transition to a Mature Theater. Contingency operations are short duration combat operations to defeat enemy forces or expel them from occupied territory. If these objectives are not accomplished in a short time, the operation may transition to a mature theater.

(e) Operations in Support of Deployed Forces.

(1) Capabilities. The division is organized, equipped and trained to conduct the following types of combat operations.

(a) Covering Force Operations to gain time for deployment, identify enemy intentions, force enemy deployment from line of march and attrit enemy forces.

(b) Deep battle operation to divert follow-on echelons and destroy the enemy's ability to sustain his planned intentions.

(c) Operations in the Main Battle Area through coordinated offensive and defensive operation to destroy an enemy force or to permit decisive offensive action elsewhere on the battlefield.

(d) Rear battle operations to destroy enemy forces by rapid response and lethal firepower.

(2) Area of Operations (AO). The division AO will be larger in mature Contingency Areas, where the division is likely to be employed in an economy of force role, than in NATO where it is likely to be retained in Corps or Army Group Reserve for containment and rear battle operations. Large AOs well suit the division force design and scheme of maneuver. This capability has particular application in the provision of flank security, once the break-through has been achieved in the Corps offensive battle.

(3) Battle Design. Within the division AO three concurrent battles are fought in the Deep, Main, and Rear Battle Areas. The four maneuver brigades, including the CBAA, are task organized with the air and ground maneuver and support forces, dependent on the terrain and nature of the threat. The focus of the battle design is then to:

(a) Exploit the division's Distributed Command and Control, Communication, Intelligence (DC3I) and Target Acquisition capability, and its mobility in order to act more quickly than the enemy can think and react.

(b) Apply concentrated anti-armor firepower to destroy the enemy force at the critical time and place on the battlefield, while that enemy force is mounted in open terrain.

(c) Seek to contain rather than defeat the enemy's point of main effort.

(4) Offensive Operations. The ID(MTZ) defeats a defending force by conducting "fixing operations" to the enemy's front and attacking into his flank and rear area. This is achieved by infiltrating light, mobile ground forces through enemy positions; by enveloping a flank; or by conducting an air assault from or on a flank. Combat operations, supported by tactical air elements, are often conducted in the enemy's rear to reduce his ability to resupply forward forces and to force him to commit large combat assets to rear battle missions. Support for these operations relies heavily on integrated organic aviation, indirect fires, tactical air systems, organic air defense, intelligence, deception, and the joint application of electronic warfare. Continuous planning for the potential employment of nuclear and chemical weapons in the offense is also conducted.

(a) In the attack the division seeks to maximize its advantages - mobility and offensive anti-armor capability - while minimizing those of the enemy. Battlefield mobility is enhanced by the use of helicopters and high mobility ground vehicles for rapid maneuver. It develops deep attack targets using organic and supporting intelligence systems. Once an enemy vulnerability has been identified, it is attacked with maximum speed, surprise and violence. Deep attacks include destructive fires of supporting Air Force assets, naval assets, artillery, and maneuver forces including attack helicopters. The emplacement of obstacles, EW, Air Defense and deception provide support. Maneuver forces stay behind or infiltrate enemy lines, slip past strong defensive positions, and concentrate to destroy critical installations. Stealth, cover and concealment, and deception enable the attacking force to hide its movements and close with the enemy before he is fully prepared. The division commander assigns objectives and task organizes forces, while allowing subordinate commanders freedom of action in deciding how to fight their battle. Small unit elements move on multiple routes of advance at night, under smoke, or during bad weather, reducing the time of exposure and denying the enemy lucrative targets. The extensive use of deception to confuse the enemy and divert his combat power supports the attack.

(b) The division may also attack:

(1) To break through lightly entrenched enemy forces.

(2) To seize decisive terrain.

(3) To seize and establish bridgeheads or airheads.

(4) To destroy or reduce an enemy force operating in a rear area.

(5) As part of movement to contact, exploitation, or pursuit.

(5) <u>Defensive Operations.</u> Defense is local, temporary, and aggressively offensive in nature. It focuses on the destruction of the enemy's ability to attack, rather than on the retention of terrain. Sufficient combat power is positioned for the close-in battle to prevent the attacking enemy from achieving success at that point. Forces in depth allow the division commander to destroy an enemy penetration or to impair it by deep counter-attack. The primary targets of the "deep" attack in support of the defense are those elements determined to be critical to the continuation of the enemy offensive action and vulnerable to destructive attack. Deception supplements the defense, causing the enemy to apply combat power to nonessential areas and leading him into preselected engagement areas. The division seeks to establish a continuous flow of information on the enemy and to deny similar information on its own forces. It controls choke points and may employ stay-behind forces which, when bypassed, attack command posts and interdict enemy lines of communication. Continuous planning for the potential employment of nuclear and chemical weapons in the defense is also conducted.

(a) Although much of the division is deployed forward, it retains a strong force in depth. It is positioned where it can best destroy enemy penetrations, mount deep attacks, or conduct rear battle operations. Once the enemy main effort has been detected, the force, or part of it, may move rapidly by air and ground into the rear of the enemy force to destroy the cohesion of its attack. When vital areas are threatened or if an enemy places himself in a vulnerable position, the Division Commander may order limited counterattacks to destroy the enemy main force.

(b) The division only retains key terrain and installations, when their retention or protection is critical to current or planned operations.

(6) Retrograde Operations.

(a) Delay. The division can delay against enemy heavy forces. High speed avenues of approach are covered by protected, direct fire positions supported by air defense, indirect fires, attack helicopters, and tactical air elements. The delay force wears down the enemy, causing him to expend ammunition and fuel. The delay trades space for time and reduces the effectiveness of enemy forward elements while avoiding decisive engagement. Supporting operations designed to provide combat multipliers to the delaying force are employed to influence enemy actions. Air defense systems, indirect fires, and close air support are directed at stripping the enemy of his command and control assets, artillery, aviation, electronic warfare assets, and air defense umbrella. Limited objective counterattacks, at critical points in the battle, are executed when a favorable opportunity is presented. Offensive operations against the enemy's rear are also mounted during the delay battle. The mobility and firepower of attack helicopters and high mobility ground attack vehicles are highly effective in the delay.

(b) The division can also conduct other types of retrograde actions such as a withdrawal or retirement.

(7) Cover and Deception. Cover and deception are critical to success in all operations. Extensive efforts are made to deceive the enemy by suggesting that the division is committed to doing something that it is not doing. Deception planning is an integral part of operational planning. The division IEW and Psychological Operations are closely linked with the deception plan, as are counterintelligence and OPSEC.

e. Functional Areas. To introduce the ID(MTZ) into an area of operations and to conduct sustained combat operations, the division focuses on the following 10 functional areas and their associated combat requirements:

(1) Command and Control. Command and Control is exercised to employ forces and resources in such a way as to effect the collapse of the enemy's ability and will to continue

the fight. The system acts as a single entity and consists of the commanders, staffs, command post organization, procedures, and the necessary information on which decisions are based. Other functional areas, particularly communications and intelligence and electronic warfare support the system. The tasks of the command and control system are to find out what is happening, decide what to do about it, issue the necessary instructions, monitor how well the instructions are being carried out, and cycle through the tasks faster than the enemy can react.

(2) Close Combat. Close combat is the conduct of the AirLand, direct fire, maneuver battle. Included are light weapons, anti-armor systems, and combat vehicles. Fundamental to close combat is maneuver to destroy the enemy with direct fire weapon systems supported by combat support and combat service support elements of the division, corps or JTF, and the other services, e.g. close air support and naval gunfire.

(3) Fire Support System. The Fire Support System consists of all fires, including nuclear and chemical, other than close fires provided by maneuver direct fire systems used in their primary role. It includes the acquisition, control and coordination capability to integrate the Fire Support System with the scheme of maneuver. The mission of the Fire Support System is to contribute to the combat effectiveness of the division by enhancing its combat power.

(4) Air Defense. Air defense comprises the destruction, neutralization, or reduction of effectiveness of enemy aircraft utilizing active and passive means. The system includes friendly target acquisition means considered integral to air defense as well as its related command and control. The objective of air defense is to limit the effectiveness of enemy offensive air operations to a level permitting freedom of action for friendly forces. The division's HIMAD coverage is provided by corps, joint task force, or attached elements when deployed.

(5) Communications. Communication is the distribution of accurate and timely information among units. Included is the capability to communicate in a hostile EW or nuclear environment. The fundamental tasks include guarding security, switching, maintenance of procedures, transmission, termination, and management. Communication is critical to the other battlefield tasks.

(6) Intelligence and Electronic Warfare (IEW). IEW assets determine the movement, character, disposition, capabilities, and intention of hostile units to support the planning for and execution of operations. They include surveillance in support of command and control and the means to correlate, integrate, and fuse this information with that of other sensor systems and sources into intelligence. IEW also includes the capability to detect, identify, locate, report, disrupt, deceive, and exploit hostile systems operating in the RF spectrum. The division controls the electromagnetic spectrum through the use

of mobile, lightweight EW systems. By analyzing the enemy's communication systems, the division targets or monitors vital command and control networks. The EW system is capable of intercept, jamming, deception, and countersurveillance.

(7) Combat Support Engineering and Mine Warfare (CSEMW). CSEMW includes neutralizing obstacles to friendly force movement, emplacing obstacles to canalize and impede enemy force movement, preparing positions to enhance friendly force survivability, and providing general engineering support. Division's topographic capability is provided by EAD.

(8) Combat Service Support. Combat service support for the division is designed to maximize the number of weapons systems fully operational on the battlefield. This support arms, fuels, fixes, and re-mans the weapons systems as far forward as possible; provides supply, maintenance, services, medical aid, and personnel services support to tactical units. CSS is the essential battle support of committed forces and those ordinary and extraordinary measures taken to continuously reconstitute the forces. It facilitates rapid movement of troops and supplies to concentrate combat power at critical times and places.

(9) Nuclear, Biological, and Chemical (NBC) System. The objective of the division is to survive and accomplish its mission despite lethal and degrading NBC hazards. The system focuses on survival through NBC defense measures that warn and protect individual soldiers. The system facilitates accomplishing the mission with specified operational procedures, specialized equipment, and trained units to reduce the potential loss of combat effectiveness associated with NBC warfare.

(10) Aviation. Within the division, aircraft provide for reconnaissance, command and control, close combat, air assault, and logistic resupply. The system includes the necessary command and control and combat service support to integrate and sustain aircraft in each functional area and to conduct air and ground operations within the overall scheme of maneuver.

APPENDIX C

ORGANIZATIONAL CHARTS

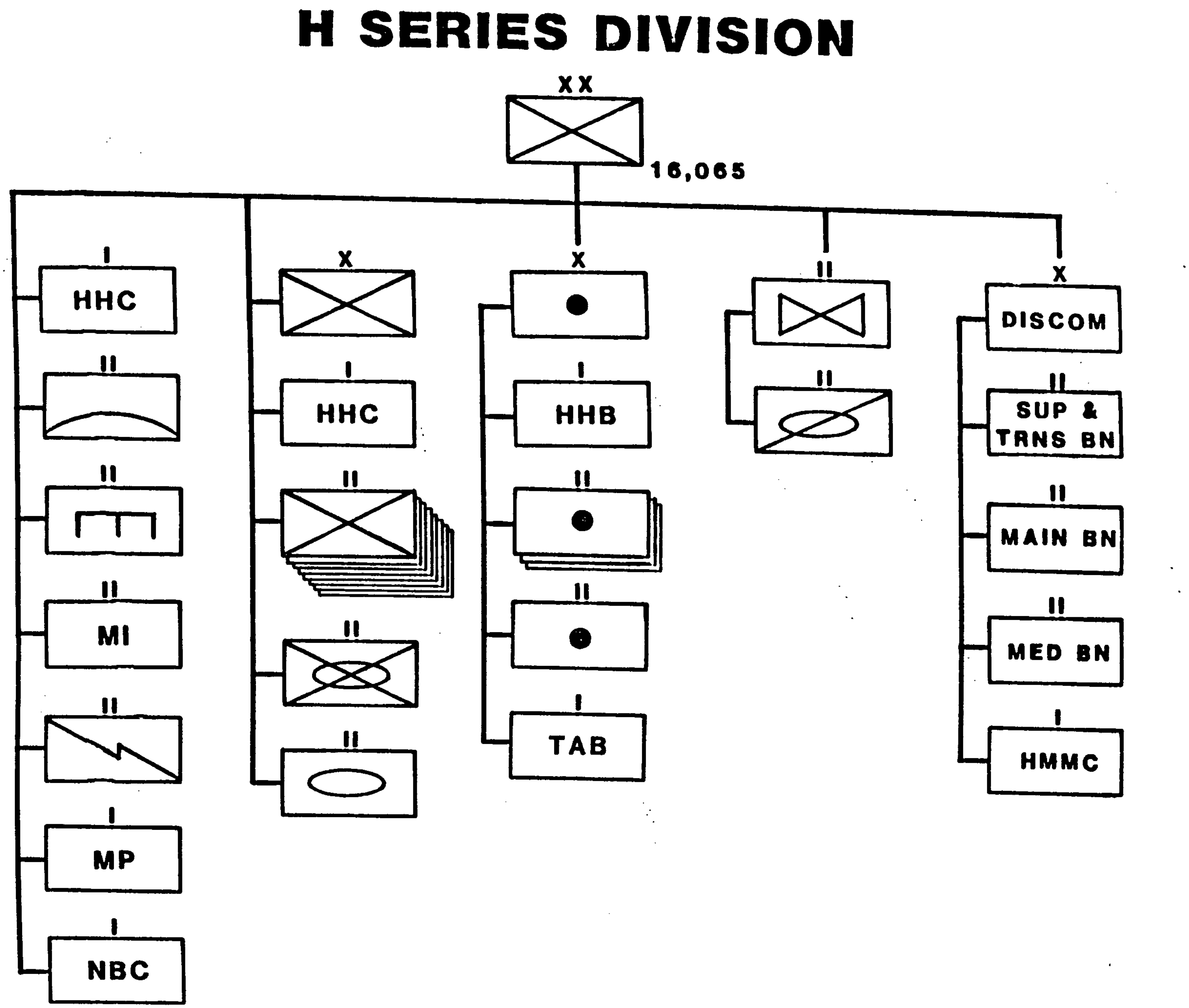
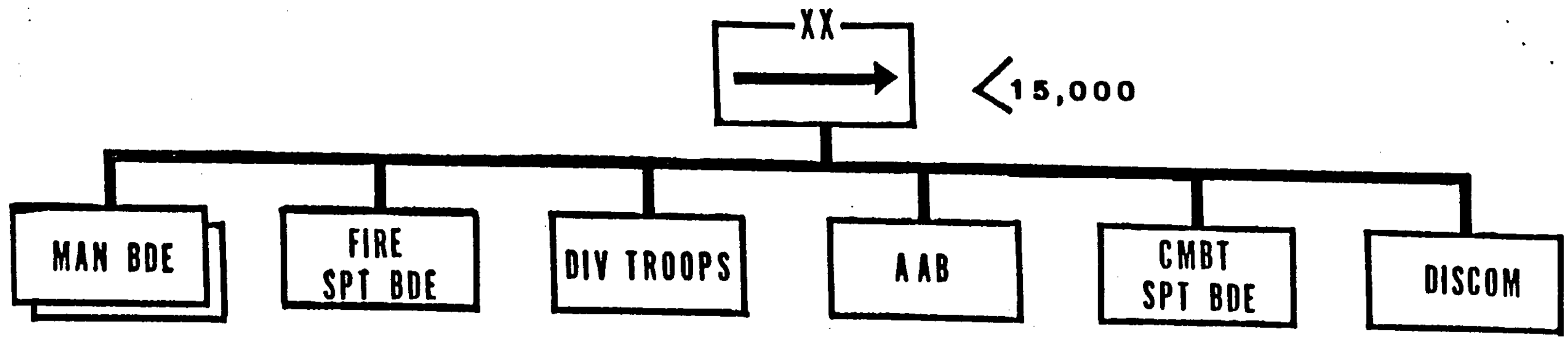

