THE FIRE SUPPORT COORDINATION LINE: IS IT TIME TO RECONSIDER OUR DOCTRINE?

A thesis presented to the Faculty of the U.S. Army Command and General Staff College in partial fulfillment of the requirements for the degree

MASTER OF MILITARY ART AND SCIENCE

by

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Doctrinally, the FSCL is a permissive fire control measure which opens the area beyond the FSCL to all fires without clearance from subordinate, supporting or adjacent units. The supporting air component should be informed of surface-to-surface fires delivered beyond the FSCL.

This study explains the use of the FSCL as a restrictive measure and explores the Corps deep battle relative to theater operational considerations.

This study concludes that the current doctrinal FSCL definition is not valid within the context of joint operations. On a nonlinear battlefield characterized by ground attack systems that will engage targets in an area previously accessible only to aircraft delivered munitions, coordination must occur between the ground and air component for delivery of fires beyond the FSCL.

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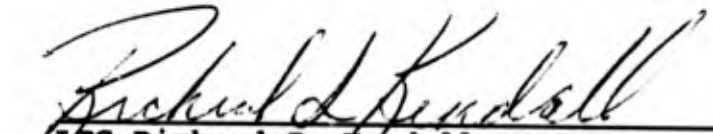

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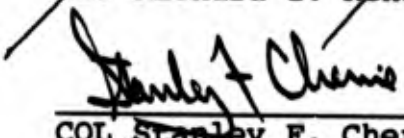

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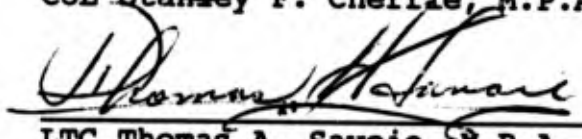

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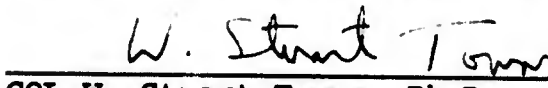

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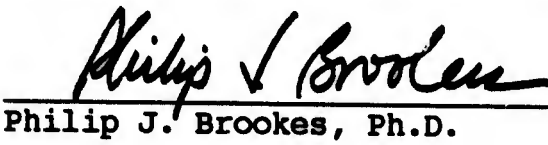

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The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

ABSTRACT

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This study investigates use of the Fire Support Coordination Line (FSCL) in VII Corps during Operation Desert Storm. The FSCL was considered a restrictive fire control measure by VII Corps due to the requirement to clear surface-to-surface fires beyond the FSCL with the Air Force.

Doctrinally, the FSCL is a permissive fire control measure which opens the area beyond the FSCL to all fires without clearance from subordinate, supporting or adjacent units. The supporting air component should be informed of surface-to-surface fires delivered beyond the FSCL.

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CHAPTER 1

> We must maintain an effective war-fighting doctrine. At no time in our history has doctrine proven its importance so decisively as it did in Desert Storm. AirLand Battle is now part of the vernacular of America . . . . We now must ensure our doctrine continues to evolve so it will be as effective on the battlefields of tomorrow as it was during Desert Storm . . . . For let there be no doubt: the Field Artillery of tomorrow, with its unique ability to range throughout the length and breadth of the battlefield, will be at the cutting edge of our doctrine in the next century.[1]
>
> General Carl E. Vuono, 9 May 1991

INTRODUCTION

The purpose of this study is to investigate the use of the Fire Support Coordination Line (FSCL) by VII Corps during Operation Desert Storm. The thrust of this study is to determine whether or not this fire support coordination measure (FSCM) has retained its value as a permissive measure within the context of AirLand Battle doctrine. Since the publication of this doctrine in the 1982 edition of the Army's capstone warfighting manual, Field Manual (FM) 100-5, more emphasis has been placed on fighting deep operations.

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[1]Carl E. Vuono, "Change, Continuity and the Future Field Artillery," Field Artillery (June 1991): 9.

For the Corps, this means looking out far enough in time and space to acquire and engage enemy forces that could soon influence the divisional close battles. The purpose of maneuver boundaries and FSCMs are to distinguish the different areas of the battlefield and to assign responsibility and control of fires to each echelon of command. Operation Desert Storm provided the first opportunity for the Army to exercise AirLand Battle doctrine in a combat situation as part of a joint and combined force with multi-corps formations. The use of boundaries and FSCMs was an integral part of the success of the coalition forces engaged in battle with the Iraqi forces and, to some degree, was successful in preventing excessive fratricide among coalition partners.

