STUDY PROJECT

THE IMPLICATIONS OF AIRLAND OPERATIONS AND SMART MUNITION TECHNOLOGY ON FIRE SUPPORT

BY

Lieutenant Colonel Michael L. Leahy
United States Army

USAWC CLASS OF 1992

U.S. ARMY WAR COLLEGE, CARLISLE BARRACKS, PA 17013-5050

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1a. REPORT SECURITY CLASSIFICATION Unclassified	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; distribution is unlimited.
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE	
4. PERFORMING ORGANIZATION REPORT NUMBER(S)	5. MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION U.S. Army War College Carlisle Barracks 6b. OFFICE SYMBOL (If applicable)	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS (City, State, and ZIP Code) Carlisle, Pennsylvania 17013-5050	7b. ADDRESS (City, State, and ZIP Code)
8a. NAME OF FUNDING/SPONSORING ORGANIZATION 8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c. ADDRESS (City, State, and ZIP Code)	10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO. / PROJECT NO. / TASK NO. / WORK UNIT ACCESSION NO.

11. TITLE (Include Security Classification)
The Implications of AirLand Operations and Smart Munition Technology on Fire Support

12. PERSONAL AUTHOR(S)
LTC Michael L. Leahy

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
Final MSP	FROM _____ TO _____	92/04/15	33

16. SUPPLEMENTARY NOTATION

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

Some of the futuristic weapon technology that is an essential underpinning to the AirLand Operations concept was employed in Operation Desert Storm. The success of these smart weapon systems indicate an optimistic future for the high technology approach to designing future warfighting systems. It also suggests new ways for commanders to fight at the operational and tactical levels of war. This paper focuses on smart munitions and the role of fire support in AirLand operations. It examines their implications on current fire support doctrine and field artillery structure, and recommends changes based on them. Intended to compliment analytical efforts to determine future field artillery force structure, it provides a subjectively derived baseline against which emerging data can be compared.

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT ☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS	21. ABSTRACT SECURITY CLASSIFICATION Unclassified
22a. NAME OF RESPONSIBLE INDIVIDUAL COL Duane E. Williams, Project Adviser	22b. TELEPHONE (Include Area Code) (717) 245-3845 22c. OFFICE SYMBOL AWCAA

USAWC MILITARY STUDIES PROGRAM PAPER

THE IMPLICATIONS OF AIRLAND OPERATIONS AND SMART MUNITION TECHNOLOGY ON FIRE SUPPORT

AN INDIVIDUAL STUDY PROJECT

by

Lieutenant Colonel Michael L. Leahy
United States Army

Colonel Duane E Williams
Project Advisor

U.S. Army War College
Carlisle Barracks, Pennsylvania 17013

ABSTRACT

AUTHOR: Michael L. Leahy, Lt Col. USA

TITLE: Implications of AirLand Operations and Smart Munition Technology on Fire Support

FORMAT: Individual Study Project

DATE: 15 April 1992 PAGES: 33 CLASSIFICATION: Unclassified

Some of the futuristic weapon technology that is an essential underpinning to the AirLand Operations concept was employed in Operation Desert Storm. The success of these smart weapon systems indicate an optimistic future for the high technology approach to designing future warfighting systems. It also suggests new ways for commanders to fight at the operational and tactical levels of war. This paper focuses on smart munitions and the role of fire support in AirLand Operations. It examines their implications on current fire support doctrine and field artillery structure, and recommends changes based on them. Intended to compliment analytical efforts to determine future field artillery force structure, it provides a subjectively derived baseline against which emerging data can be compared.

TABLE OF CONTENTS

INTRODUCTION

In his book Field Artillery and Firepower,[1] Mr. Jonathan Bailey observes that while artillery ammunition changed little in the first thirty-five years after World War II, major advances have occurred in the last decade. Ranges have increased due to improvements to delivery systems, propellants and shells. Terminal effects have increased due to improvements in ballistic solutions, terminal guidance, dispersion of effects and explosive anti-armor submunition design. In addition to these technological changes, fundamental changes in the international security environment occurred as the decade drew to a close. As noted in TRADOC Pam 525-5, the new world of the 1990's, "with its regional character, demise of Soviet hegemony, growing instability in the third world, and exploitation of the technological opportunities has required an evolution of the underlying concept which defines

how our army will operate."[2] Termed AirLand Operations, this emerging concept refocuses the concepts and capabilities of AirLand Battle for a strategic army and changing environment.

In response to the technological advances and the AirLand Operations concept, the field artillery community is conducting a detailed study to determine the preferred composition and structure of field artillery systems to meet future world wide requirements. Referred to as Legal Mix VII, it employs computer simulations to address the advances in technology and changes in concept, and produces analytical data upon which to base conclusions and recommendations. Through what it terms the precision destruction revolution, The Field Artillery School at Fort Sill sees a window of opportunity to affect a fundamental change to the ways the operational and tactical commanders fight.