H SERIES DIVISION
XX
16,065
HHC
MI
MP
NBC
HHC
HHB
TAB
DISCOM
SUP & TRNS BN
MAIN BN
MED BN
HMMC

FIG 1

STRIKE DIVISION



MANEUVER BDE
- 2-QKV BNS
- 1-MPG BN
- 1-SPT CO
  - . ENG PLT
  - . MAINT PLT
  - . EW PLT
  - . NBC PLT

FIRE SPT BDE
- 2-CANNON BNS
- 1-MORTAR BN
- 1-MLR BN
- 1-TAB

DIV TROOPS
- 1-NBC CO
- 1-ADA BN
- 1-SIG BN
- 1-MI BN

AIR ATK BDE
- 3-ATK HEL BN
- 1-CSAB BN

CMBT SPT BDE
- 1-ABN INF BN
- 1-AIR CAV SQDN
- 1-ENG BN
- 1-RECON CO

DISCOM
- 3-FWD SPT BNS
- 1-MAIN SPT BN

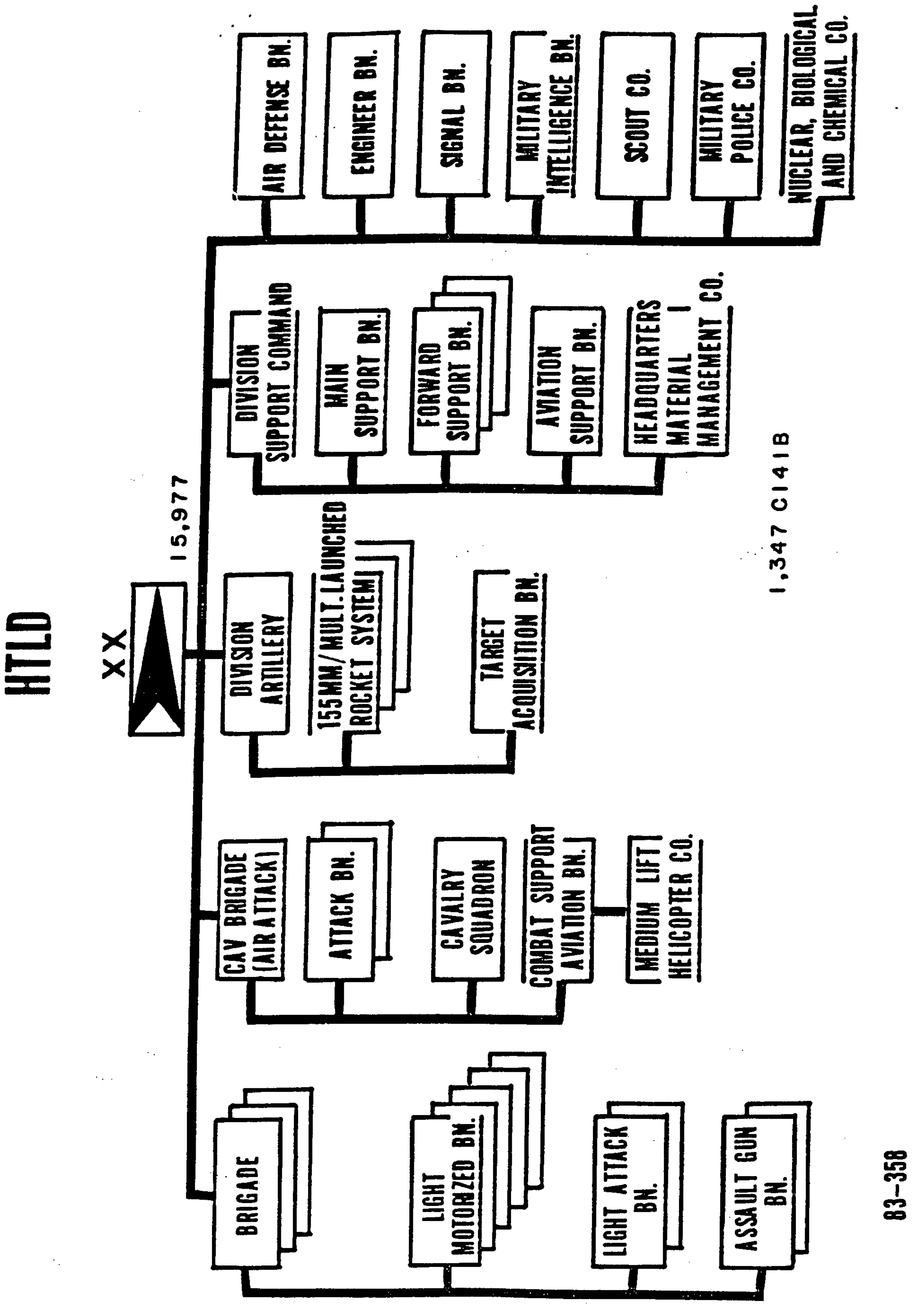
PLUS UP ANALYSIS

MOBILE INFANTRY

DECEPTION UNIT

ADDN'L AVIATION LIFT

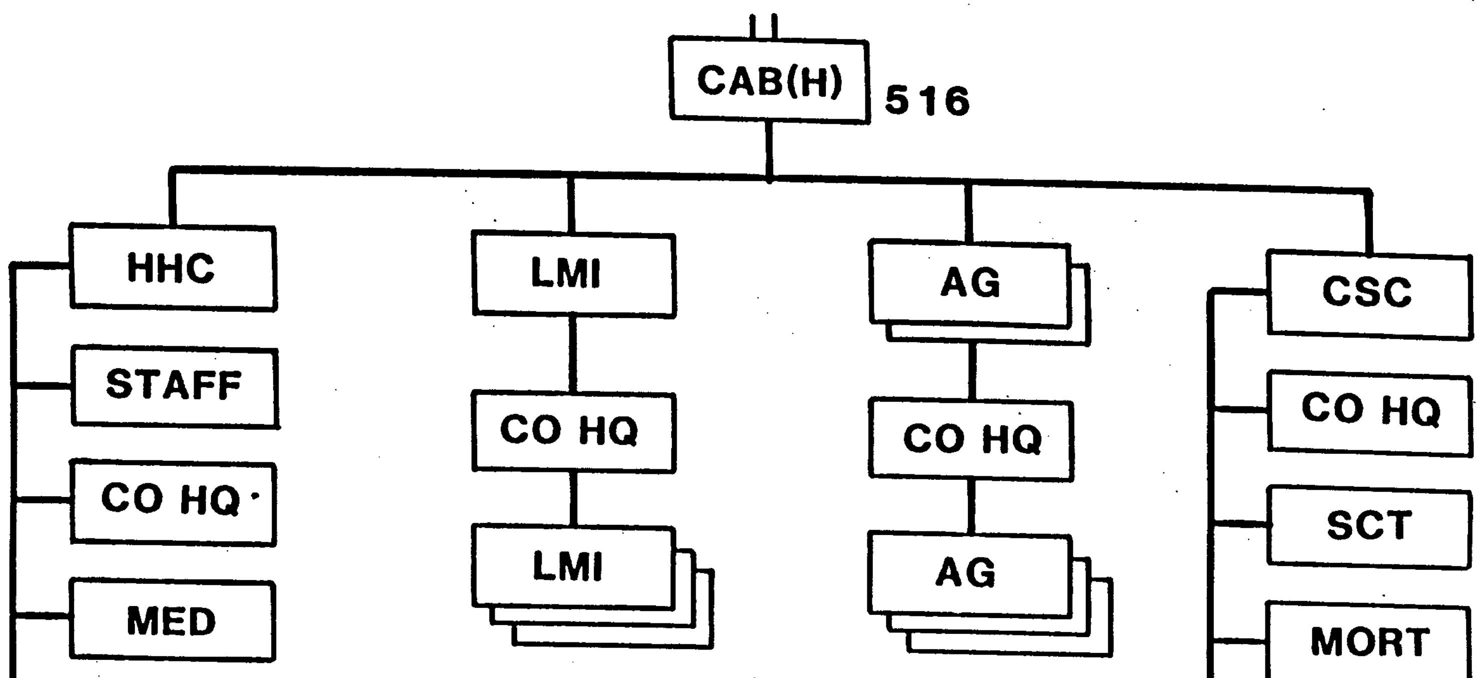
FIG 2



HTLD
XX
15,977
BRIGADE
LIGHT MOTORIZED BN.
LIGHT ATTACK BN.
ASSAULT GUN BN.
CAV BRIGADE (AIR ATTACK)
ATTACK BN.
CAVALRY SQUADRON
COMBAT SUPPORT AVIATION BN.
MEDIUM LIFT HELICOPTER CO.
DIVISION ARTILLERY
155MM/MULT. LAUNCHED ROCKET SYSTEM
TARGET ACQUISITION BN.
DIVISION SUPPORT COMMAND
MAIN SUPPORT BN.
FORWARD SUPPORT BN.
AVIATION SUPPORT BN.
HEADQUARTERS MATERIAL MANAGEMENT CO.
AIR DEFENSE BN.
ENGINEER BN.
SIGNAL BN.
MILITARY INTELLIGENCE BN.
SCOUT CO.
MILITARY POLICE CO.
NUCLEAR, BIOLOGICAL AND CHEMICAL CO.
1,347 C141B
83-358