The importance of this question to our doctrine is the high degree of certainty that future conflicts will involve joint and/or combined forces. The importance of joint doctrine to joint warfighting is measured in the ability of the friendly forces to apply combat power efficiently and safely (reduced fratricide) to quickly achieve theater strategic and operational objectives. To ensure the ability of US forces to meet these requirements, training must be conducted regularly in accordance with

clearly defined doctrinal parameters that are understood and applied by all members of the joint warfighting force. This training will then have its payoff when the joint forces are committed to combat and are capable of quick and efficient resolution of the situation. Their success will be based on the doctrinal tactics, techniques, and procedures which have been the framework of all joint training.

On 27 February 1991, the Iraqi Army was in disarray and units were fleeing north to escape the Coalition Forces which were rapidly enveloping Kuwait. In the VII Corps zone, *Republican Guard Forces Command* units were loading heavy equipment on trailers to salvage as much combat power as possible. VII Corps planners knew the Iraqi forces were fleeing and that this presented a perfect opportunity to complete their destruction, the stated objective of the VII Corps campaign. The most effective and capable system for this destruction was Coalition aircraft. Frantic attempts to request air support were made, yet the end result was an inability to get approval on sorties short of the FSCL. The FSCL had been moved by the Air Component Commander, General Horner, out beyond the area in which the corps commander now wanted to engage lucrative targets, but no aircraft were allocated to support the destruction of the enemy. The Air

Component Commander had specified that no air attacks would be made short of the FSCL without an air or ground controller from the supported corps. The Iraqi forces were well beyond the range of organic corps assets and it was impossible to get eyes on the target. This situation amplified the doctrinal bastardization of the FSCL which had been a feature of Desert Storm from the beginning of offensive air operations, and the centralized control of air interdiction at Central Command. Beyond the FSCL was Air Force territory, and no fires could be delivered in that area without clearance by the Air Component. Short of the FSCL was Army territory, and aircraft did not fly in that area unless directed by an air controller. This restrictive interpretation of the FSCL precluded the VII Corps from directing the destruction of the *Republican Guard Forces Command* as they made their escape north to Basrah.[2] Hindsight has shown that at least fifty to sixty percent of the *Republican Guard* divisions escaped with their equipment due to this joint warfighting problem that was the approved solution at theater level.[3]

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[2]Colonel Stanley F. Cherrie, VII Corps G-3, interview by author, Leavenworth, Kansas, 13 April 1992.

[3]US News and World Report, "Triumph Without Victory" (New York: Random House, 1992), 405-406.

Following Desert Storm, a survey developed by the Center for Army Lessons Learned (CALL) and the Army Research Institute Field Unit at Fort Leavenworth investigating a range of command and control issues was disseminated to Army units. Several limitations are specified to caution drawing conclusions from the responses. No screening of the respondents has taken place, giving all opinions equal weight regardless of rank or position of respondent; and, there is a danger that some opinions are uninformed and based on hearsay rather than personal experience. Despite these limitations, CALL believes that the survey results do provide an accurate reflection of the opinions of the majority of Army Desert Storm participants. Three versions of the survey which targeted commanders and staffs were distributed. Two questions elicited responses which directly relate to the subject of this thesis. Question ten asked: Did control measures ensure cooperation between forces? Were they too restrictive to subordinates? Describe any difficulties. Question 33 asked: How effective were fire control measures during daytime and night operations. Describe any problem areas. Of 422 respondents ranging in grade from brigadier general to staff sergeant, 378 indicated that control measures had ensured cooperation between units with only 49 indicating that they were too restrictive to subordinates.