The primary purpose of this paper is to present a subjective perspective of the technological advances in munitions and the evolution in warfighting concepts, and to recommend field artillery doctrine and structure changes based on their implications. Intended to compliment analytical efforts like Legal Mix VII, it provides an independently derived basis upon which to judge and compare emerging results. It starts with a review of the present field artillery system in AirLand Battle, and is followed by a discussion of technological advances in field artillery munitions, an explanation of the new AirLand

Operations concept and the role of fire support in it, an examination of the implications the new technologies and concept have on the doctrine and structure of the field artillery and recommendations derived from them, and concludes with some general remarks about the issues.

CURRENT FIELD ARTILLERY DOCTRINE AND STRUCTURE

As detailed in FM 6-20, Fire Support in The AirLand Battle,[3] fire support is the collective and coordinated use of indirect fire weapons, armed aircraft and nonlethal electronic systems in support of a battle plan. The principle fire support asset available to the maneuver commander at the tactical and operational levels is the field artillery. Its mission is to destroy , neutralize and suppress the enemy with its cannons, rockets or missiles, and to integrate other fire support assets into the fight. It accomplishes this mission by fighting a doctrine that supports the AirLand Battle concept, and by properly structuring itself to fulfill the requirements of that doctrine.

Doctrine

Fire support is employed to support the commander's scheme of maneuver by delaying, disrupting or destroying enemy forces. The force commander's ability to employ the diverse group of fire support systems in a synchronized effort is the result of a process known as fire support planning and coordination.

Successful command direction of this process is dependent on adherence to the principles of fire support, accomplishment of the basic tasks of fire support and performance of the roles of the field artillery. Summarized in the following paragraphs, these three topics are the basis of fire support being an essential element of combat power.

The three principles of fire support serve to focus the fire support effort. The first principle is that the fire support system must perform as one force. All fire support assets must function with the effective delivery of fires as their primary purpose. The second principle is that the fire support system must be responsive to the needs of the force commander. Individual concerns of each asset are subordinate to the needs of the maneuver forces. The third principle is that the fire support system is the responsibility of the force field artillery commander. As the force fire support coordinator (FSCOORD), he is responsible for insuring all fire support means are integrated properly into the battle.

The four basic tasks of fire support serve as unifying factors for the system. The first task, support forces in contact, is to respond to the needs of the forces engaged with the enemy. The second task, support the force commander's battle plan, is to provide timely and accurate fires to attack designated high-payoff targets that are critical to the

successful accomplishment of the mission. The third task, synchronize fire support, is the precise arrangement of fire support assets in time, location and purpose to produce the most effective fires. Sustain the force, the fourth principle, is to keep fire support available to the force commander, at all times, through timely logistics actions.

The three roles of the field artillery serve to delineate general target sets and methods of engagement. The first role is to provide close support fire. This is used to engage enemy forces that are in contact with friendly forces. It allows the maneuver commander to multiply combat power at specific points throughout the battlefield. The second role is to provide counterfire. This is used to attack enemy indirect fire systems and their supporting facilities. It gives the maneuver commander freedom of action throughout his sector. Providing interdiction fire is the third role. This serves to disrupt, delay or destroy enemy forces that, because of range limitations or intervening terrain, cannot directly engage friendly forces. It provides a means of isolating the battlefield to the maneuver commander.

The complexity of adhering to the principles of fire support, accomplishing the basic tasks of fire support, and performing the roles of the field artillery requires the field artillery to be a flexible, yet focused combat force. The field artillery meets this requirement by using the following two-step

command and control process, detailed in FM 6-20-1,[4] in which a command relationship is established with a senior headquarters and a tactical mission is assigned each battalion.

In the first step, a command relationship of organic, assigned, attached or operational control (OPCON) is established with a senior headquarters. The senior headquarters is usually a field artillery headquarters, however, it can be a maneuver headquarters. In most instances a field artillery battalion is either assigned or attached. As an assigned unit, it is commanded by an organization on a relatively permanent basis and is provided administrative and logistic support by that organization.. As an attached unit, it is commanded by an organization on a temporary basis and may be provided administrative and logistic support by that organization or the organization to which it is assigned. Normally, field artillery battalions are not given OPCON command relationships. The tactical missions they are assigned more precisely define their relationship with supported commands than does the OPCON command relationship.