FIG 3

OBJECTIVE
HEAVY COMBINED ARMS BATTALION

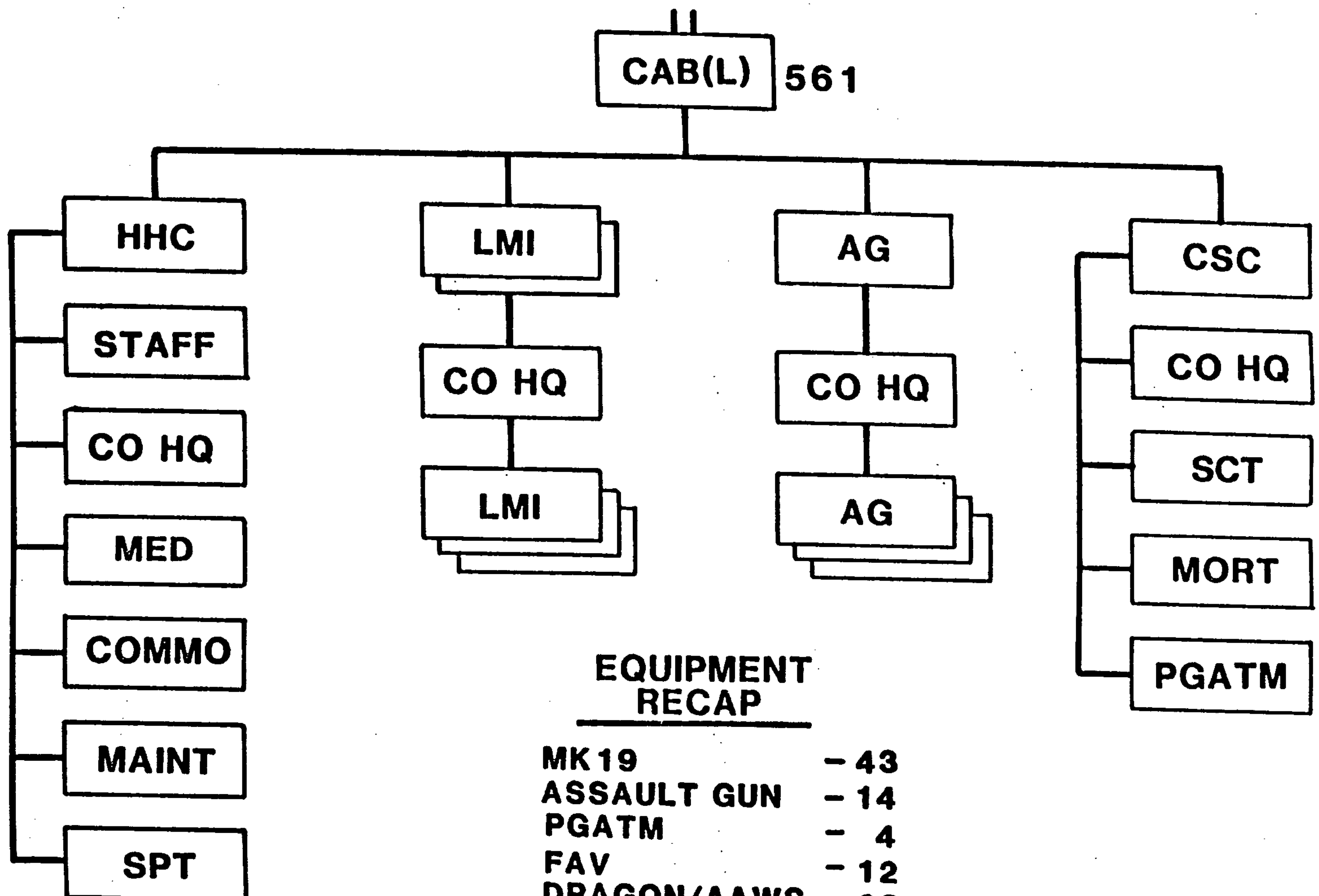


EQUIPMENT RECAP

MK19	– 29
ASSAULT GUN	– 30
PGATM	– 4
FAV	– 12
DRAGON/AAWS	– 15

FIG 4

OBJECTIVE
LIGHT COMBINED ARMS BATTALION



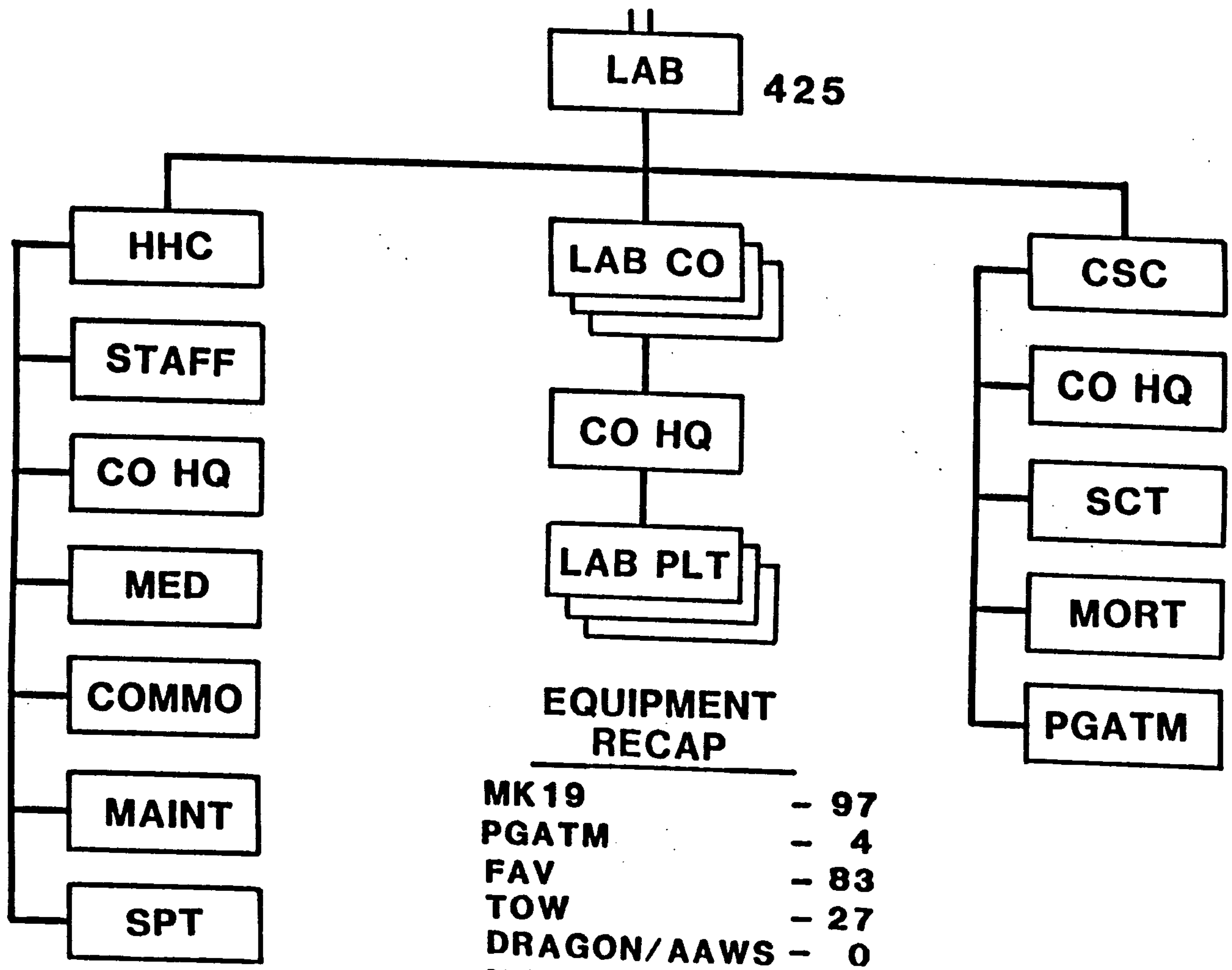
EQUIPMENT RECAP

MK19	– 43
ASSAULT GUN	– 14
PGATM	– 4
FAV	– 12
DRAGON/AAWS	– 30
MORTARS	– 6

83-1163

FIG 5

OBJECTIVE
LIGHT ATTACK BATTALION



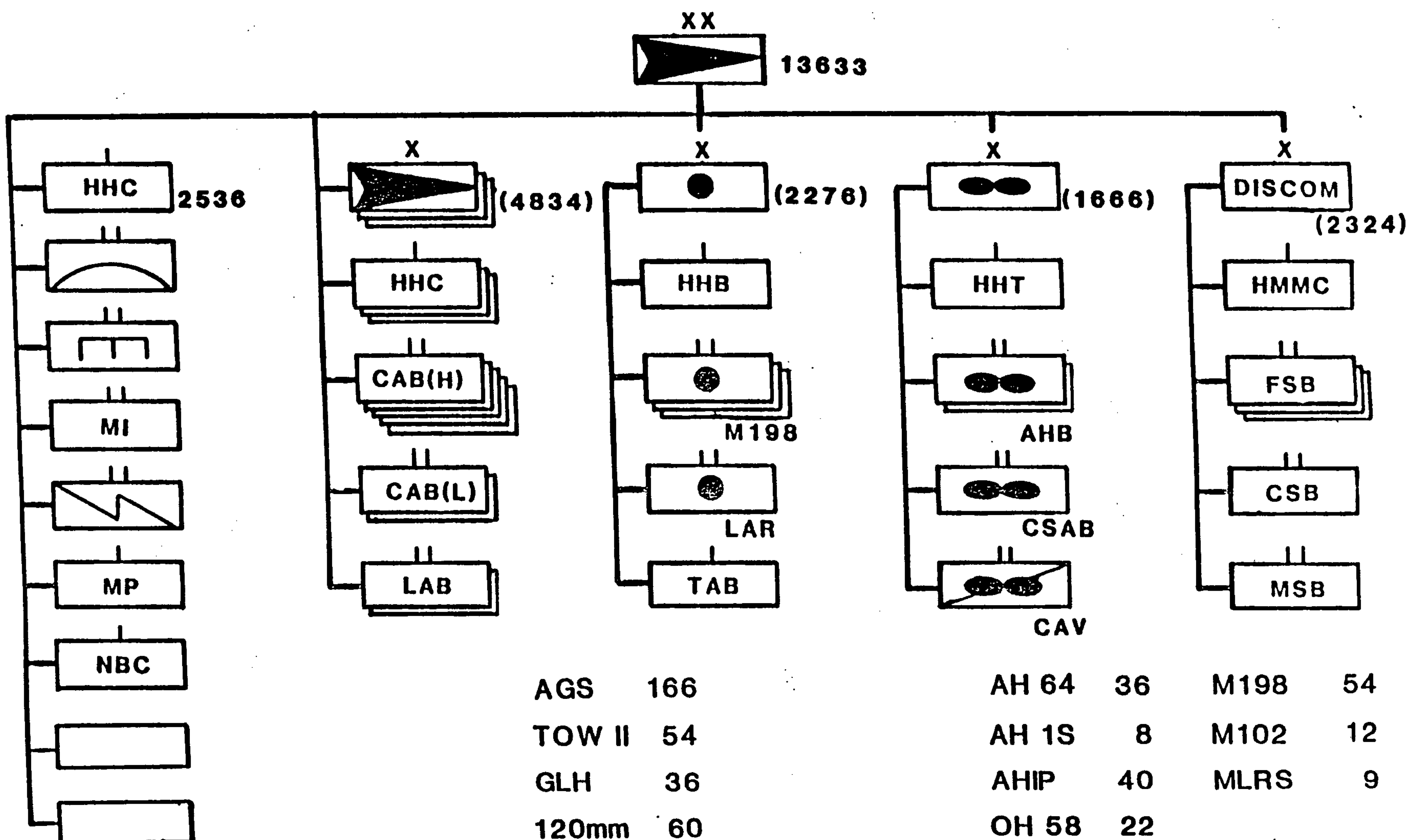
EQUIPMENT RECAP

MK19	– 97
PGATM	– 4
FAV	– 83
TOW	– 27
DRAGON/AAWS	– 0
MORTARS	– 6

83-1165

FIG 6

9ID(MTZ) OBJECTIVE DESIGN



AGS	166
TOW II	54
GLH	36
120mm	60
MK19	965
FAV	327

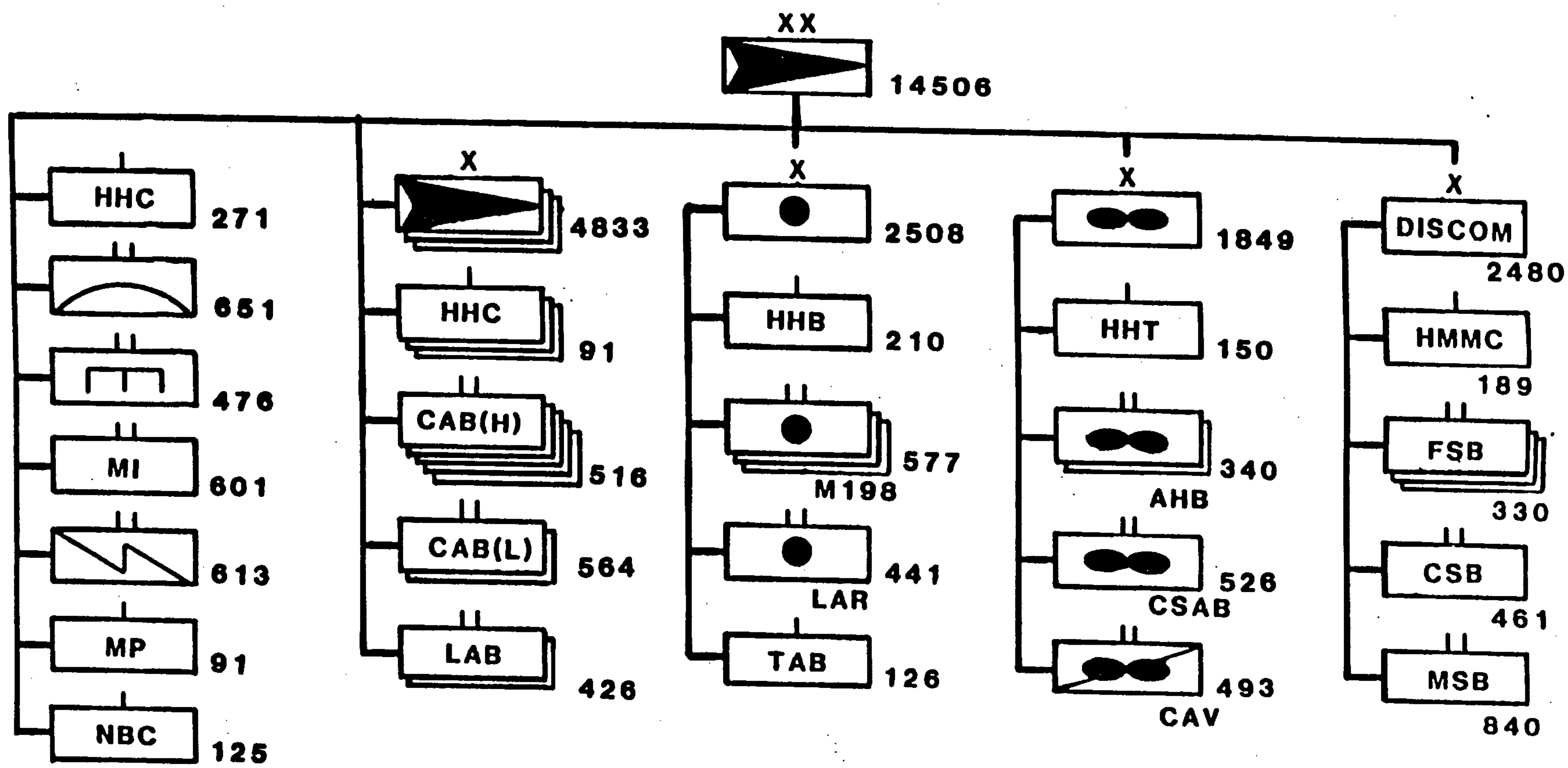
AH 64	36
AH 1S	8
AHIP	40
OH 58	22
UH 60	47
TOW II	12

M198	54
M102	12
MLRS	9

12/03/84
84-1251

FIG 7

HTLD

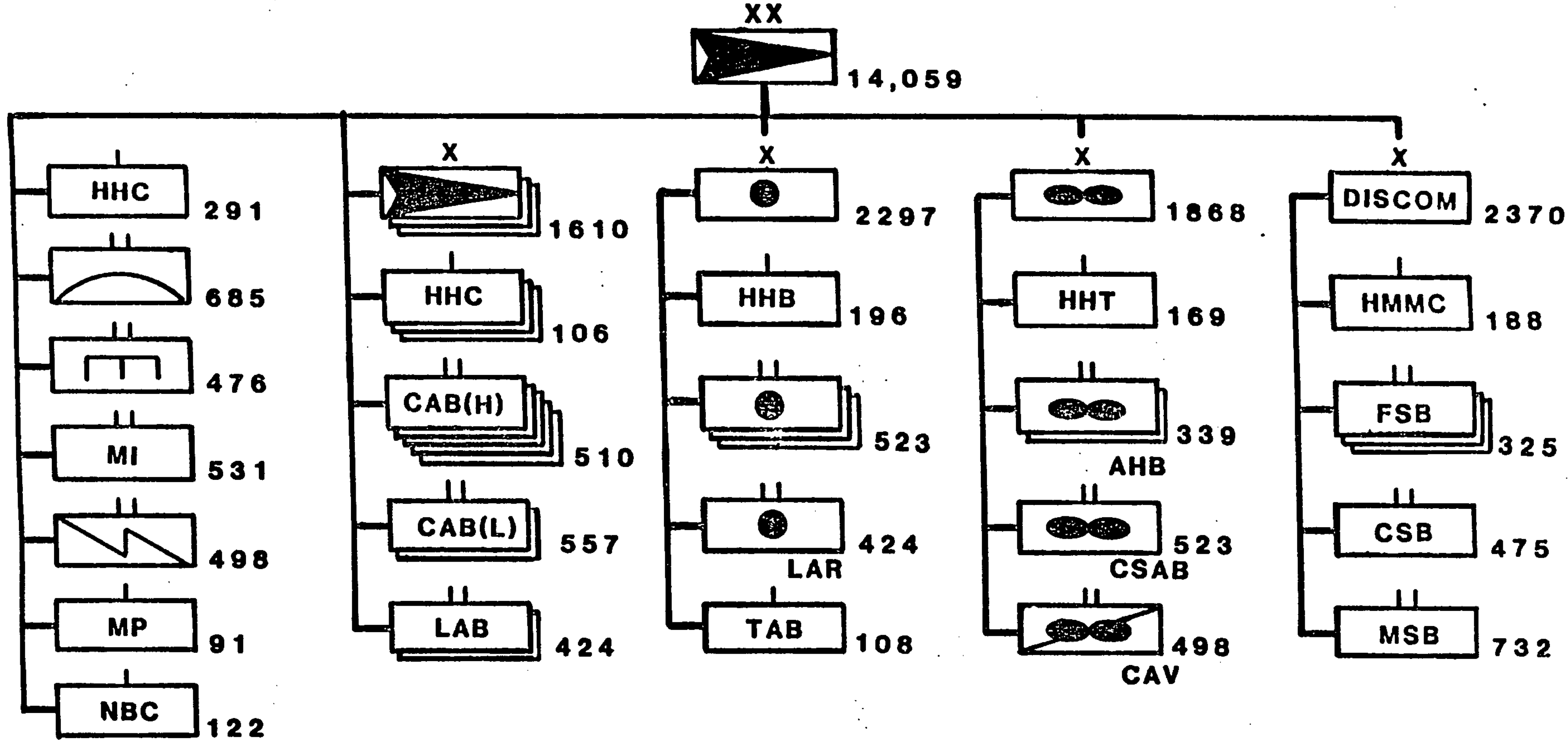


DECEMBER 1983

83-1183 9/3

FIG 8

9ID(MTZ) DIVISION DESIGN



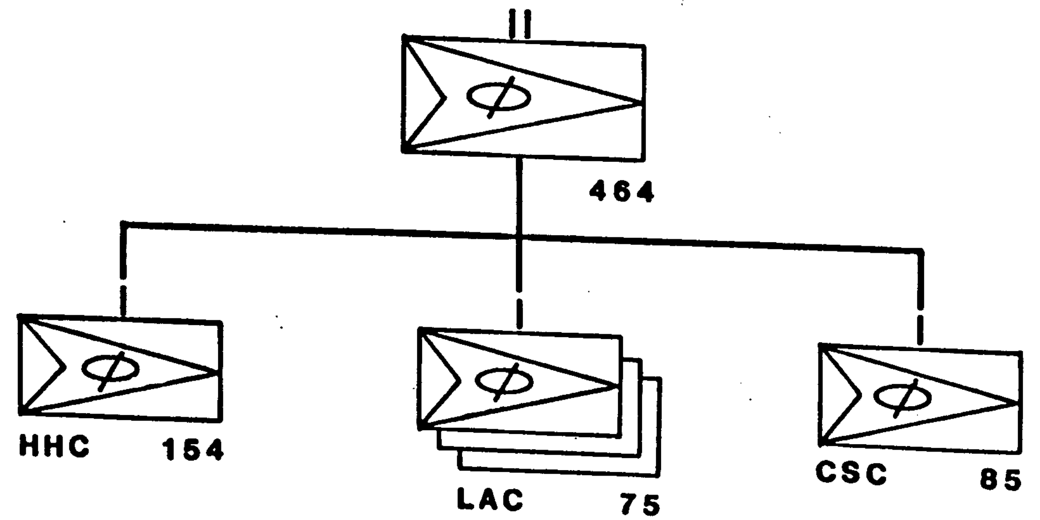
1200 C141B SORTIES

DECEMBER 1984

FIG 9

84-1250

INTERIM
LIGHT ATTACK BATTALION
(LAB)

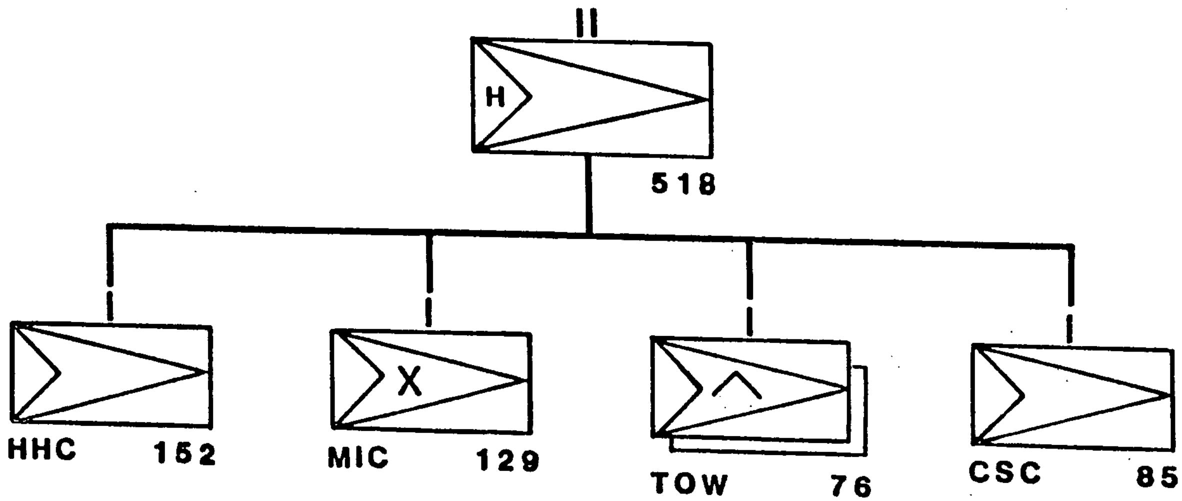


31 - HMMV TOW
91 - MK19 GMG
6 - MORTARS, 107mm

88-097

FIG 10

INTERIM
COMBINED ARMS BATTALION, HEAVY
(CAB-H)

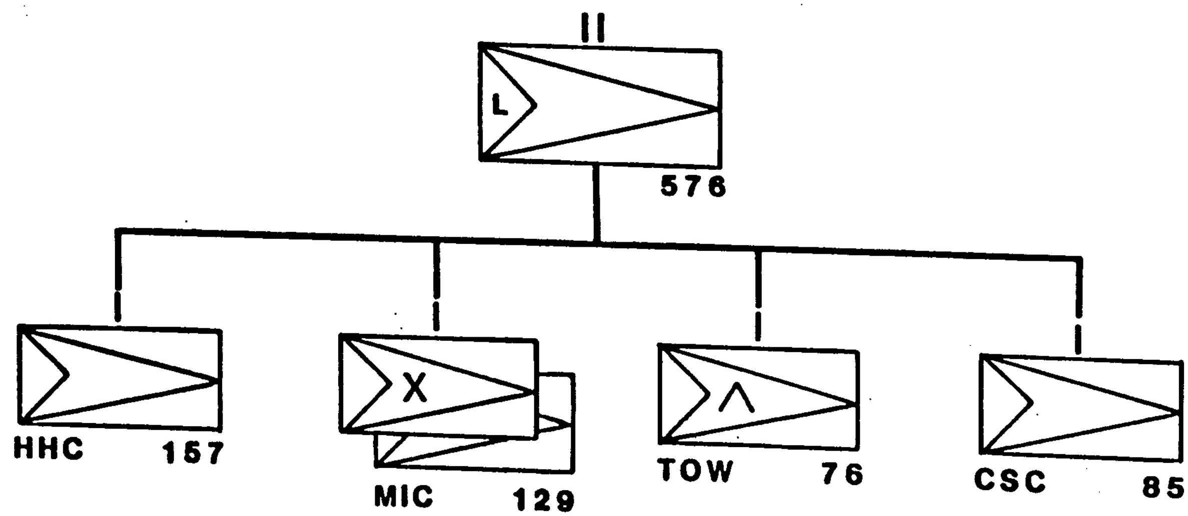


44 – HMMWV TOW
67 – MK19 GMG
15 – DRAGON
6 – MORTARS, 107mm
9 – INF SQUADS

88-096

FIG 11

INTERIM
COMBINED ARMS BATTALION, LIGHT (CAB-L)