Use of the FSCL was a frequently mentioned area of controversy. Comments included:

- VII Corps uses an FSCL as a restrictive control measure not in accordance with current definition. Made use of CAS difficult. (Assistant Division Commander)
- The FSCL does not mean the same thing to the Air Force as to the Army. No massing of ground artillery, Army air and Air Force could be accomplished. (Division G3)
- The FSCL either needs to be redefined or used as currently defined. Firing beyond the FSCL was painful/ difficult to get permission. (Brigade Fire Support Officer)
- FSCLs were too restrictive and only ensured that some targets didn't get hit. (Division Assistant G3 Plans)
- FSCL definition needs to be adhered to by higher headquarters. (Division G3 Operations)
- VII Corps FSCL was used in a restrictive manner. Caused massive problems in direct support of task force. (S3)
- Non-doctrinal definition turned . . . FSCL into a restrictive, instead of permissive control measure . . . clearing indirect fire request instituted to prevent fratricide. (Division Fire Support Element)
- . . . . there were no fires allowed beyond the FSCL. It was, in effect, an RFL. Coordination to fire

required 30 plus minutes eliminating responsive fires. If control measures were properly used . . . things would have gone better. (Battalion S2)

- An FSCL had been established for the Air Force, however it had a completely different meaning for the ground troops. No fires were allowed beyond the FSCL, which caused delays in mission time when the Task Force came in contact, because Corps had to clear missions. (Assistant S3)

- The . . . FSCL . . . was used incorrectly by our Divarty; the [FSCL] was used to restrict fires by lower echelon units. (Task Force Fire Support Officer)[4]

These responses indicate concern existed at all levels within Army units committed to combat concerning the non-doctrinal application of the FSCL. As this thesis will demonstrate, the perceptions of these respondents did not always correspond with the actual conditions. But this points out the very real danger that perceptions, whether accurate or not, can be reality to the soldier on the battlefield. Doctrine must address these concerns and ensure a common base with which all services agree and train.

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[4]Center for Army Lessons Learned, "Preliminary Analysis of CALL Surveys." All entries are quotes from the written answers to the survey questions.

RESEARCH QUESTION

The primary research question of this thesis is: Should tactics, techniques, and procedures with respect to the fire support coordination line be reconsidered for possible modification in light of recent US experiences in Operation Desert Storm. Several subordinate questions which must additionally be answered are:

- Do existing FSCMs support AirLand Battle doctrine?
- Do all joint partners accept and use the joint definitions for employment of the FSCL and other FSCMs?
- Should our doctrine with respect to all FSCMs be reconsidered in light of our experiences during Operation Desert Storm?

BACKGROUND

The need to control lethal fires and their effects on friendly forces has been recognized since World War I, but only as we have increased the emphasis on the synchronization of combat power through joint operations with AirLand Battle doctrine have we examined in greater detail our use of FSCMs. This emphasis has been clearly evident in the prosecution of

operational campaigns and tactical battles during Return of Forces to Germany (REFORGER)[5] and in the simulation center of Battle Command Training Program (BCTP)[6] for corps and division commanders. Proper usage of measures that will prevent friendly fires from affecting converging forces and other delivery systems in a rapidly moving scenario have also been the focus of corps and division level terrain walks with key leadership in the Fulda Gap and Meiningen Corridor (formerly primary avenues of approach for Warsaw Pact forces into the Federal Republic of Germany).

This training emphasis has been proper and coordination has been extensively practiced. The mechanical application of FSCMs to complement tactical scenarios has been accomplished by fire support coordinators, but without the critical visualization of the actual import of these FSCMs in high and mid-intensity air-ground combat operations.

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[5]REFORGER was an annual joint/combined training exercise in which US units earmarked for deployment to Western Europe in the event of a crisis were deployed on a selective basis. This deployment demonstrated the commitment of the US in countering the threat posed by the Warsaw Pact.

[6]BCTP is a component of the US Army Combat Training Center strategy. The mission of BCTP is to train active and reserve component Division and Corps Commanders and battle staffs to execute their mission essential tasks in an externally evaluated joint and combined setting.

The one element that no amount of aggressive or well-designed training can provide is the impact of live rounds from a myriad of direct and indirect fire systems throughout the length and breadth of the battlefield and what that really means for the synchronization of combat power. When confronted with this dilemma of air and ground systems both capable of delivering ordnance into the deep operations area on the battlefield in Iraq and Kuwait, the exigencies of the situation appear to have persuaded high-level decision makers to modify doctrinal application of FSCMs. Modification in the name of mission, enemy, time, terrain and troops available (METT-T) provided added insurance against possible ground-to-air fratricide and deferred to the air component the ability to control deep operations rather than coordinate with ground components.