In the second step each field artillery battalion is assigned a tactical mission. The tactical missions of direct support (DS), reinforcing (R), general support reinforcing (GSR) or general support (GS) describe in detail the support responsibilities of field artillery battalions, without altering

command relationships. A battalion in direct support to a maneuver brigade is primarily concerned with the fire support needs of only that brigade. Reinforcing is a tactical mission that causes one FA battalion to augment the fires of another FA battalion. The general support reinforcing mission requires an FA battalion to furnish fires for the force, usually a maneuver division, as a whole, and to reinforce another FA battalion as a second priority. Finally, a battalion assigned a general support mission provides fires to the force as a whole. Individually, these missions focus the fires of each battalion. Collectively, they meet all field artillery support requirements. Combined with established command relationships, they provide the flexible, yet focused field artillery force.

Structure

The field artillery is structured to provide responsive and effective fires, and to coordinate all fire support assets supporting the maneuver commander. The structure of the combat systems is designed around the battalion as the basic operational unit. The structure for the coordination process is designed around fire support elements (FSE) at each level of maneuver headquarters.

The combat elements of the field artillery are located at corps and division levels. The corps artillery headquarters commands one or more FA brigades. Each FA brigade consists of

usually three, but up to six cannon (155mm and 203mm) and multiple launch rocket system (MLRS) battalions. The heavy division artillery headquarters usually commands three cannon (155mm) battalions, each DS to a maneuver brigade, and a MLRS battery, normally GS to the division. The light division artillery headquarters commands three DS cannon (105mm) battalions, and a GS cannon (155mm) battery. Airborne and air assault division artilleries have only three DS cannon (105mm) battalions. Tailored to match the mission of their parent division, all FA battalions have similar structures.

The basic design and structure of the cannon and MLRS battalions is built around a three firing battery concept. To command and support the firing batteries, the 155mm cannon battalions and the MLRS battalions have a headquarters battery and a service battery. The 105mm battalions have a combined headquarters and service battery for command and support. The 155mm cannon firing batteries have two platoons of four guns each, and the MLRS batteries have three platoons of three launchers each. This structure provides flexibility during fast moving operations, enhances survivability by providing more dispersion, and maintains adequate command and control by establishing an effective span of control from battalion to platoon. The 105mm cannon batteries have a single firing platoon of six guns. This structure provides required transportability, adequate firepower, and an effective span of control. Armed

primarily with area coverage ammunition, all of these structures are designed to rapidly and accurately mass the fires of all weapon systems to produce maximum effects.

To coordinate and control the rapid and accurate massing of all fire support, the field artillery has a system of fire support elements at each level of maneuver command form company to corps. These FSEs provide fire support expertise and advise to the maneuver commander, and function as the primary links from maneuver to all fire support assets. At the company level, the FSE is a fire support team (FIST) manned and equipped for mobile operations. At the battalion and brigade levels, the FSEs are manned and equipped for operations at the main tactical operation centers only. At the division and corps levels, the FSEs are manned and equipped to operate at the main and forward tactical operation centers. As structured, this system is fully capable of controlling and coordinating the massing of unsophisticated (dumb) munitions to achieve maximum effects. The dominance of this capability is, however, questionable considering advancements in smart munition technology and resulting employment techniques.

SMART MUNITION TECHNOLOGY

Smart munitions hold the promise of greatly improving the effectiveness of the field artillery. In a 1988 Pentagon paper

titled Extended-Range Smart Conventional Weapon Systems,[5] smart munitions are presented as the means by which the benefits of long range, indirect fire weapon systems can be fully realized. These benefits are targeting flexibility to strike deep and reach laterally across the area of operations, employment feasibility to disperse laterally and in depth for survivability while providing full area coverage with all systems, and deployment flexibility to respond immediately to developing situations throughout the area of operations. The value of the smart munitions is that with the proper technology, their effectiveness against high value targets remains constant throughout the range of the indirect fire systems.

A variety of technologies are being considered for smart munitions. Imaging infrared, laser ranging/imaging, millimeter wave, synthetic aperture, acoustic and man-in-the-loop fiber optic guidance are the primary candidates. Each has its strengths and weaknesses. The effects of weather, countermeasures, and the fog of war may require a mix of these technologies in independent systems or in some combination of them in a single system. Focused on acquiring an effective indirect fire capability against the tank, developmental efforts are likely to produce solutions for attacking and destroying less difficult targets.

In his 1987 article MLRS Smart Munitions,[6] Mr. Bill Rittenhouse presented a brief, but comprehensive discussion on

the technology of smart munitions. Summarized below, it provides a good basis of understanding. Smart munitions fall into two categories derived from the size of the munition's "footprint". A "footprint" is the area of ground, around a ballistic aim point, in which the munition can detect and engage a target element.