24 – HMMWV TOW
75 – MK19 GMG
30 – DRAGON
6 – MORTARS, 107mm
18 – INF SQUADS

88-096

FIG 12

THE 9th DIVISION 1988

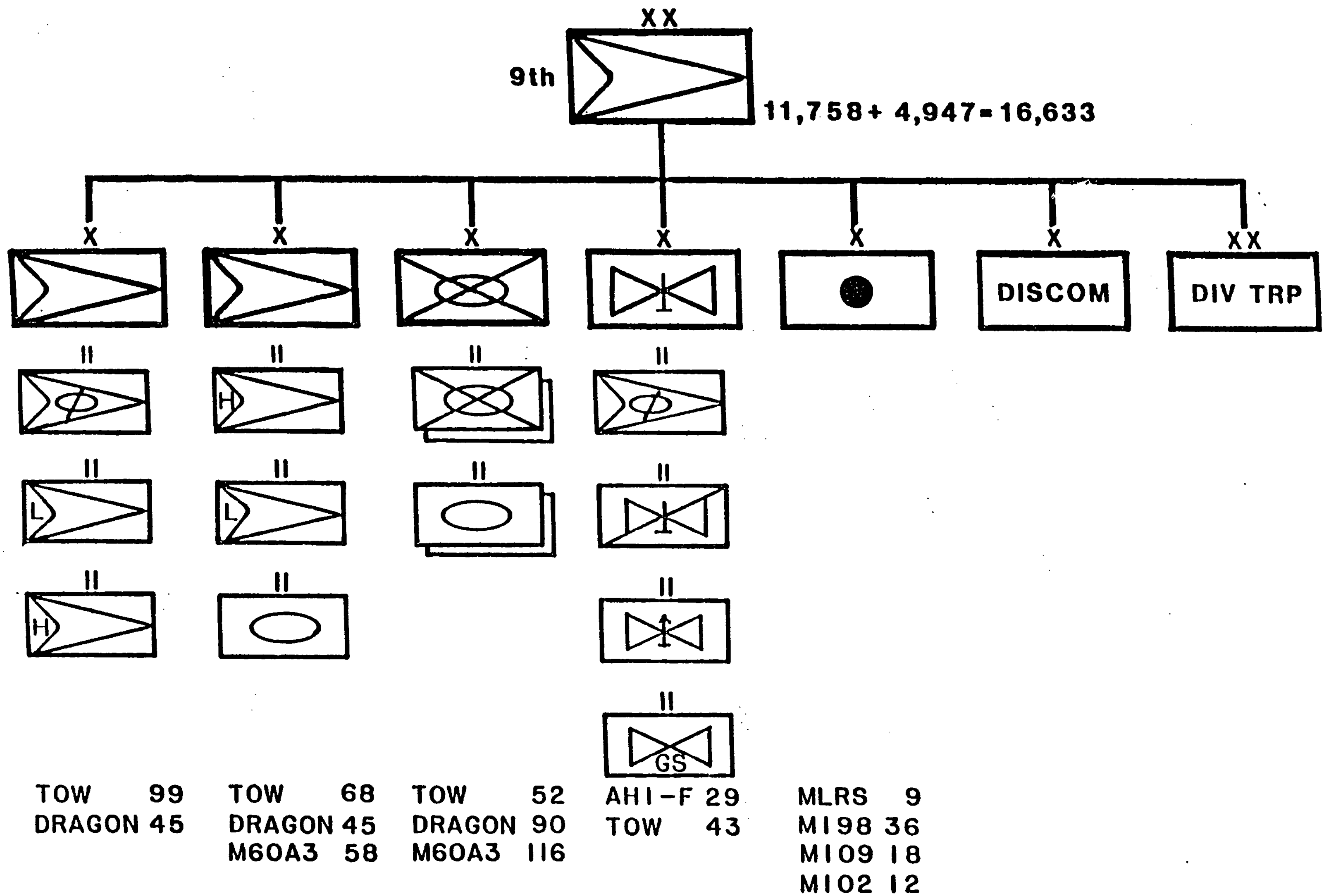


FIG 13

APPENDIX D

EQUIPMENT SUMMARY

EQUIPMENT SUMMARY

The organizational and operational concept specified key systems necessary for motorized operations. The following is a brief description of some of the key pieces of equipment in the division, organized by battlefield operating systems.

INTELLIGENCE

The Unmanned Aerial Vehicle (UAV) system performed the functions of long-range surveillance, route reconnaissance, communications and non-communications intercept/DF/jamming, environmental sensing, and communications relay. System taskings were received from the MI battalion operations center through the operations section of the general support company for GS missions and from the operations section of the forward support company for brigade DS missions. Information from the UAV was downlinked to ground system components, processed and digitally reported to appropriate users. All elements were carried on HMMWVs. The 9ID used a manually piloted surrogate UAV, called MERCURY GREEN, during the testing of the objective division.

The Long Range Electro-Optical (LREO) System was an amplification camera system designed to provide long-range day (30 km) and night (19 km) surveillance of the battlefield. Images could be recorded on a videocassette recorder with a display of azimuth, elevation, and date/time group for analytical purposes. When in a direct support role, information collected was sent concurrently to the supported unit and the MI battalion operations center.

The Universal Acquisition System (UAS)-11 was a ground-based observation, surveillance and target acquisition system used to detect, identify, locate and range targets which emit a thermal signature. It had both day and night (thermal) capability and, for targets within ten kilometers, it could determine range to within ten meters by means of its laser range-finder. It was also capable of directing laser beam-riding missiles onto targets, should the situation warrant.

The PRD-11 was a man-portable vehicular radio receiver and direction finder system which provided accurate radio interception and line of bearing information.

The TLQ-17 was a mobile jamming set used against both ground and airborne communications signals.

The TRQ-32 was a radio receiving system used to receive, record, and determine the direction of transmitted signals. Communications intercept was provided in the HF, VHF, and UHF ranges, while direction finding was provided in the VHF range only.

The AN/ULQ-19 (RACAL) was a VHF responsive jamming system which was used to collect, jam, or harass enemy voice communications.

MANEUVER

The Assault Gun System (later called Armored Gun System, or AGS) was initially conceived as a wheeled lightly armored vehicle equipped with a missile capable of killing a tank head-on. It evolved into a tracked vehicle equipped with a rapid-firing kinetic energy gun, capable of killing tanks, BMPs, and helicopters. The AGS had a secondary mission against bunkers and buildings. It was C130 and C141 transportable. Lightly armored, it gained its protection from speed, maneuverability, cover, and concealment. It was not to be used as a tank. For LASER STRIKE and BORDER STAR 85, the M901 Improved TOW Vehicle (ITV) was used as a surrogate, while a search for technology closer to the objective design was on-going. Several prototype AGSs were built by private industry as possible candidates.

The Fast Attack Vehicle (FAV) was a lightweight, all terrain vehicle with utility based on its superior speed and mobility. A low silhouette, small size and speed made it difficult to detect, track, or engage, thus enhancing its survivability, especially during night operations. It had a two man crew and had two configurations: one was armed with the TOW missile system; the other had the MK-19 40mm grenade machine gun. Two FAVs could be slung under a UH-60 helicopter and seven could be carried by a CH-47D. The FAV eventually became linked to an Army-wide requirement for a similar-type vehicle called the Light Forces Vehicle (LFV).

The High Mobility Multipurpose Wheeled Vehicle (HMMWV) squad carrier was a highly mobile wheeled vehicle which carried an infantry squad of eight personnel. It was armed with the MK19 40mm GMG, was capable of being carried by UH60 helicopter, and could be transported in C130 and C141 aircraft. The design concept called for the squad carriers to have ballistic protection against small arms and fragments. The surrogate for the HMMWV squad carrier was the M882 Dodge pickup truck, specially modified with an improved suspension, a roll cage, and seats with seat belts for the infantry squad. A interim version of the squad carrier was a M998 HMMWV Cargo Carrier, modified in the same manner as the M882.

The Precision Guided Anti-Tank Missile (PGATM) system was designed to furnish each maneuver battalion with long-range (approximately eight km) indirect anti-tank capability using either self-contained, lock-on-after-launch munitions (fiber optic missiles) or laser beam riding munitions (the Ground Launched HELLFIRE--GLH). This long-range capability greatly enhanced the maneuver battalion's ability to destroy key enemy weapons systems selectively from long-range hide positions. The GLH platoons used in LASER STRIKE and BORDER STAR 85 had Ground Laser/Locator Designators (GLLD) mounted on FAVs to acquire and lase targets. In addition, the artillery Forward Observation and Lasing Teams (FOLTs) could designate targets, as could any airborne laser designator. The missiles were mounted and fired from modified M882 Dodge pickup trucks.

The Mark 19 was a 40 mm grenade machine gun with a maximum effective range of 2250 meters against area/personnel targets. The MK 19, mounted on squad carriers and Fast Attack Vehicles (FAV), was used primarily as an area suppression weapon against infantry forces. However, firing the new improved M430 HEDP ammunition, the MK 19 also had utility against lightly armored vehicles. The eventual development of a modified TVS-5 sight with a dual reticule would give gunners a night firing capability. Due to the relatively slow velocity of the 40 mm round, the weapon was fired in a semi-indirect fire mode. At extended ranges, the gunner generally adjusted by burst on target. While normally mounted, the MK 19 could also be fired from the ground using a tripod.

The TOW (Tube-Launched, Optically Tracked, Wire Command-Link, Guided) missile was a powerful anti-tank weapon. When the missile was fired, a sensor in the launcher tracked a flare in the tail of the missile. The gunner needed only keep his crosshairs on the target. A computer in the launcher corrected any deviation of the missile from the crosshair aim point and sent corrections to the missile via two extremely fine wires that deploy in flight. The system had a day and night (thermal) sight and a range of 3750 meters.

The Dragon was a medium-range (1000 meters), wire-guided anti-tank missile that provided man-portable anti-tank capability at infantry platoon level. The gunner kept his sight crosshair on the target. An electronic mechanism the launcher tracked an infrared flare in the tail of the missile and keeps it aligned with the gunner's line of sight via commands sent along two thin wires. Course corrections were made by rocket thrusters in the body of the missile.

FIRE SUPPORT

The Lightweight TACFIRE (LTACFIRE) replaced the standard battalion TACFIRE Computer mainframe and Variable Format Message Entry Devices. Under the LTACFIRE concept, the battalion computers processed less information and perform fewer functions. The equipment and TOC was smaller and lighter, allowing incorporation directly into a single C3 HMMWV. Primary technical fire control was done at the battery level, and the fire support system gained a device that had a capability for storage of tactical target data. At fire support team (FIST) level, the FIST headquarters was equipped with the improved FIST Digital Message

Device (DMD) that permitted FIST chiefs to monitor and coordinate calls for fire. At battalion and brigade level, the fire support officers accessed the DivArty and battalion computers for special weapons target analysis and fire planning functions. The FA battalions had a lighter, smaller, less complex system which reduced the sustainment training impact of the standard TACFIRE computer. The system could be transported by C130 or UH-60 and was air droppable.

The Ground Laser Locater Designator (GLLD), AN/TVQ2 tactical system with accessories, including night sight, weighed 180 pounds. The Laser Designator/Range Finder Module (LD/R) was the principal component of the system. It contained the laser and all associated electronics, optics and controls. With the Laser Designator/Rangefinder, the operator designated targets with a narrow beam of encoded laser energy. Either a precision guided munition or an airborne laser spot seeker set on the same coded setting would home in on the laser energy reflected from the target. The GLLD's thirteen power optics provided the capability to engage targets out to five kilometers. The operator could also use the unit to determine an accurate range and direction to targets or reference points. The LD/R could be connected directly to a DMD allowing the direct feed of digital range data automatically to the Fire Direction Center. GLLDs improved target location accuracy greatly. The GLLD provided a capability to determine an accurate range (+/- five meters) and azimuth (+/- two miles) to a target or reference point. It performed precision laser designation. The GLLD used a pulse-coded laser designator that was compatible with all US and many NATO laser guided munitions. It also designated targets for aircraft-launched weapons. The GLLD was compatible with all US and many NATO airborne laser spot acquisition systems mounted on close air support aircraft and attack helicopters.

COPPERHEAD, a cannon-launched guided projectile, was a 155 mm artillery projectile designed to destroy stationary or moving enemy tanks and other high value targets. When the projectile reached the general vicinity of the target, it searched for and acquired the reflection of a laser beam projected on the target by a friendly forward observer. It then made the necessary course corrections and homed in on the laser spot. COPPERHEAD had a range of sixteen kilometers.

AIR DEFENSE

The HMMWV Mounted Stinger (HMS) (also known as Pedestal Mounted Stinger--PMS) was a highly mobile short-range, low altitude, lightweight air defense system. It consisted of a HMMWV-base vehicle with an integrated fire control unit module which was made up of a rotatable turret, two missile launching platforms and a gunner's station. It was equipped with a Forward Looking Infrared Radar (FLIR), giving it day, night and adverse weather capability. It carried eight Stinger missiles which could be removed and used in a man-portable role. The system was capable of shooting while moving, and its fire-and-forget ability allowed engagement of multiple aircraft.

Light Air Defense System (LADS) was the objective design concept for a short range air defense (SHORAD) weapon system employed to protect the division's priority assets such as maneuver forces and lodgement areas. The LADS weapon system could defeat the complete air target (fixed and rotary wing aircraft) at a maximum effective forward aspect range of approximately six kilometers. It was self-propelled with the mobility and transportability of the supported force. It would have a dual role (ground-to-air/ground-to-ground) capability. Two prototypes were tested to meet the objective design: the Vulcan Wheeled Carrier (VWC) and the PMS. Ultimately, the Army chose PMS as the primary SHORAD system for all light forces.

The Tactical Defense Alert Radar (TDAR) was an early warning radar that disassembled into three man-portable packages. It was quickly assembled and operated silently using 24-volt power supplied by standard vehicle batteries. The radar had a range of 20 kilometers, and its clock-type display could be remoted up to 100 meters. TDAR was allocated to each battery, but had no dedicated crew. The thirteen tactical defense alert radars augmented the SHORAD battalion's eight Improved Forward Area Alerting Radars (FAAR). The TDARs would be employed as a gap filler to provide target alerting information to units not covered by FAAR. Centralized sensor management enabled the battalion to directly emplace the TDARs to fill coverage gaps along likely air avenues of approach, to provide a forward extension of FAAR coverage, and to enhance "blinking" as a survivability technique. Although the TDAR was susceptible to ECM, this activity provided alerting information to the Stinger section in its area of operation. The radar's light weight enabled optimum positioning (by UH-60 or manpack) where terrain restricted trafficability.

ENGINEER

The Armored Combat Earthmover (ACE) was a highly mobile armored, amphibious combat earthmover that significantly enhanced the support role of the combat engineers on the modern AirLand battlefield. The ACE allowed earthmoving capability to move and survive in the forward battle area in close combat with other elements of the combined arms team. This was not possible before the ACE. High speed cross-country mobility enabled the ACE to be shifted flexibly across the battlefield as well as remain tightly tucked up to supported maneuver task forces. It enhanced the mobility, countermobility, and survivability of light combat forces. Priority tasks were excavation and preparation of obstacles, battle positions, strong points, artillery positions, protective emplacements for command posts, air defense, communications equipment, and critical supply/logistical areas.

The Ground Emplacement Mine Scattering System (GEMSS) was a trailer-mounted engineer system that could be used to emplace large tactical minefields rapidly in areas controlled by friendly forces. GEMSS was designed to lay down hasty minefields to channel approaching enemy armor into constricted areas for more rapid, efficient, destruction by friendly forces. GEMSS could be employed to protect flanks and provide backup of secondary defensive positions in friendly territory. Previously, minefield emplacement required extensive manpower, time, and logistical support. The GEMSS could lay down up to 800 mines in three 900 by 60 meter rows, separated by 50 to 100 meter lanes, all within 20 to 30 minutes. The self-destruct nature of the scatterable mines enabled friendly maneuver through an area after the mines had done their job and self-destructed.