The issue then is to determine whether or not conditions have changed sufficiently to consider making permanent doctrinal changes to our existing tactics and techniques or if doctrine should be modified as necessary by the Commander-in-Chief of the theater of operation to meet his projected demands of METT-T. Given that our desire to avoid fratricide will continue to be an issue in future conflict, should we reconsider how we intend to accomplish

the very difficult task of synchronizing surface-to-surface and air-to-surface fires 100 kilometers in front of the forward line of own troops (FLOT)? We have finally placed systems in the hands of the corps commander with which he can reach out and more readily affect deep operations, but we may have tied his hands with additional coordination requirements which could allow his high payoff targets (HPT) to slip away before they can be engaged.

DEFINITION OF TERMS

No study of FSCMs can begin without an understanding of definitions which reflect current inter-service agreement or Army doctrine. Joint Publication 1-02 provides the Department of Defense (DOD) approved joint definition for the fire support coordination line. The preface of Joint Pub 1-02 clearly states that DOD components "will use the terms and definitions [contained in Joint Pub 1-02] without alteration unless a distinctly different context or application is intended."[7] However, joint commanders are provided with the flexibility to modify the application of joint doctrine if

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[7]Joint Chiefs of Staff, Publication 1-02, Department of Defense Dictionary of Military and Associated Terms (Washington DC: Joint Chiefs of Staff, 1989), iii.

exceptional circumstances within the theater in their best judgement so warrant.[8] This definition also represents a standardized and approved definition for North Atlantic Treaty Organization (NATO) allies. The joint definition for the FSCL as specified in Joint Pub 1-02 is:

> A line established by the appropriate ground commander to insure coordination of fire not under his control but which may effect current tactical operations. The fire support coordination line is used to coordinate fires of air, ground or sea weapons systems using any type of ammunition against surface targets. The fire support coordination line should follow well defined terrain features. The establishment of the fire support coordination line must be coordinated with the appropriate tactical air commander and other supporting elements. Supporting elements may attack targets forward of the fire support coordination line, without prior coordination with the ground force commander, provided the attack will not produce adverse effects on, or to the rear of, the line. Attacks against surface targets behind this line must be coordinated with the appropriate ground force commander.[9]

What this definition indicates is a concern for the protection against air-to-ground fratricide of the ground forces on the near side of the FSCL rather than ground-to-air fratricide of the air delivery systems on the far side of the FSCL.

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[8]Joint Chiefs of Staff, Publication 1-01, Joint Publication System, Joint Doctrine and Joint Tactics, Techniques, and Procedures Development Program (Washington DC: Joint Chiefs of Staff, 1988; with change 1, 1989), I-3.

[9]Joint Pub 1-02, 144.

The remaining family of FSCMs which are used by Army forces are specified in FM 6-20-30, Fire Support for Corps and Division Operations and defined in FM 101-5-1, Operational Terms and Symbols. Additional joint definitions for several of these FSCMs are found in Joint Pub 1-02. There are three forms of control measures. These are boundaries, permissive, and restrictive fire support coordinating measures. In combination, these control measures provide structure for command, control and coordination.

Boundaries are used by maneuver commanders to designate a geographical area within which a specified unit has both tactical freedom of action and responsibility of control and coordination. Boundaries are both permissive, in that the maneuver commander enjoys complete freedom of fire and maneuver within his boundaries, and restrictive in that no fires may be delivered across boundaries without coordination with the responsible commander, although direct fires against clearly-identified enemy targets without prior coordination is permissible provided friendly forces are not endangered.[10]

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[10]US Army, FM 6-20-30, Fire Support for Corps and Division Operations (Washington DC: Department of the Army, 1989), F-1 and F-2 and US Army, FM 101-5-1, Operational Terms and Symbols (Washington DC: Department of the Army, 1985), 1-11 and 1-12.

Permissive measures used within the Army include the coordinated fire line, the fire support coordination line and the free fire area (Figure 1-1).

> The coordinated fire line is a line beyond which conventional indirect fire means (mortars, field artillery, and naval gunfire ships) may fire at any time within the zone of the establishing headquarters without additional coordination. The purpose of the coordinated fire line is to expedite the attack of targets beyond it.[11]

The FSCL is defined as a fire control measure which allows the corps and its subordinate and supporting units (such as Air Force components) to expeditiously attack targets of opportunity beyond the FSCL. The attack of targets beyond the FSCL by Army assets should be coordinated with supporting tactical air. Coordination is defined as informing and/or consulting with the air component. However, Army doctrine states that inability to effect coordination does not preclude the attack of targets beyond the FSCL.