The first category of smart munition descends toward a target along a relatively horizontal glide path, and are referred to as large "footprint" munitions. The length of this glide path gives the munition its large area of coverage. Often called a terminally guided warhead (TGW), it has no motor and depends on its designed gliding capability. At a designated point along its trajectory the shell, rocket or missile (referred to as a bus) that is carrying the munition(s) ejects it (them). Once ejected, the munition begins its descent and glides to the target area. Upon detection of a target element, the munition adjusts its flight path to strike the target element. Armed with an armored piercing shape charge, the munition strikes the target, usually from above, and pierces the armor destroying vital internal components or igniting on board ammunition. The large area of the "footprint", plus the angle of attack and penetrating power of the munition make the TGW effective against moving armored combat vehicles.

The second category of smart munitions produces a small area of coverage, and are referred to as small "footprint" munitions. As with TGW, at some point along the trajectory of the bus, the munition is dispensed and begins its descent. Unlike the TGW, however, its descent is vertical. As it descends, the munition sweeps an ever decreasing circle of target area below. When a target is detected, it fires an explosively formed fragment into the top of the target element. While not as powerful as that of the TGW, the penetrating power of this munition is effective against lightly armored combat vehicles. Its small "footprint" and lack of maneuverability, however, restrict its effectiveness to sitting targets primarily. Overall, it is an effective weapon against enemy armored artillery in firing position and stationary light armored vehicles.

While they will be capable of devastating effects on enemy forces, smart munitions will be expensive and limited in numbers. They will therefore be employed using a methodology that conserves these limited resources until they are most effective, and is controlled through an intricate fire support command and control structure. A decide-detect-deliver approach will be used for employment. The decide stage involves selecting relevant targets. The detect process consists of allocating acquisition systems to search for and locate the relevant targets. The deliver stage is the actual attack and destruction of the targets with the smart munitions. The success of this

process is dependent on the rapid flow of information and directives through the fire support command, control and communications system, with its linkages to the maneuver command system. Wasting smart munitions on irrelevant targets, or missing the opportunity to strike the relevant ones could adversely affect friendly maneuver operations.

AIRLAND OPERATIONS

AirLand Operations is an evolution of AirLand Battle. It is a concept designed to have universal utility across the continuum of combat. It is focused on dictating how the fight will progress. It does this by applying the advantages of developed operational techniques and superior technologies. Conducted in four interrelated stages, as discussed in TRADOC Pam 525-5[7], it coordinates the capabilities of all elements of the force.

The first stage is preparation for operations. Intended to gain the initiative as early as possible, this stage consists of obtaining information, conducting intelligence preparation of the battlefield, planning movement and staging superior combat capabilities. The second stage sets the conditions for decisive actions and results. Selected enemy forces are isolated while friendly forces maneuver, undetected, to the most advantageous positions. The third stage is the conduct of combat operations to achieve the desired end result. Once appropriate conditions are established, maneuver forces attack with overwhelming combat

power to defeat the enemy. The fourth stage is the preparation for follow-on actions. Logistics and reconstitution efforts prepare the force for whatever follow-on missions are assigned.

Transcending this operational cycle is the need for timely and accurate fire support. The success of each stage is heavily dependent on successful fire support. Overall success is, therefore, dependent on the execution of a coordinated fire support plan by a properly structured fire support force. A complex and difficult task, this plan must meet the particular needs of each stage, as explained in the following paragraphs, if it is to insure overall success.

Stage I encompasses those activities designed to deploy the force, prepare the battlefield, and protect the force. Fires are used during this phase to protect the force and conduct counter reconnaissance. Immediately upon arrival of forces, the operational commander establishes a reconnaissance/surveillance combined armed force. The primary mission of the force is to secure the overall force, confirm sensor intelligence, and verify enemy forces. Heavily supported by indirect fire assets, the reconnaissance force contains enough combat power to conduct counter reconnaissance, counter surveillance, and other security operations. The operational commander relies heavily on fires to enable this force to cover a wide area and, if necessary, attack enemy reconnaissance and forward detachments.

During stage II, the operational commander establishes conditions that lead to decisive operations. Fires are used to set up the conditions to maneuver. All fire support assets are synchronized to destroy critical enemy maneuver forces, fire support forces, and command and control assets throughout the depth of the battlefield. The objective is to attack, separate, isolate, and attrit designated enemy forces, making it difficult for them to mass, and making them vulnerable to decisive operational maneuver. Attack of the enemy's operational center of gravity destroys his ability to synchronize and coordinate his combat power, and denies him the time and space to recover, mass, or maintain momentum. As the operational commander positions his maneuver forces to move into the next phase, he uses operational fires to open paths for future maneuver and to hold enemy maneuver forces in place. As he transitions into Stage III, operational fires are employed to cutoff and isolate the battlefield.