The Light Assault Bridge was a lightweight highly mobile, trailer-mounted bridge capable of supporting light infantry forces with a rapidly placed assault bridge. The Light Assault Bridge would be employed by engineer units attached to forward elements of light infantry. It possessed the same degree of mobility and endurance as the force it supported. The system was a military load class 30 double-folded scissors bridge with a 23 meter span capability.

The Mine-Clearing Line Charge (MICLIC) was a trailer-mounted engineer system that was used primarily, but not exclusively, in anti-tank/anti-vehicle minefield breaches (100 meters long X 8 meters wide). It could also be employed to breach close-in or heavily defended mine obstacles, although this was not the optimum method for breaching. The MICLIC consisted of a trailer chassis, launcher/rail assembly, and packaged line charge. The line charge was 350 feet in length and contained five pounds per foot of C-4 plastic explosive, a total of 1750 pounds. Detonation of the charge would clear the lane by causing sympathetic detonation of mines alongside the line.

The Small Emplacement Excavator (SEE) was a lightweight, all-wheel drive, diesel-driven, high-mobility vehicle with backhoe, bucket loader and other attachments. The SEE would be used to dig combat emplacements quickly (i.e., crew served weapons positions, command posts and individual fighting positions) for units in the main battle area. The high mobility of the SEE provided an earthmoving machine capable of rapid movement between battle positions.

The Tactical Explosive System (TEXS) was a binary explosive system. TEXS was employed by combat engineers in the covering force, main battle and rear areas to create long anti-tank ditches using pre-emplaced or rapidly emplaced pipe. It also would be used to crater roads, destroy bridges, create rubble obstacles in urban areas, reduce counter-mobility obstacles, create or destroy fighting positions, and in general purpose demolition tasks. It consisted of liquid explosives, mixing/pumping equipment, pipe and a modified SEE.

The VOLCANO was a multiple delivery (heliborne or ground) mine system. VOLCANO would be employed offensively and defensively to delay the enemy, isolate the battlefield, and reinforce friendly forces. Ground VOLCANO was an engineer system that could be used to emplace large tactical minefields and point minefields rapidly in areas controlled by friendly forces. It would ultimately replace GEMSS and become the principal scatterable mine delivery system. The system had a 960 mine capacity and was capable of providing a mined area 1100 meters X 150 meters in dimension. VOLCANO responsiveness was limited only by the the crew's ability to load the dispenser (approximately 15 minutes) and the vehicle speed in traveling to and traversing the area to be mined.

COMBAT SERVICE SUPPORT

The Palletized Loading System (PLS) concept called for a family of heavy and medium wheeled vehicles, associated trailers, and de-mountable cargo beds. Each vehicle had an integral self-load/unload capability using an organic hydraulic arm. All parts of the system were air transportable by C130 or C141B aircraft. The PLS allowed supplies, ammunition, and equipment to be loaded on the cargo beds, lifted onto the vehicle, and then down-loaded without any other load handling equipment. A PLS vehicle and trailer could transport up to 30 tons of supplies. It could carry 350 155mm rounds at one time, five times the carrying capacity (72 rounds) of a five ton truck. Such a vehicle showed great promise for the throughput of supplies to the rapidly moving motorized units.

The High Mobility Materiel Handling Equipment (HMMHE) consisted of a high mobility, common-chassis vehicle capable of mounting a variety of attachments in the front and rear. Items available included universal kits--front and rear--for one man rapid mounting and demounting, hookup and operation of all Small Emplacement Excavator (SEE) tractor attachments, Army standard trailers (including PLS), forklift (400 pounds) and crane (with 25 foot reach). The vehicle had the capability to tow a loaded trailer at convoy speeds on the highway. When it was operating as a yard tractor, the HMMHE could tow one or more Army standard trailers. The HMMHE also has the capability to serve as a mobile hydraulic power source for a wide range of hydraulic pumps and attachments; tools could be mounted, dismounted or operated by one operator. The HMMHE had utility in all motorized organizational and DS level CSS activities, as well as in the engineer battalion.

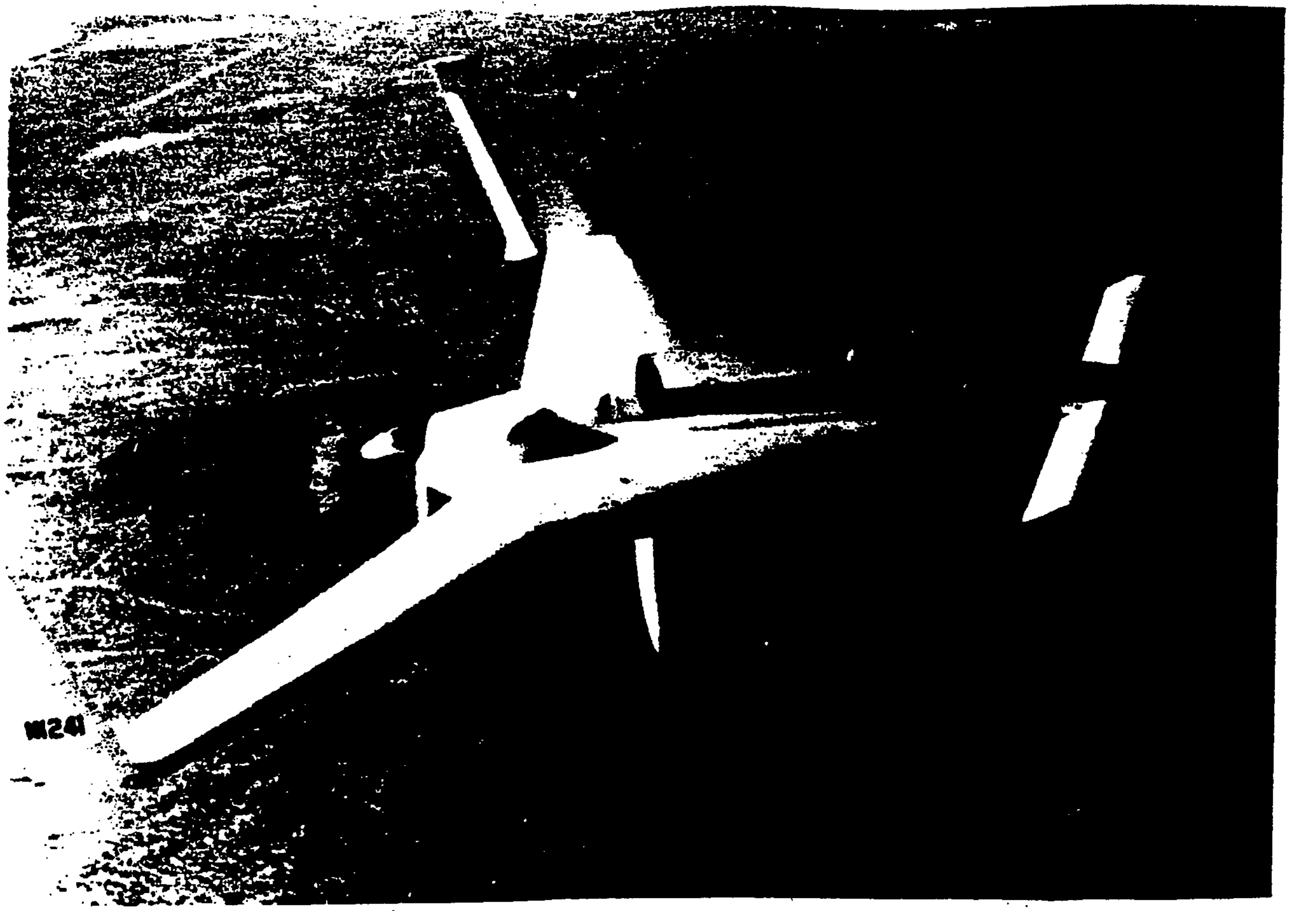
COMMAND AND CONTROL

One of the most innovative systems was the Distributed Command and Control System (DCCS). The DCCS consisted of equipment, communications, personnel, and procedures which enhanced command, control, and communications among the tactical leadership cells throughout the division. Designed to tie into the Army's command and control system at a later date, it consisted of computer hardware linked to FM radios which used burst transmissions to send large amounts of information in a very short amount of time. This greatly reduced the load on command tactical radio nets, and allowed for division-wide focused distribution of information. Later renamed Maneuver Control System 2.0 (MCS 2.0), DCCS was a viable integrated system of hardware and software with the potential to enhance command and control survivability and effectiveness.

The Integrated Command Post System (ICPS) was a combination of vehicular shelters, rapid-erect tentage, heating, lighting, ventilation, cables, map-boards, cabinets, generators, power conditioning and distribution, camouflage and other command post support requirements. The ICPS allowed the DCCS to be utilized tactically at all levels between division and the various battalions. The ICPS was designed for use in variety of standard Army vehicles, from M577 tracked command post vehicles to five ton trucks. The ICPS allowed the high technology systems to be deployed tactically across the battlefield.

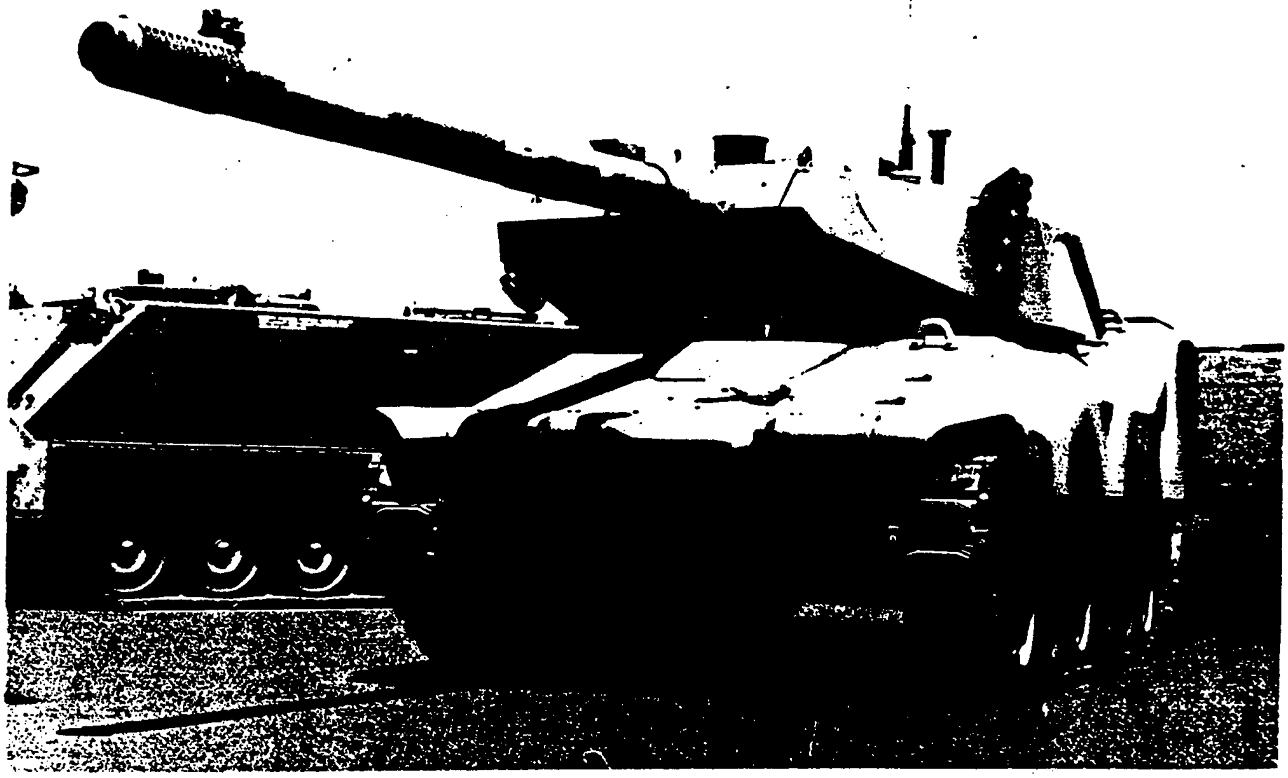
The Tactical Command, Control and Communication Vehicle (TC3V) was designed to place all division-level radio nets in a single vehicle. Each TC3V had the following nets: division command (VHF-FM), division intel (VHF-FM), division tactical operations center (single side band), and division UHF tactical satellite (TACSAT). The TC3V was also equipped with facsimile machines that were compatible with the vehicle's communications equipment. All nets were secure and could handle voice, data, and facsimile. The signal battalion deployed the vehicles in support of the division Main CP, Tactical CP, Division Rear/DISCOM, DivArty, the four maneuver brigades, and the separate battalions. The interim TC3V used for LASER STRIKE and BORDER STAR 85 consisted of modified M1010 ambulances. Each was specially modified with heavy duty suspensions and appropriate electrical wiring.

The Position Location Reporting System (PLRS) was a computer-based system which provided near real-time position, location, identification, and navigation information for the units it supported. The major components were the master station, an alternate master station, and the user unit. Each master station could track 370 user units at any time, using frequency hopping technology to ensure communications security, jamming protection, and low probability of signal intercept. It was a line-of-sight system that used radio frequencies between the master station(s) and two other user-units to triangulate and determine locations. The user read-out gave each using unit the capability to request position location and navigation data for itself or other units. It operated under all conditions of visibility, weather, terrain, and tactical environments. Additionally, the PLRS had an inherent digital data communication capability.



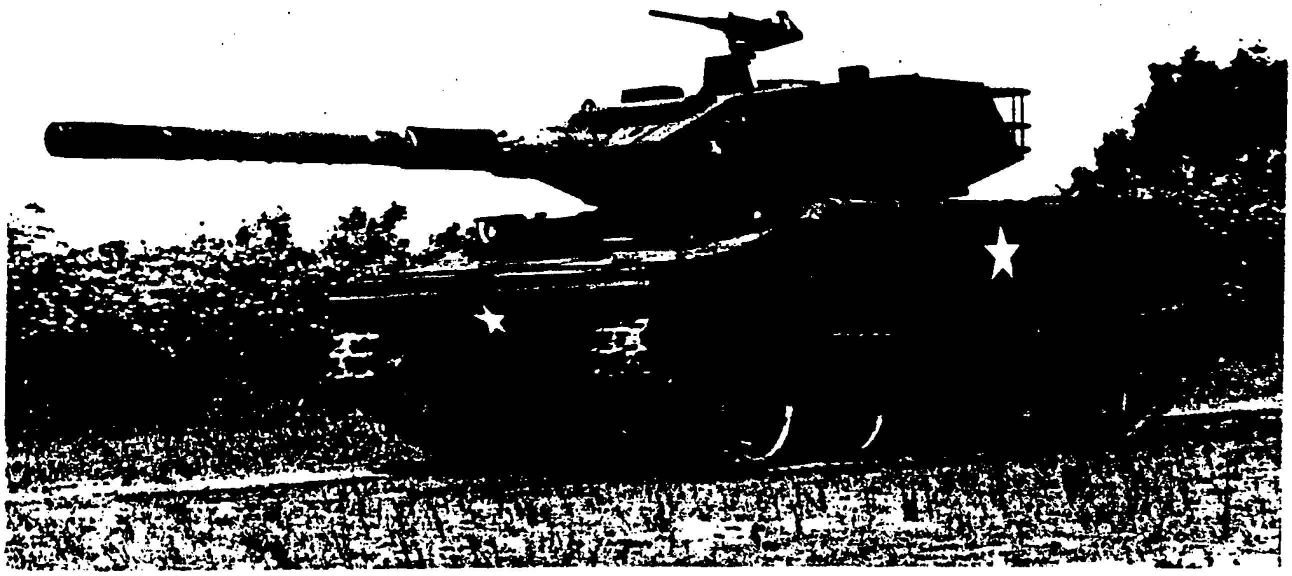
MERCURY GREEN (SURROGATE UNMANNED AERIAL VEHICLE)

LONG RANGE ELECTRO OPTICAL SYSTEM (LREO)



PROTOTYPE ARMORED GUN SYSTEM (AGS)

PROTOTYPE ARMORED GUN SYSTEM (AGS)