The free fire area is a specific area into which any weapon system may fire without additional coordination with the establishing headquarters.[12]

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[11]Ibid., F-2.

[12]Ibid., F-4.

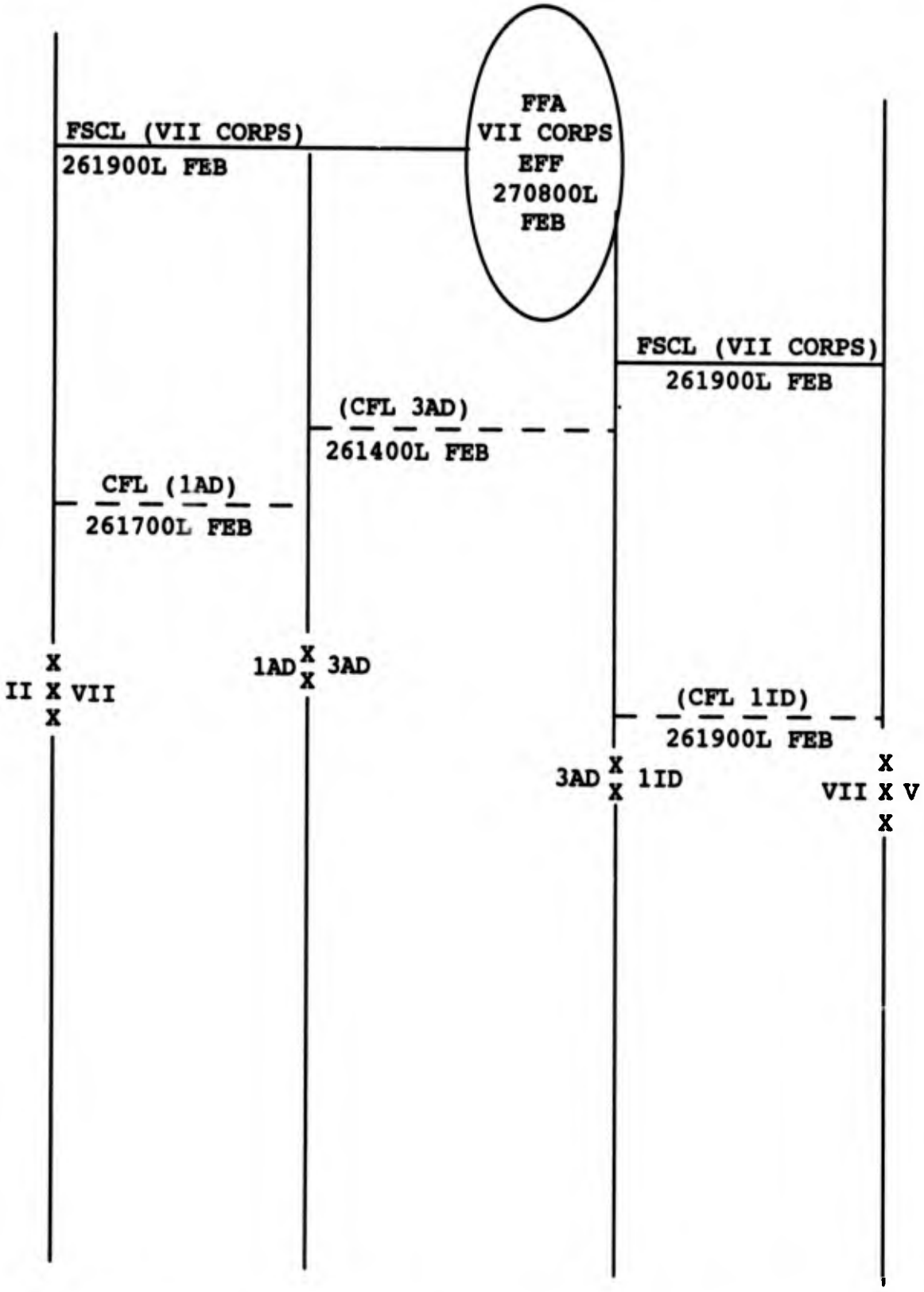

Figure 1-1 (Permissive Fire Support Coordinating Measures) (For illustrative purposes only, not reflective of actual Desert Storm battlefield geometry)

Restrictive measures reflect Army concern with not only facilitating freedom of fires and maneuver, but simultaneously ensuring the protection of air and ground forces throughout the depth of the battlefield. Measures used include the restrictive fire line, the airspace coordination area, the no-fire area and the restrictive fire area (Figure 1-2).