In Stage III, the operational commander initiates decisive maneuver supported by fire. Divisional fires are employed in support of maneuver forces, while operational fires continue to maintain favorable conditions in the battle area. Maneuver units are given the mission to attack, defend, exploit, or pursue and destroy designated enemy forces. Tactical fires are planned and executed to support these operations. They are focused on targets that could immediately impact the battle. At the

maneuver brigade level, intense close combat actions are envisioned to last for shorter rather than longer periods. The tactical fires must therefore be responsive, accurate and lethal. To allow the subordinate commands to concentrate on the decisive battle, the operational commander retains responsibility for isolating the tactical objective area. He continually uses long-range indirect fires to destroy critical targets and maintain the proper conditions.

Having depleted some portion of his combat capability while conducting decisive operations, the operational commander will conduct reconstitution of his forces during Stage IV. Ideally, heavy attrition has been avoided, thus limiting force reconstitution requirements to sustainment and, possibly, reorganization. The principle action upon completion of decisive operations is to disperse the force and establish security to protect the force to facilitate future operations and appropriate force reconstitution. As in Stage I, fires will play a key role in protecting the force and conducting counter reconnaissance operations. If hostilities have not ceased, much of the operational force's intelligence and fire support capability will continue to be engaged in operational joint fires as the commander transitions to the first stage of the next operation.

IMPLICATIONS ON FIRE SUPPORT AND FIELD ARTILLERY

Smart munitions appear capable of significantly improving the effectiveness of the field artillery. AirLand Operations explains how the army must operate to succeed in a new environment that is already upon us. Singularly, each would require some adjustments to the way the field artillery goes about its business, and how it is structured to do so. Together, however, they demand much more than minor adjustments. They require the following doctrinal and structural changes to set the course for the field artillery to follow well into the future.

Doctrine

Like AirLand Battle itself, the underlying principles of supporting the maneuver force with fires are deep rooted and, in many cases, relevant today. As with its evolution to AirLand Operations, however, fire support doctrine requires a degree of refocusing and expansion to meet the challenges of new technologies and a new world environment. The following modifications to the principles and basic tasks of fire support, as well the roles and tactical missions of the field artillery are in order.

The three principles of fire support remain applicable. The definitions of the first and second principles should, however, be expanded to address the details of two former basic tasks. The task to synchronize fire support should be incorporated into the

first principle that the fire support system is the responsibility of the force field artillery commander. Synchronization of fire support is the clearest way to express the FSCOORD's responsibility to integrate all fires into the battle. The task to support the force commander's battle plan should be incorporated into the second principle that the fire support system should be responsive to the needs of the force commander. Both speak to the supportive position of all fire support assets to the force commander's fight. These adjustments more clearly define the principles of fire support.

The two remaining tasks of fire support, support forces in contact and sustain fire support, are still valid with minor modifications to their definitions. Two new tasks, shape the battlefield and protect the force should be added. When combined, as follows, the four tasks directly address the fire support requirements in the four stages of AirLand Operations.

The performance of the task protect the force enables the commander to conduct each stage of his operation without major interruptions. Critical during the first and fourth stages, it is his major combat power asset that insures security of his force. Secondary during the second and third stages, it provides a continuous force that shields the overall operation from interference. The performance of the task shape the battlefield enables the force commander to set the conditions to achieve

decisive results. It is achieved by destroying or isolating selected enemy forces throughout the theater of operations. It is designed to reduce the enemy's combat power and his ability to employ it. The performance of the task support forces in contact enables the commander to influence the battlefield with firepower. It provides forces engaged with the enemy with responsive fire power that destroys enemy forces, enhances survivability of friendly forces, and allows freedom of maneuver. The performance of the task sustain fire support provides the force commander continuous availability of firepower. It involves the continuous performance of logistical and technical support to all fire support assets to insure availability throughout all stages of the operation.

The roles of the field artillery, like the principles and tasks of fire support, require some revision and expansion. The original three, with some modifications to their definitions, remain. A fourth, deep fires, is added as a valid, separate role. No longer a subset of the roles of counterfire and interdiction fire, deep fires is a critical, independent action required of the field artillery to support the force commander in AirLand Operations. As detailed in the following paragraph, the four more adequately express the roles of the field artillery.

Close fires are those fires used to engage the enemy troops, weapons or positions that are posing a present threat to the tactical force. They enable the commander to rapidly multiple combat power by shifting fires quickly about the battlefield. Counterfires are fires used to attack enemy indirect-fire systems, to include mortars, tube artillery, air defense, and rocket or missile systems that can range friendly forces. They allow the commander freedom of action and reduce the enemy's ability to multiply his combat power. Interdiction fires are those fires that prohibit the enemy from moving forces. They reduce or eliminate his freedom of action and disrupt his time lines. Deep fires are those fires used to engage enemy troops, weapons or positions that can threaten the force at a future time. They enable the commander to shape the battlefield by reducing enemy combat power and the overall effectiveness of his force.