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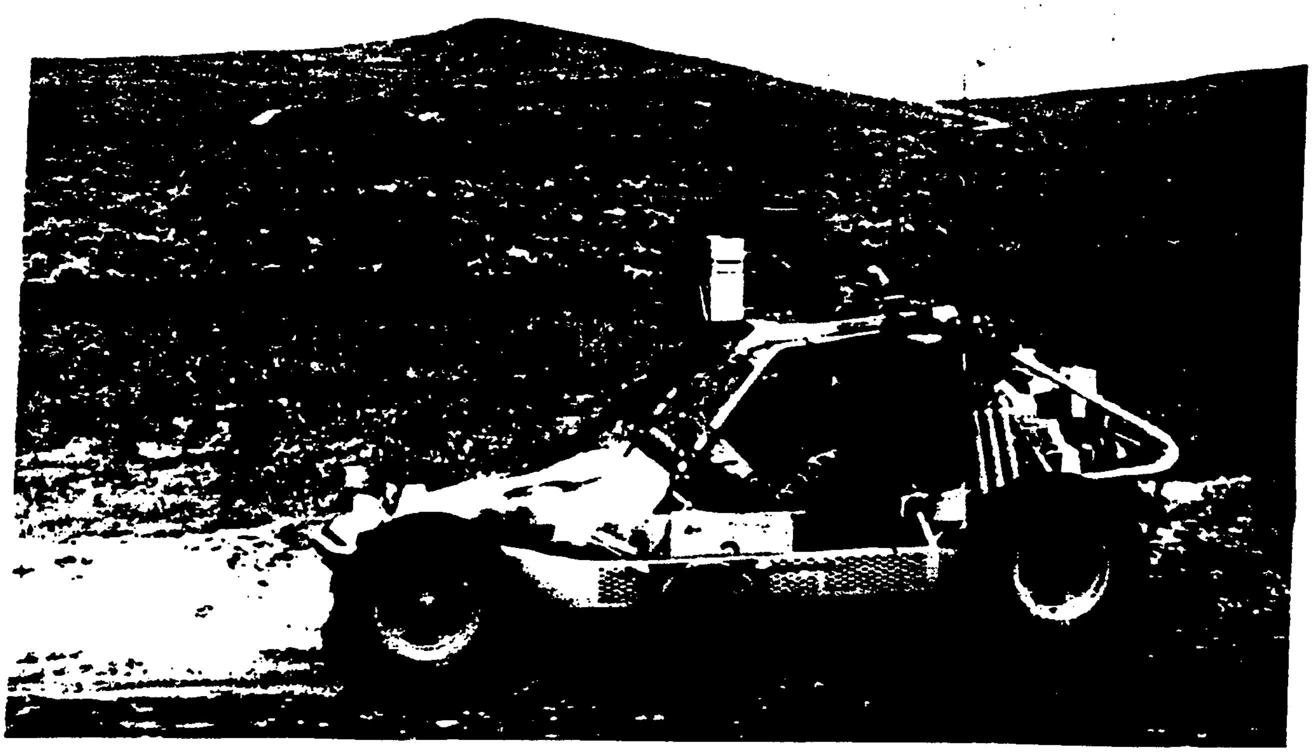
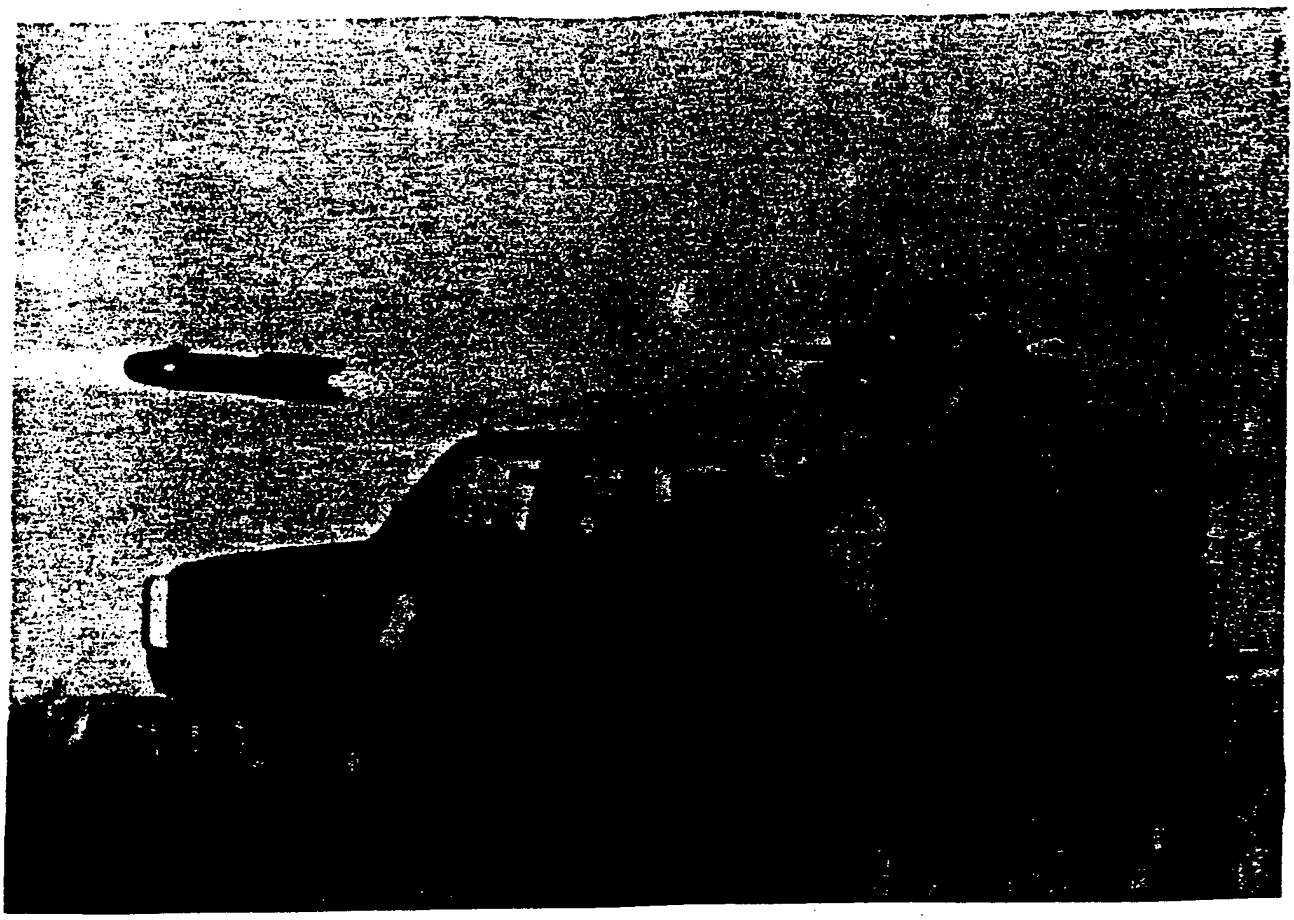
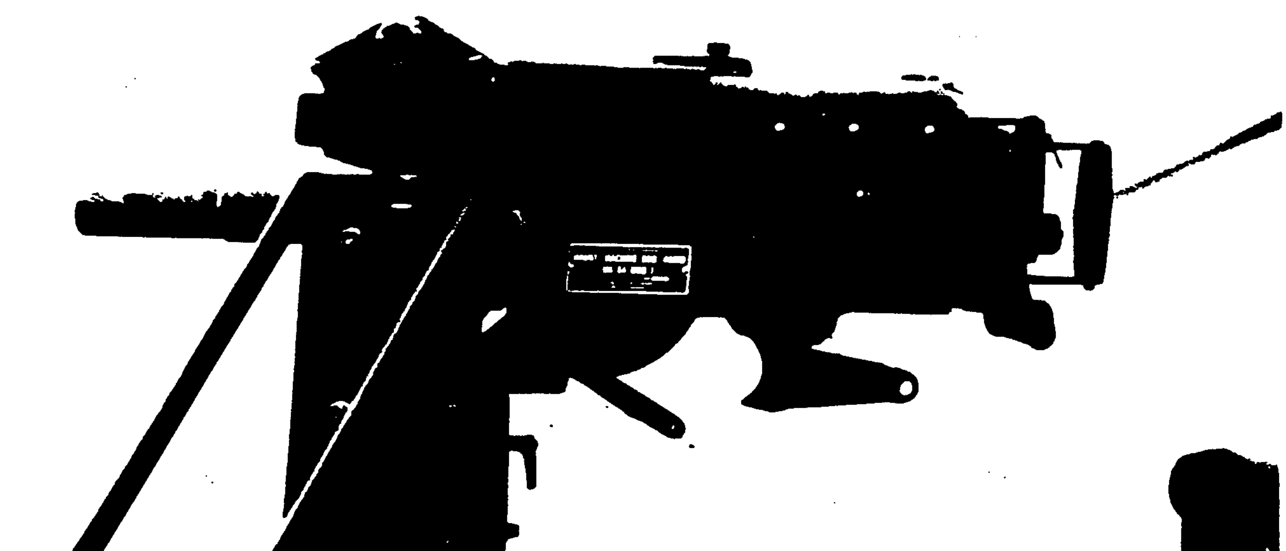


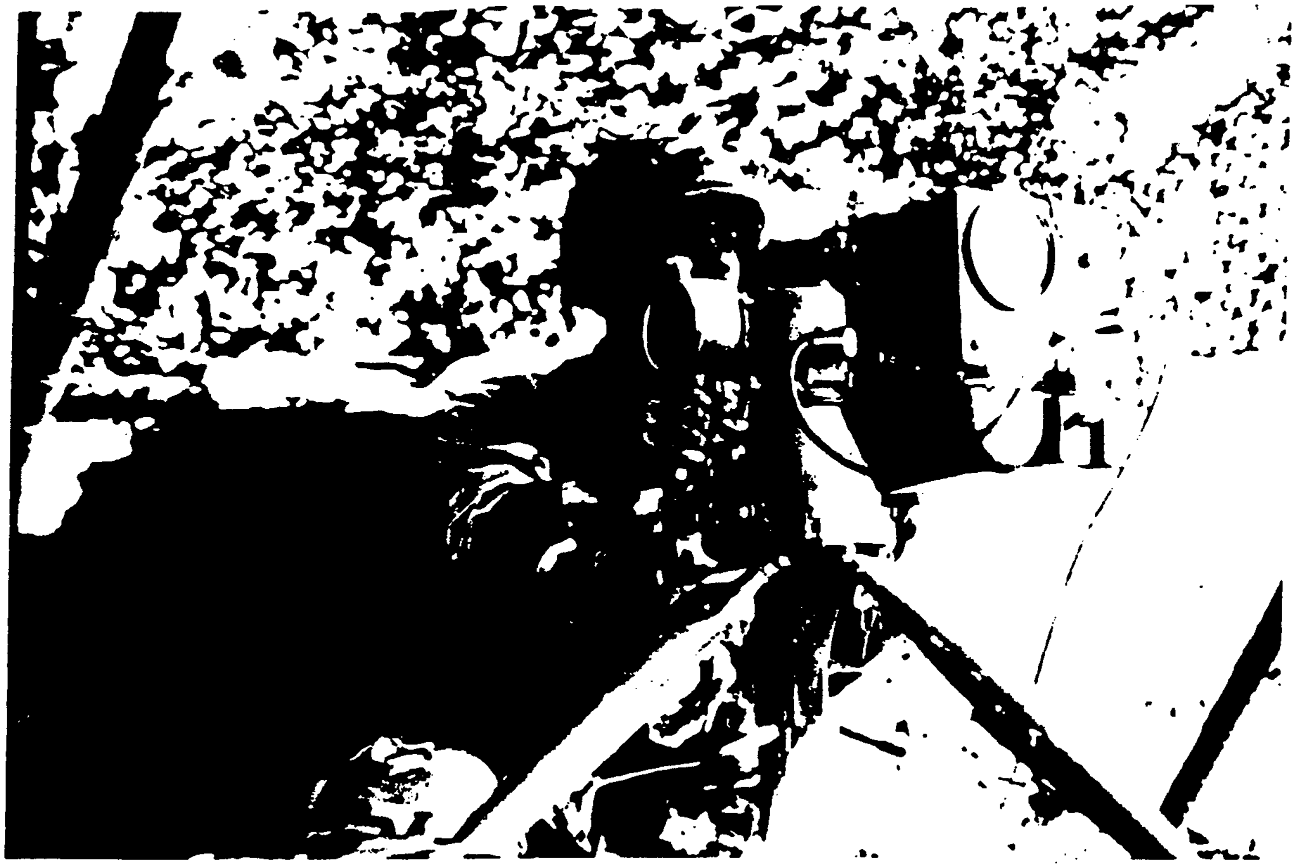
FAST ATTACK VEHICLE (FAV)



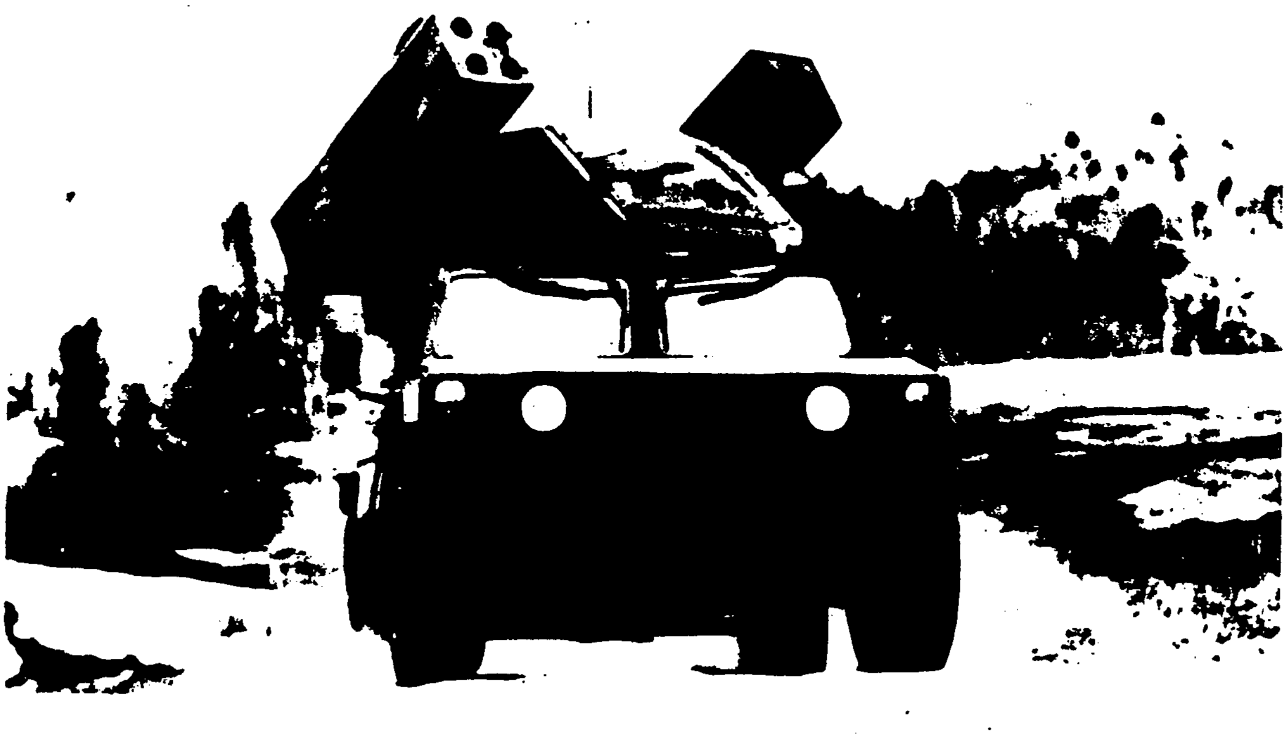
GROUND LAUNCHED HELLFIRE (GLH)



MK19 GRENADE MACHINE GUN



GROUND LOCATOR LASER DESIGNATOR (GLLD)