The restrictive fire line is a line established between converging friendly forces that prohibits fires or the effects of fires across the line without coordination with the affected force. It is intended to prevent interference between the converging friendly forces.[13]

The airspace coordination area is intended to coordinate the simultaneous attack of targets near each other by multiple fire support means, one of which is normally air. It is a block of space through which fires may not pass to allow aircraft reasonable safety from surface fires. It may be implemented as either a formal or informal measure. The formal application is a three-dimensional box which requires a significant amount of time to coordinate and implement. Informal measures can be established using time, lateral

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[13]Ibid., F-5.

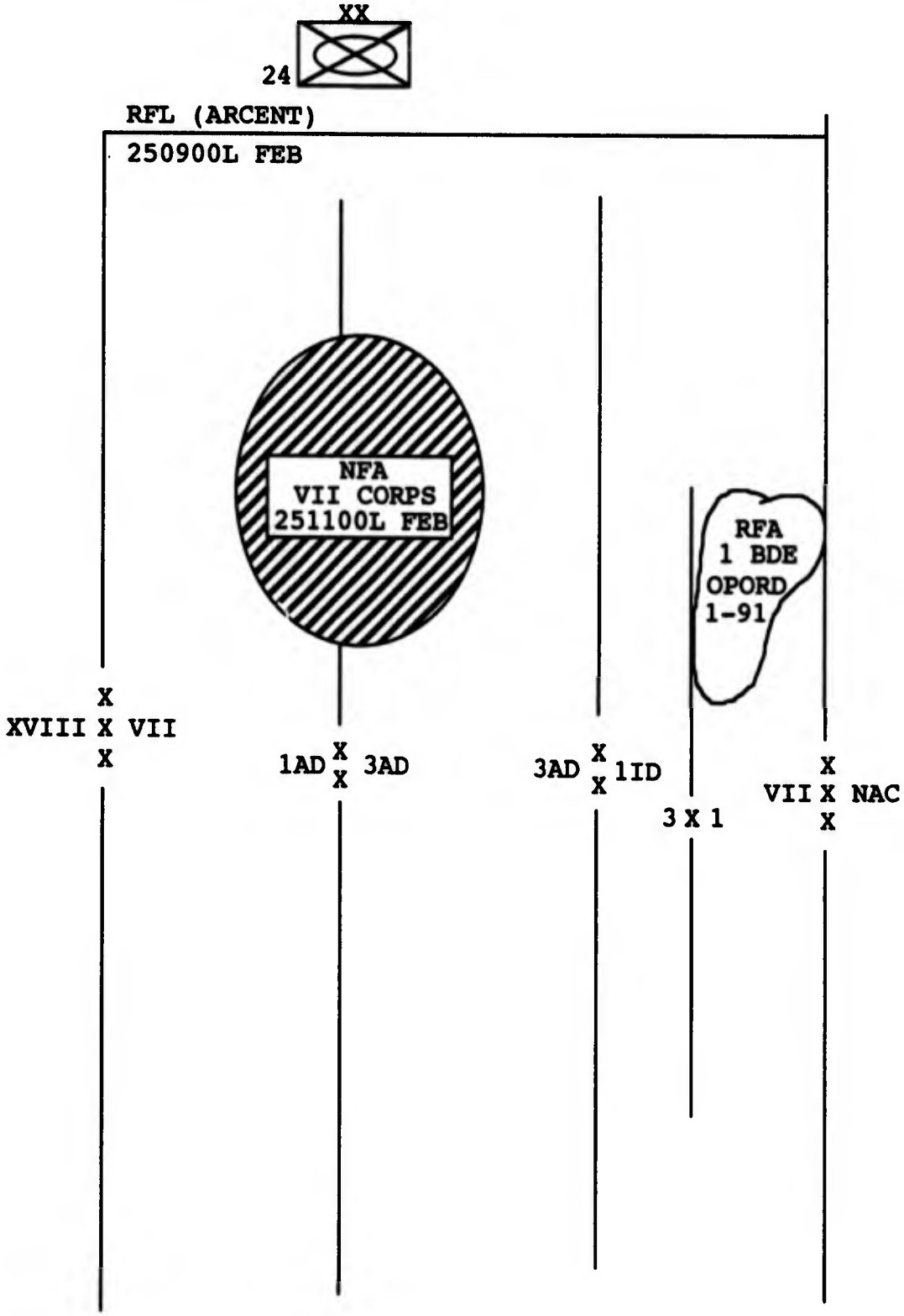

Figure 1-2 (Restrictive Fire Support Coordinating Measures) (For illustrative purposes only, not reflective of actual Desert Storm battlefield geometry)

separation, or altitude to provide separation between surface-to-surface and air-delivered fires. Informal measures tend to be easier to plan, coordinate and are more rapidly implemented, and therefore most often used.[14]

The no fire area is an area into which no fires or effects of fires are allowed. Two exceptions are approval of fires on a mission-by-mission basis by the establishing headquarters or the right of a commander to engage enemy forces firing upon his force from the no fire area.[15]

The restrictive fire area is an area in which specific restrictions are imposed and in which fires that exceed those restrictions will not be delivered without coordination with the establishing headquarters.[16]

During Desert Storm three other types of FSCMs were established for use by joint forces. All were nondoctrinal adaptations to the situation within the theater. These included kill boxes/zones, the artillery deconfliction line, and the reconnaissance and interdiction planning line (RIPL).

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[14]Ibid., F-5.

[15]Ibid., F-6.

[16]Ibid., F-7.

Kill zones were 60x60 mile areas which were broken into 15x15 mile kill boxes and used by the Air Force to focus air where they thought it would do the most good (most targets). They were used to assign missions and were easily programmable into the aircraft navigation computer. Since they were not force oriented and not coordinated with maneuver boundaries they were of limited utility in the eyes of the ground forces in helping to shape Iraqi forces for the ground campaign.[17]