The combination of command relationship and tactical mission for the field artillery units is designed to ensure responsive fire support. The present command relationships of field artillery units assigned to division artilleries and attached to corps artillery brigades does this. Decentralizing these relationships down to maneuver brigade and division level, respectively, has been suggested considering the effects of force reductions. To do so, however, would seriously degrade the corps commanders' ability to influence the balance of combat power and

the division artillery commander's ability to orchestrate a coordinated fire support effort in the division. This is not to say, however, that the need to insure adequate fire support assets at the maneuver brigade level is not a valid concern. On the contrary, considering the speeds at which future battles will occur and the great distances they will cover, changes to fire support at the maneuver brigade level, as recommended in the following paragraphs, should be made or the resultant lack or degradation of dedicated fire support could seriously affect the brigade's ability to fight to its full potential.

The combat strength of a maneuver brigade is heavily dependent on the fire support provided by its direct support field artillery battalion. It is the only fire support asset the maneuver brigade commander controls. It is his most rapid and effective means to mass combat power. He must be able to count on the availability of his DS battalion at all times at equal or better combat readiness than his maneuver battalions. Removing the DS battalion on a repeated basis when the brigade is not engaged in direct combat operations has serious adverse effects. Following the adage of "never keep artillery in reserve" exposes the DS battalion to continuous combat operations and separates it from the maneuver brigade as it plans and rehearses upcomming operations. Both degrade its capability to support the maneuver brigade in future operations. The notion of joining the brigade "on the fly" as it goes into a combat operation is equally

misguided. The speed and distances of a modern fight will be too much for an exhausted field artillery battalion. While able to go through the motions of link-up, it will not be able to provide its full fire support capability to a brigade that is planning to fight with that missing support.

To correct the potential problem for the maneuver brigade DS battalion, a change to the tactical mission rather than to the command relationship is required. The critical fire support linkages resident in the division artillery command structure should not be abandoned. The effectiveness of the DS battalions, as well as that of the whole division, depends on the coordinated fire support effort orchestrated by the division artillery headquarters. As such, the DS artillery battalion should retain its command relationship with the division artillery headquarters. The concept of the DS battalion's habitual relationship with its supported maneuver brigade, however, should be strengthened. The explanation of DS should clearly state that the DS artillery battalion not only habitually supports the same maneuver brigade, but that it remains with its supported maneuver brigade, regardless of the brigade's mission, to enhance coordination, training and combat effectiveness.

Structure

The organization and force design of the fire support system at corps and division are generally conducive to the conduct of

AirLand Operations and the employment of smart munitions. Modifications are, however, required to make these systems fully capable of fighting this doctrine and these munitions. Additionally, the army that will fight this concept and these munitions will be smaller than it is today. Efficiencies will be required that may affect the availability of effective fire support. The basic design of corps and division fire support systems must, therefore, be focused on insuring the capability to project lethal power, the versatility to respond to rapid change and the expansibility to meet major events. It must adhere to the principles of fire support, and support the performance of the basic tasks of fire support, the roles of the field artillery, and the tactical missions of the field artillery as defined under AirLand Operations and with smart munitions.

Fire support within the division is built around the assigned field artillery direct support cannon battalions and a type general support unit. The DS cannon battalions primarily perform the task of support the forces in contact, the role of close support fires and the tactical mission of direct support. Extremely difficult requirements, these battalions depend heavily on previously mentioned habitual relationships and constant training to insure proficiency. Designed for this specific mission, economizing measures here would decrease their effectiveness and adversely affect the combat power of their supported maneuver brigade. These battalions' performance of

their DS function is a success story that will, with the advent of smart munitions, improve in AirLand Operations. The ability of the field artillery force within the division to adequately provide the remainder of the tasks, roles or tactical missions is, however, a different story.

The field artillery force resident within a division, beyond the DS battalions, lacks the robustness to adequately support the division. The air assault and airborne divisions have none. The heavy and light divisions have only a battery sized unit that usually ends up attached to a battalion of like weapons that must be provided to the division to insure adequate support. The efficiency of maintaining and training an independent battery at the division when it will rarely be employed in such a manner is questionable. That the proper sized unit, a battalion, is not initially provided to all divisions is equally questionable. While somewhat less demanding to perform, but no less critical, the number of roles, tasks and tactical missions this unit must perform exceed that of the DS battalions almost three to one. This one unit is responsible for the roles of counterfire, interdiction fire and deep fire, the basic tasks of protecting the force and shaping the battlefield, and the tactical missions of reinforcing, general support reinforcing and general support.

While additional Field Artillery assets are usually provided by corps to perform these requirements, failure to do so would severely cripple the division's ability to successfully conduct AirLand Operations.