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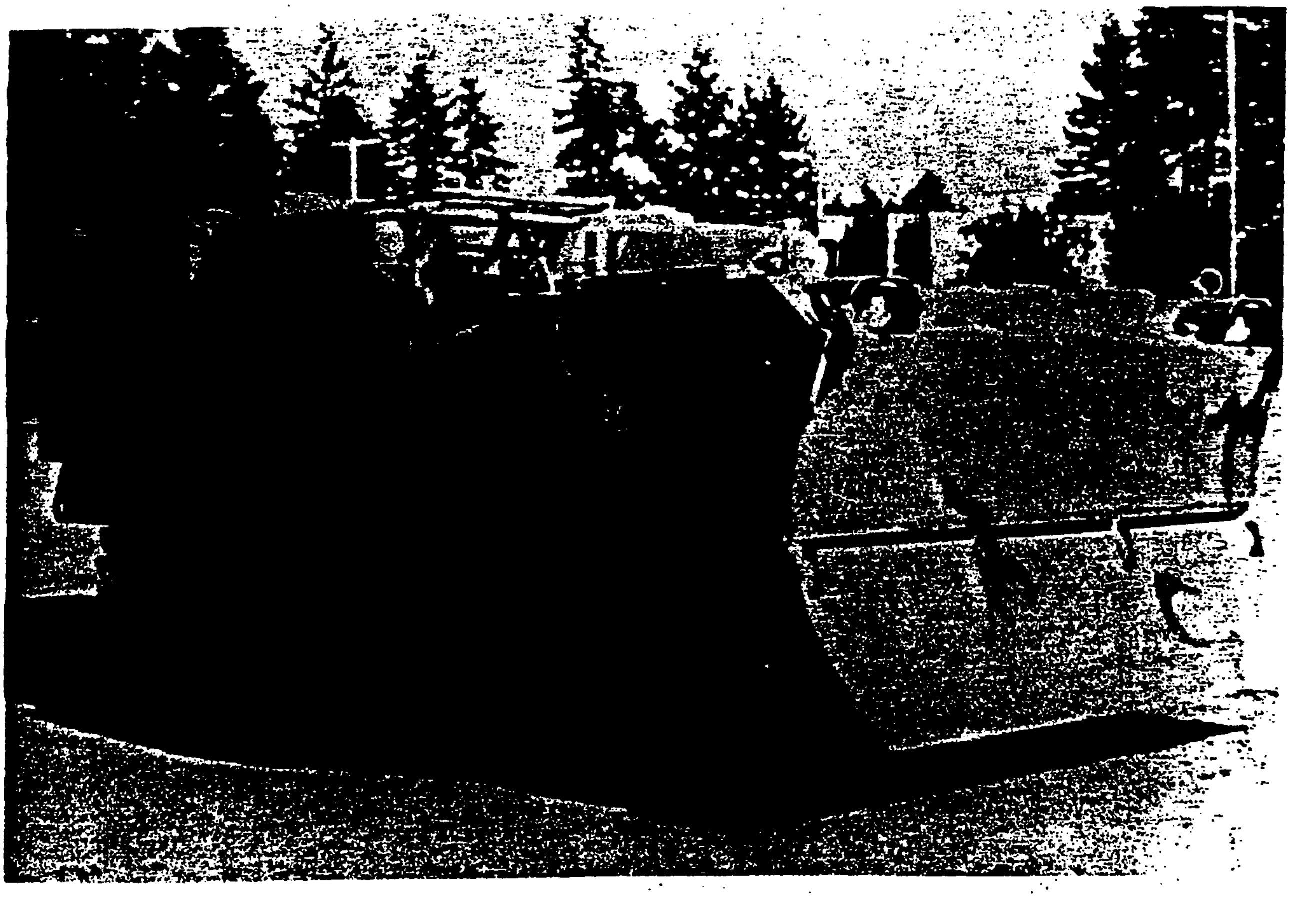
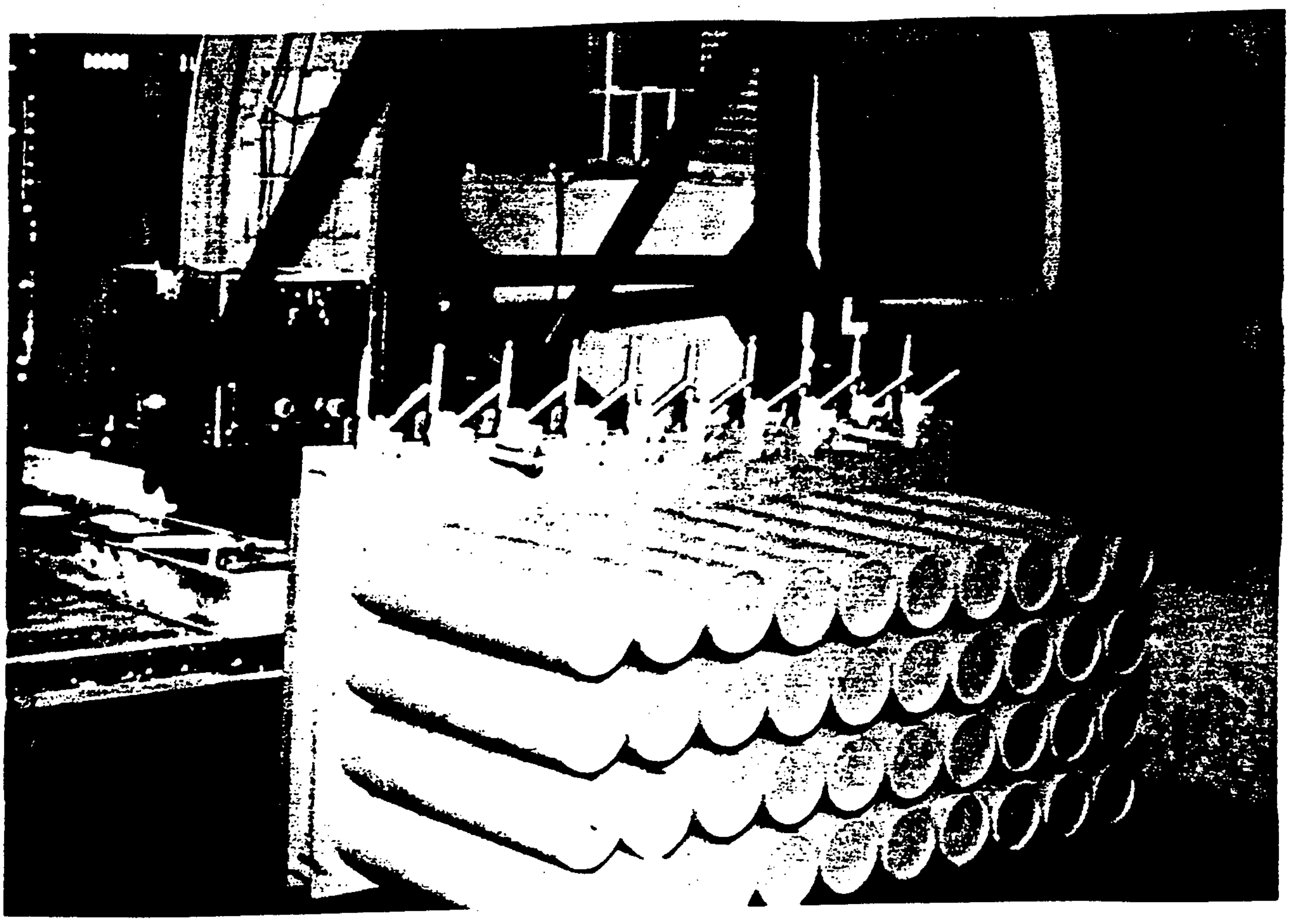
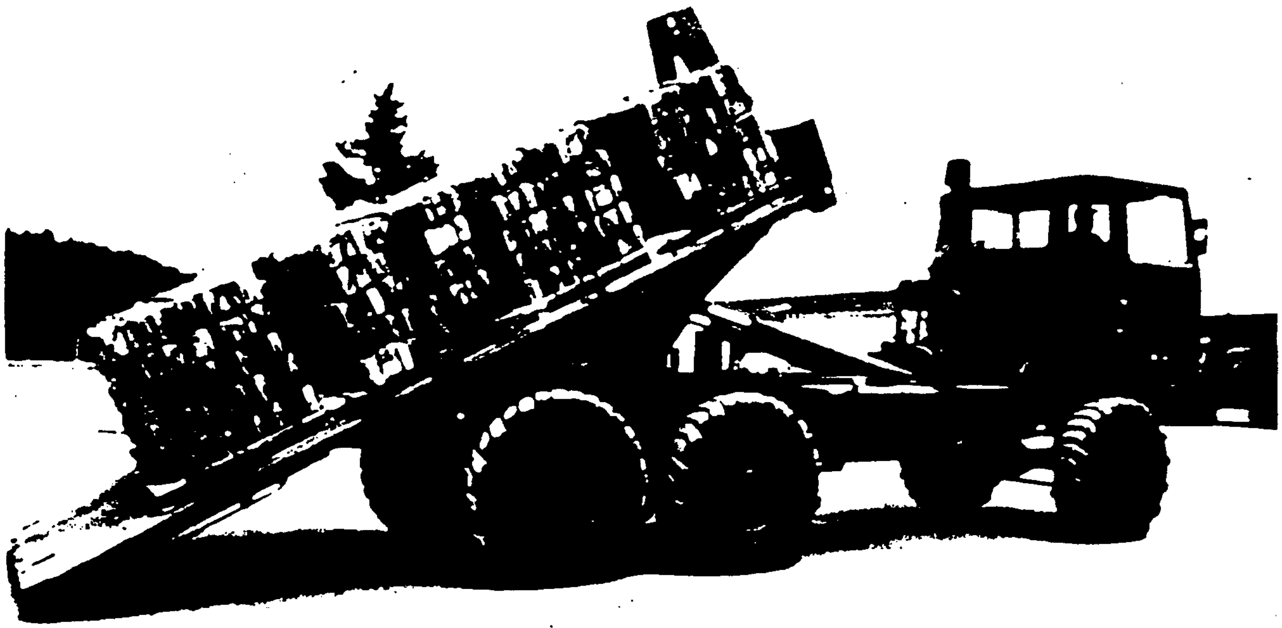


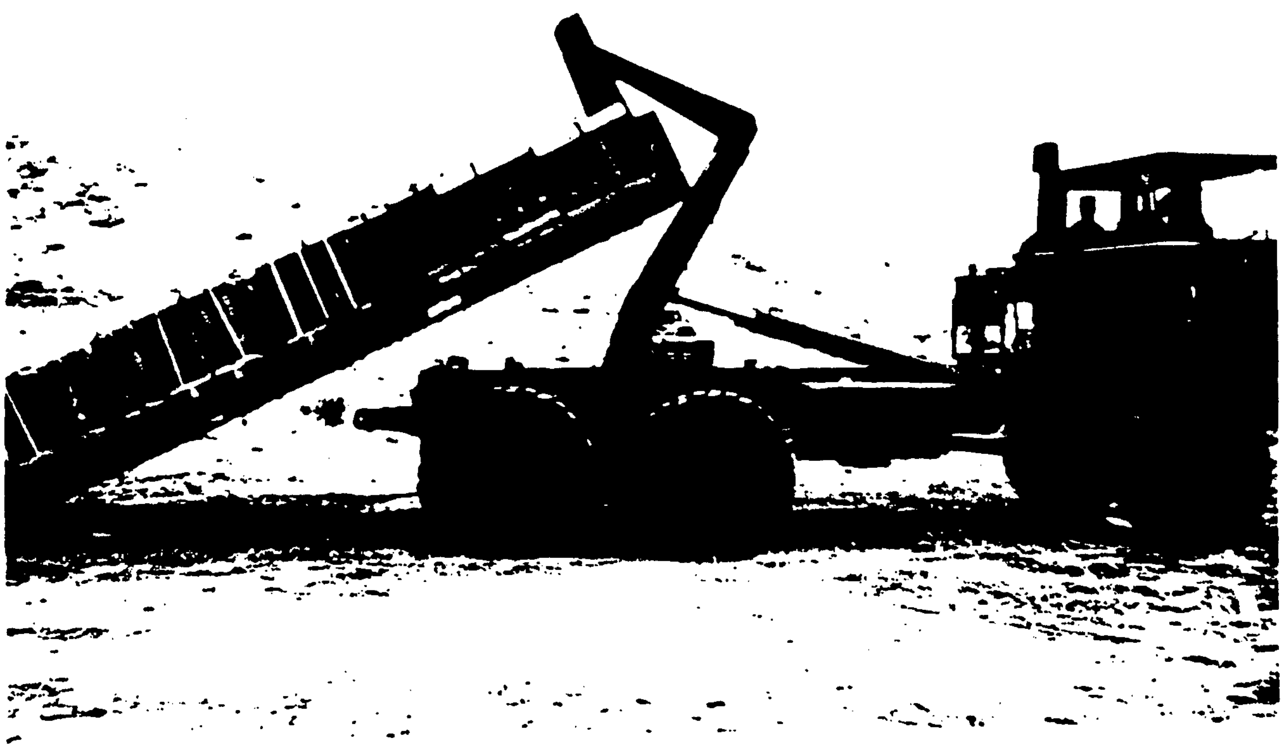
ARMORED COMBAT EARTHMOVER (ACE)

SMALL EMPLACEMENT EXCAVATOR (SEE)

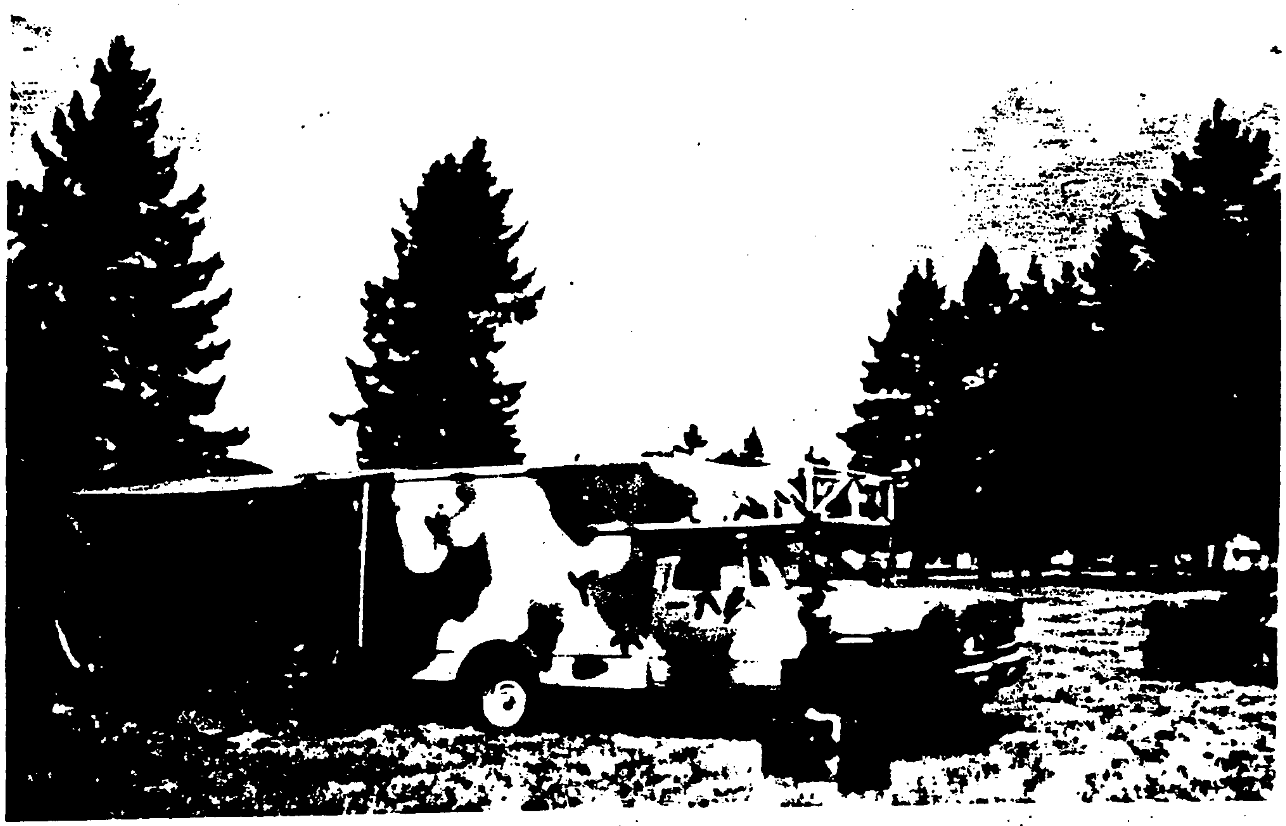


AERIAL VOLCANO



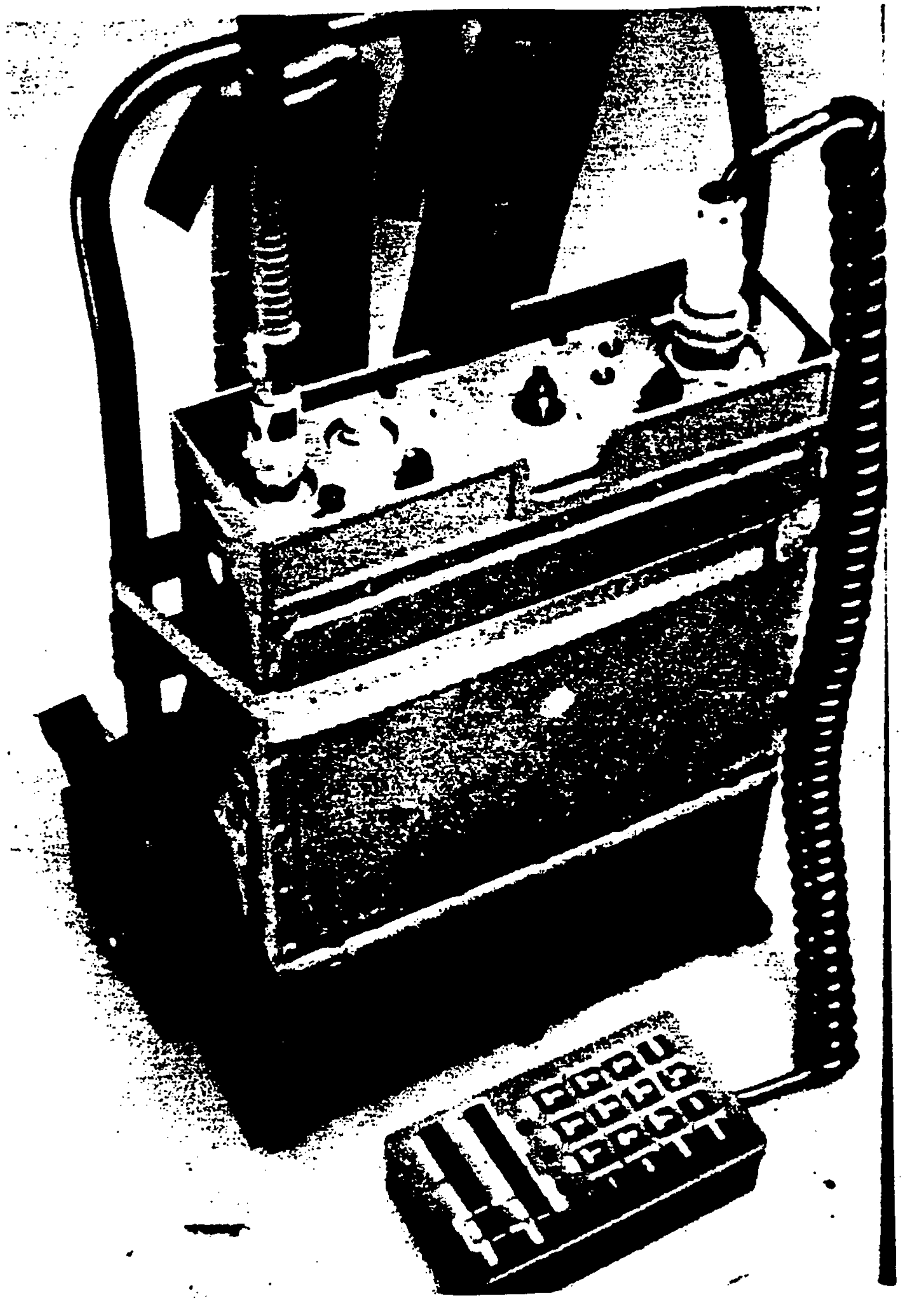


PALLETIZED LOADING SYSTEM (PLS)