The field artillery brigades are the corps commander's assets with which to weight the battle and insure each of his subordinate commands are properly resourced in terms of fire support. Additionally, they are the fire support organizations with which he provides general support for his corps. Like the additional artillery unit in the division, these brigades must be able to perform all the roles, tasks, and tactical missions not performed by the DS battalions at the division level. At the corps level, they must provide the capability to do the counterfire, interdiction and deep fire roles, the protect the force and shape the battlefield tasks, and the general support tactical mission. Ideally, there should be at least one field artillery brigade for each division and one for use at corps level.

The internal structure of the brigades should be relatively standard and capable of performing all roles, tasks and tactical missions. The brigades that support the divisions should consist of two cannon battalions and one MLRS battalion. This arrangement provides two cannon battalions that can perform the reinforcing and general support reinforcing missions to the DS units as well

as a temporary DS mission to the divisional cavalry squadron or the division's air brigade. It also provides an additional MLRS battalion capable of all roles, tasks and tactical missions not performed by the cannon battalions. The brigade that will supports the corps as a whole, should consist of one cannon and two MLRS battalions. This arrangement provides two MLRS battalions capable of performing all non-DS fire support requirements for the corps. The cannon battalion in this brigade provides additional flexibility such as being combined with other field artillery brigade cannon battalions, and forming a fire support force for the corps' armored cavalry regiment, with each battalion providing DS fires for a squadron.

As with the field artillery brigades and division artilleries, the basic design and structure of the cannon and MLRS battalions is generally conducive to conducting AirLand Operations and employing smart munitions. Presently built around the three firing battery concept with subordinate firing platoons, the employment tactics, span of control and crew effectiveness have proven to be successful. They must, however, also adapt to the conceptional and technological evolution and sustain the capability to project lethal power, respond to change and expand to major events. To do so, changes to their design, number of weapons and number of personnel may be required.

Deciding exactly what to change and how to change them is a complicated process that takes into consideration a number of factors.

Battalions must be designed so that they can perform all of their tasks, roles and tactical missions. That the exact number of weapon systems or personnel and the final structure cannot be recommended right now is not important. What is important is that the process to determine them is sound. The key to the process is the interaction of computer derived weapon effectiveness data and experience derived human factors. Computer analysis of combat operations focuses on effectiveness data that indicates exact numbers of weapons needed to achieve desired results. Alone, it gives accurate, but sterile, prediction of battle outcomes. Human factor consideration focuses on design and manning of the command structure and individual sections so that weapon systems are employed to their fullest capability. That ample firepower is available, does not necessarily mean that it will all be employed effectively. Alone, consideration of human factors provides for the proper span of control. In isolation, both produce good products. Together, however, they produce the best product.

Current fire support force design does not enable the maneuver battalion fire support officer (FSO) or the brigade FSCOORD to properly execute fire support coordination in AirLand Operations with advanced technology munitions. Overall, the field

artillery has done a good job constructing a fire support system that provides command, control and communication (C3), target acquisition and delivery of firepower. It has recognized that this system is what makes fire support work, and has championed it for development and resourcing. Foremost in this system are the fire support agencies in command posts from corps to company. It is through these agencies, or fire support elements (FSE), that the force commander, advised and assisted by the FSCOORD, directs the use of fire support.

During battle, the duty position of the maneuver commander is forward. The characteristics of AirLand Operations requires him to be in direct and constant contact with his subordinate commanders and close enough to the battle to get a sense or feel of the situation. If they are to be equally effective, the battalion FSO and the brigade FSCOORD must accompany their respective maneuver commanders. AirLand Operations and the employment methodology of smart munitions require quick decisions. The windows of opportunity are fleeting. The battalion FSO and brigade FSCOORD must be in a position to immediately advise their maneuver commander and rapidly implement fire support measures to support his directives. To successfully do this they must have the equipment and manpower to sustain forward operations. Neither are provided for by present force design.

Backed by robust main tactical operations centers (TOC), the maneuver commanders at battalion and brigade operate from forward tactical command posts (TAC) that are manned and equipped to support the operation. While backed by the FSE at the maneuver TOC and by the field artillery battalion TOC, the battalion FSO and brigade FSCOORD do not have properly manned or equipped TAC's from which to operate. To remedy this, the fire support force design must be expanded to enable the battalion FSO and brigade FSCOORD to operate at peak efficiency. A forward command vehicle of equal mobility and survivability as that of the maneuver commander is required for each. It should be equipped with the required communication devices to insure access to all available fire support. A fire support team should man the vehicle and be able to assist the FSO or FSCOORD in accomplishing all his tasks during continuous operations. Correcting this deficiency and insuring the other established FSEs are properly manned and equipped at equal efficiency levels as their maneuver counterparts will enable the field artillery to function effectively in AirLand Operations, and get the full value from the advanced technology weapons it will employ.

CONCLUSION

Throughout its history, artillery has adapted to technological and operational advances. It has successfully maintained the capability to provide the commander responsive and mobile firepower with which to influence the battle at critical

times and places. Once again, artillery stands on a threshold of a new era. Facing simultaneous changes in technology and operational concept, it is poised to transition to a higher level of effectiveness.

Mr. Jonathan Bailey states that "the utility of firepower depends on the factors which generate it and the enemy's susceptibility to it."[8] He went on to indicate that while the quantity and quality of delivery systems and ammunition are major factors, their usefulness is wasted if an efficient employment process is not operational. This same thought process has been argued in this paper. The Army is in the process of adopting a new operational concept that is designed to meet the needs of the foreseeable future. At the same time, it is bringing on board new munition technologies that expand its capabilities, as well as support the new concept. For the field artillery to successfully support the Airland Operations concept and get the full value from the smart munitions, it must change its doctrine and structure as recommended in this paper, and summarized in the following paragraphs.

The recommended changes to field artillery doctrine bring it in line with AirLand Operations by addressing each of the four stages, as well as the concept as a whole. The three principles

of fire support remain, however, the definitions of the first two are expanded to include the two former fire support tasks synchronize fire support and support the commander's battle plan. The three principles are:

- The fire support system must operate as one force.
- The fire support system must be responsive to the needs of the force commander.
- Direction of the fire support system is the responsibility of the field artillery commander.

Two new basic tasks are added to the two that remain. Together, they directly address AirLand Operation's four stages. The four basic tasks are:

- Protect the force. (new)
- Shape the battlefield. (new)
- Support forces in contact.
- Sustain fire support.

Along with modifications to the definitions of the original three roles of the field artillery, a fourth is added. The four roles are to provide:

- Close fires.
- Counterfire.
- Interdiction fires.
- Deep fires. (new)

The four tactical missions of the field artillery remain. The definition of direct support is expanded, however, to strengthen

the concept of the DS battalion's habitual relationship with its supported maneuver brigade. The tactical missions are:

- Direct support.
- Reinforcing.
- General support reinforcing.
- General support.

The structural changes recommended in this paper are designed to enable the field artillery force to fulfill all of its tasks, roles, and tactical missions while adhering to the principles of fire support. The field artillery within a division should consist of one DS cannon battalion per ground maneuver brigade, plus a MLRS battalion for the heavy divisions or a 155mm battalion for the light divisions. There should be a field artillery brigade per division and one per corps. The divisional brigades should consist of two 155mm cannon battalions and one MLRS battalion. The corps brigade should consist of one 155mm cannon battalion and two MLRS battalions. To properly plan and coordinate all fire support, there should be a FSE for both the main and tactical operations centers of the maneuver battalion, brigade, division and corps. Each FSE should be equipped to match the maneuverability of its supported operations center and manned for continuous operations.

The field artillery force doctrine and structure recommended in this paper fit and compliment the warfighting concept and the

smart munitions the army will use in the future. They are not a doctrine and force structure in search of a concept to fit them. As such, when combined, they provide a sound base upon which to build the future field artillery force, and against which to compare the results of evolution efforts such as Legal Mix VII.

ENDNOTES

1. J.B.A. Bailey, Field Artillery and Firepower, pp. 12-13.

2. U.S. Department of the Army, TRADOC Pam 525-5, p. 1. (hereafter referred to as TRADOC Pam 525-5)

3. U.S. Department of the Army, Field Manual 6-20, pp. 1-10.

4. U.S. Department of the Army, Field Manual 6-20-1, pp. 1-1 - 1-4.

5. U.S. Department of Defense, Extended-Range Smart Conventional Weapon Systems, October 1988, pp. 2-17.

6. Bill Rittenhouse, "MLRS Smart Munitions," Field Artillery Journal, August 1987, pp. 46-48.

7. TRADOC Pam 525-5, pp.10-34.

8. Bailey, p. 15.

BIBLIOGRAPHY

Bailey, J.B.A. Field Artillery and Firepower. Oxford: The Military Press, 1989.

Rittenhouse, Bill. "MLRS Smart Munitions," F.A. Journal. August 1987: 46-48.

U.S. Department of the Army. Field Manual 6-20: Fire Support In The AirLand Battle. Washington: 17 May 1988.

U.S. Department of the Army, Field Manual 6-20-1: The Field Artillery Cannon Battalion. Washington: 29 November 1990.

U.S. Department of the Army. TRADOC Pam 525-5: AirLand Operations. Fort Monroe: 1 August 1991.

U.S. Department of Defense. Extended-Range Smart Conventional Weapon Systems. Washington: October 1988.