IMPROVED COMMAND POST VEHICLE (EXTERIOR)

IMPROVED COMMAND POST VEHICLE (INTERIOR)



POSITION REPORTING SYSTEM (PLRS)

APPENDIX E

GLOSSARY

GLOSSARY

AAR	After Action Review
ABB	All Source Analysis System Interface Module Brassboard
ABOC	Air Battle Operations Center
ACA	Airspace Coordination Area
ACE	Armored Combat Excavator
ACR	Armored Cavalry Regiment
ADA	Air Defense Artillery
ADEA	Army Development and Employment Agency
ADIS	Automated Distributed Intelligence System
AFATDS	Advanced Field Artillery Tactical Data System
AGS	Armored Gun System (originally called Assault Gun System)--both terms used interchangably in sources depending on version of O&O referenced and view of author of system as a light tank or an infantry anti-armor system.
AGB	Assault Gun Battalion
AHB	Attack Helicopter Battalion
AHIP	Army Helicopter Improvement Program
ALO	Air Liaison Officer
ALOC	Admin Logistics Operations Center
AMC	Army Materiel Command Army Mission Commander Aircraft Maintenance Company
AO	Area of Operations
AOE	Army of Excellence
ARMS	Aviation Resource Management Survey
ARTEP	Army Training Evaluation Plan
ASAS	All Source Analysis System
ASB	Aviation Support Battalion
ASL	Authorized Stockage Level
ASPS	All Source Production Section
AT	Anti Tank
ATP	Ammunition Transfer Point
AURS	Automated Unit Reference Sheets
AVIM	Aviation Intermediate Maintenance
AVUM	Aviation Unit Maintenance
BCS	Battery Computer System
BCT	Brigade Combat Team
BCT	Briefcase Terminal (for LTACFIRE)
BCTP	Battle Command Training Program
BDE	Brigade
BG	Brigadier General
BMNT	Beginning Morning Nautical Twilight
BN	Battalion
BOC	Battalion Operations Center
BP	Battle Position
BSA	Brigade Support Area

CAB	Combined Arms Battalion
CAB(H)	Combined Arms Battalion (Heavy)
CAB(L)	Combined Arms Battalion (Light)
CAC	Combined Arms Center
CAS	Close Air Support
CBAA	Cavalry Brigade (Air Attack)
C^2	Command and Control
C^3	Command, Control, and Communications
C^3I	Command, Control, Communications, and Intelligence
CDEC	Combat Developments Experimental Center
CEOI	Communications Electronics Operating Instructions
CEWI	Communications, Electronic Warfare and Intelligence
CI	Counter Intelligence
CM	Counter Mobility
CO	Company
COHORT	Cohesive Operation and Readiness Training
COLT	Combat Observation Lasing Team
COMINT	Communications Intelligence
CPX	Command Post Exercise
CS	Combat Support
CSA	Chief of Staff, Army
CSAC	Combat Support Aviation Company
CSC	Combat Support Company
CSEMW	Combat Support Enginneering and Mine Warefare
CSS	Combat Service Support
CUCV	Commercial Utility Cargo Vehicle
DA	Department of the Army
DAO	Division Ammunition Office
DARCOM	Army Materiel Development and Readiness Command (now Army Materiel Command)
DCCS	Distributed Command and Control System
DC^3I	Distributed Command, Control, Communications, and Intelligence
DCSOPS	Deputy Chief of Staff, Operations
DCSRDA	Deputy Chief of Staff, Research Development and Acquisition
DCT	Digital Communications Terminal
DF	Direction Finding
DISCOM	Division Support Command
DIVARTY	Division Artillery
DMD	Digital Message Device
DMMC	Division Materiel Management Center
DOS	Days of Supply
DPICM	Dual Purpose Improved Conventional Munition
DROPS	Demountable Rack Offload and Pickup System
DS	Direct Support
DSA	Division Support Area
DSU	Direct Support Unit

EA	Engagement Area
EAD	Echelons Above Division
ECM	Electronic Counter Measures
EDRE	Emergency Deployment Readiness Exercise
ELINT	Electronic Intelligence
E-PLRS	Experimental-Position Location Reporting System
EPW	Enemy Prisoner of War
ESA	External Subjective Assessment
EW	Electronic Warfare
EWSO	Electronic Warfare Staff Officer
EXEVAL	External Evaluation
FAAR	Forward Area Alerting Radar
FARE	Forward Area Refueling Equipment
FARP	Forward Arming and Refueling Point
FASCAM	Family of Scatterable Mines
FASCO	Forward Area Support Coordinating Office
FAST	Forward Area Support Team
FAV	Fast Attack Vehicle
FCX	Fire Coordination Exercise
FDC	Fire Direction Center
FIST	Fire Support Team
FISTV	Fire Support Team Vehicle
FLIR	Forward Looking Infrared Radar
FLOT	Forward Line of Troops
FOA	Field Operating Agency
FOGM	Fiber Optic Guided Missile
FOLT	Forward Observation and Lasing Team
FORSCOM	Forces Command
FSB	Forward Support Battalion
FSO	Fire Support Officer
FSE	Fire Support Element
FSSP	Forward System Supply Point
FTX	Field Training Exercise
FY	Fiscal Year
GDU	Gun Display Unit
GEMSS	Ground Emplacment Mine Scattering System
GEN	General
GLH	Ground Launched HELLFIRE
GLLD	Ground Locator Laser Designator
GMG	Grenade Machine Gun
GS	General Support
GSAC	General Support Aviation Company
GSR	Ground Surveillance Radar
G/VLLD	Ground/Vehicular Locator Laser Designator
HELLFIRE	Heliborne Laser Fire and Forget Missile
HEMAT	Heavy Mobile Ammunition Trailer
HEMTT	Heavy Expandable Mobile Tactical Truck

HF	High Frequency
HHC	Headquarters and Headquarters Company
HHT	Headquarters and Headquarters Troop
HIMAD	High to Medium Altitude Air Defense
HMMHE	High Mobility Materiel Handling Equipment
HMMWV	High Mobility Multipurpose Wheeled Vehicle
HMS	HMMWV Mounted Stinger
HQDA	Headquarters, Department of the Army
HTLD	High Technology Light Division
HTMD	High Technology Motorized Division
HTTB	High Technology Test Bed
HUMINT	Human Intelligence
HVM	Hyper-Velocity Missile
ICP	Integrated Command Post
ICSS	Improved Combat Support Set
ID	Infantry Division
ID86	Infantry Division 86
IEW	Intelligence and Electronic Warfare
IFF	Identification Friend or Foe
IMIDCA	Interim Motorized Infantry Division Capabilities Analysis
IMOC	Improved Mobility Cannon System
IPB	Intelligence Preparation of the Battlefield
IPR	In Progress Review
IPSE	Integrated Patching and Switching Equipment
IPW	Interrogation Prisoner of War
I&S	Intelligence and Surveillance
ITMS	Integrated Training Management System
ITV	Improved TOW Vehicle
JAAT	Joint Air Attack Team
JTF	Joint Task Force
JRX	Joint Readiness Exercise
KE	Kinetic Energy
KM	Kilometer
LAB	Light Attack Battalion
	Light Assault Bridge
LAR	Light Artillery and Rocket (Battalion)
LAV	Light Armored Vehicle
LFV	Light Forces Vehicle
LID	Light Infantry Division
LMI	Light Motorized Infantry
LMIB	Light Motorized Infantry Battalion
LOGCEN	Logistics Center
LOGPAK	Logistics Package
LRP	Logistics Release Point
LRSU	Long Range Surveillance Unit

LREO	Long Range Electro Optical (System)
LTACFIRE	Lightweight TACFIRE
LTG	Lietenant General
LZ	Landing Zone
MAGB	Mobile Assault Gun Battalion
MANPADS	Man Portable Air Defense System
MAPEX	Map Exercise
MARC	Manpower Requirements Criterion
M/CM	Mobility/Countermobility
MCP	Maintenance Collection Point
MCS	Maneuver Control System
MCS 2.0	Maneuver Control System, Version 2
MEDEX	Medical Exercise
METT-T	Mission, Enemy, Terrain, Troops Available, Time
MES	Medical Equipment Sets
MHE	Material Handling Equipment
MG	Major General
MI	Military Intelligence
MICLIC	Mine Clearing Line Change
MILES	Multiple Integrated Laser Engagement System
MK19	Mark 19 (Grenade Machine Gun)
MLRS	Multiple Launch Rocket System
MMC	Material Management Center
MOC	Management of Change
MOS	Military Occupational Speciality
MOPP	Mission Oriented Protective Posture
MP	Military Police
MRE	Meal, Ready to Eat
MSB	Main Support Battalion
MSC	Major Subordinate Command
MSL	Mandatory Stockage List
MSR	Main Supply Route
MST	Maintenance Support Team
MTOE	Modified Table of Organization and Equipment
MTZ	Motorized
NAI	Named Area of Interest
NBC	Nuclear Biological Chemical
NOD	Night Observation Device
NTC	National Training Center
NVG	Night Vision Goggles
O&I	Operations and Intelligence (Net)
O&O	Operational & Organizational (Concept)
ODCSOPS	Office, Deputy Chief of Staff, Operations
ODCSRDA	Office, Deputy Chief of Staff, Research Development, Acquisition
OP	Observation Post
OPCON	Operational Control

OPFOR	Opposing Force
OPSEC	Operational Security
OSD	Operational Support Detachment
PADS	Position Azimuth Determining System
PAO	Public Affairs Officer
PCM	Pulse Code Modulation
PGATM	Precision Guided Anti-Tank Missile
PIP	Product Improvement Program
PLL	Prescribed Load List
PLRS	Position Location Reporting System
PLS	Palletized Loading System
POL	Petroleum, Oil & Lubricants
POM	Program Objective Memorandum
QRP	Quick Reaction Program
RACO	Rear Area Combat Operations
RAOC	Rear Area Operations Center
RAP	Rocket Assisted Projectile
RAS	Rear Area Surveillance
RATT	Radio and Teletype
RCMAT	Remotely Controlled Miniature Aerial Target
ROC	Required Operational Capability
ROWPU	Reverse Osmosis Water Purification Unit
RPV	Remotely Piloted Vehicle
R&S	Reconnaissance and Surveillance
SAFAD	Small Arms for Air Defense
SAW	Squad Automatic Weapon
SCD	Signals Communication Deception
SCI	Special Compartmented Information
SEE	Small Emplacement Excavator
SEAD	Suppression of Enemy Air Defense
SFAV	Surrogate Fast Attack Vehicle
SHORAD	Short Range Air Defense
SI	Special Intelligence
SIGINT	Signal Intelligence
SIGSEC	Signal Security
SSA	Supply Support Activity
SYSCOM	System Control
S&T	Supply and Transportation
TAADS	The Army Authorization Documents System
TAB	Target Acquisition Battery
TAC	Tactical Command Post
TACCS	Tactical Army Combat Service Support Computer System
TAI	Targeted Area of Interest

TCAE	Technical Control and Analysis Element
TC^3V	Tactical Command, Control and Communications Vehicle
TDA	Table of Distribution and Allowances
TEXS	Tactical Explosive System
TGPC	Terrain Gun Position Corrections
TLAT	TOW Light Anti-Tank
TOC	Tactical Operations Center
TOE	Table of Organization and Equipment
TOW	Tube-launched, Optically-tracked, Wire-guided Anti-tank Missile
TPU	Tank and Pump Unit
TRADOC	Training and Doctrine Command
TRP	Target Reference Point
TTT	Trauma Treatment Team
TTV	Trauma Treatment Vehicle
UAV	Unmanned Airborne Vehicle
UERP	Unserviceable Equipment Rally Point
UAS-11	Universal Acquisition System
VCSA	Vice Chief of Staff, Army
WRSO	Weapon System Replacement Operations
YFC	Yakima Firing Center

_NA_ (1) 52.203-6, Restrictions on Subcontractor Sales to the Government, with Alternate I (41 U.S.C. 253g and 10 U.S.C. 2402).

_NA_ (2) 52.219-3, Notice of HUBZone Small Business Set-Aside (Jan 1999).

_NA_ (3) 52.219-4, Notice of Price Evaluation Preference for HUBZone Small Business Concerns (Jan 1999) (if the offeror elects to waive the preference, it shall so indicate in its offer).

_NA_ (4)(i) 52.219-5, Very Small Business Set-Aside (Pub. L. 103-403, section 304, Small Business Reauthorization and Amendments Act of 1994).

_NA_ (4)(ii) Alternate I to 52.219-5.

_NA_ (4)(iii) Alternate II to 52.219-5.

_NA_ (5) 52.219-8, Utilization of Small Business Concerns (15 U.S.C. 637 (d) (2) and (3));

_NA_ (6) 52.219-9, Small Business Subcontracting Plan (15 U.S.C. 637 (d)(4));

_NA_ (7) 52.219-14, Limitations on Subcontracting (15 U.S.C. 637(a)(14)).

_NA_ (8)(i) 52.219-23, Notice of Price Evaluation Adjustment for Small Disadvantaged Business Concerns (Pub. L. 103-355, section 7102, and 10 U.S.C. 2323) (if the offeror elects to waive the adjustment, it shall so indicate in its offer).

_NA_ (8)(ii) Alternate I of 52.219-23.

_NA_ (9) 52.219-25, Small Disadvantaged Business Participation Program--Disadvantaged Status and Reporting (Pub. L. 103-355, section 7102, and 10 U.S.C. 2323).

_NA_ (10) 52.219-26, Small Disadvantaged Business Participation Program--Incentive Subcontracting (Pub. L. 103-355, section 7102, and 10 U.S.C. 2323).

_NA_ (11) 52.222-21, Prohibition of Segregated Facilities (Feb 1999).

_XX_ (12) 52.222-26, Equal Opportunity (E.O. 11246).

_XX_ (13) 52.222-35, Affirmative Action for Disabled Veterans and Veterans of the Vietnam Era (38 U.S.C. 4212).

_NA_ (14) 52.222-36, Affirmative Action for Workers with Disabilities (29 U.S.C. 793).

_NA_ (15) 52.222-37, Employment Reports on Disabled Veterans and Veterans of the Vietnam Era (38 U.S.C. 4212).

_NA_ (16) 52.225-3, Buy American Act--Supplies (41 U.S.C. 10).

_NA_ (17) 52.225-9, Buy American Act--Trade Agreements Act--Balance of Payments Program (41 U.S.C. 10, 19 U.S.C. 2501-2582).

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