The RIPL is a planning line established by echelons above corps (EAC) which serves to divide the battlefield between corps and Army Group. Normally sited approximately 80 to 100 kilometers from the FLOT at the limit of both the acquisition and attack ranges of corps organic systems, it serves to delineate Army Group and corps deep operation areas. Short of the RIPL, the corps has responsibility for acquisition, attack and nomination of targets for air interdiction, while beyond the RIPL is the EAC area of interest. This FSCM is used only in NATO in the Central Army

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[17]VII Corps Fires After Action Review (Draft), (Letter distributed by VII Corps Artillery HQ to subordinate units for comment, 4 March 1991).

Group area and was proposed for use within the Kuwait Theater of Operation (KTO) by VII Corps.[18]

The artillery deconfliction line was an FSCM proposed by the Air Force and approved and implemented by US Central Command (CENTCOM). It allowed artillery to fire out to maximum range as long as it did not exceed a maximum ordinate of 20,000 feet. The Air Force would coordinate routes with VII Corps Fire Support Element (FSE) for any flights below 20,000 feet from the Corps rear boundary to the FSCL.

Any discussion of coordination of fire support, especially with regard to the interface between ground and air systems, requires an understanding of the agencies involved in this coordination (Figure 1-3).

The corps fire support cell consists of a fire support element with field artillery personnel and equipment allocated to each of the three corps command posts (CP) (tactical, main and rear). Additional personnel manning this cell include an Air Liaison Officer and an Assistant Air

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[18]JULLS Number 13264-60800(00002) submitted by VII Corps G-3, Deep Operations, Major Combs and Allied Air Forces Central Europe AAFCE Manual 80-2, Offensive Air Support (March 1986), 3-2.

Defense Officer. Other personnel who actively coordinate with this cell include the G2, G3 Air, army aviation, and electronic warfare, engineer and chemical representatives. The purpose of this cell is to plan, coordinate and integrate all fire support operations, to include tactical air (TACAIR) and electronic warfare (EW) support. This includes the synchronization of close, deep and rear operations to accomplish the following battle coordination functions:

- Acquire and identify high-payoff targets (HPT).
- Assess attacks.
- Adjust assets.
- Change battle plans.
- React quickly to high priority targets.
- Recommend targets.
- Use target value analysis to identify target priorities.
- Determine fire support needs.
- Expedite fire support.
- Assess fire support effects.
- Coordinate timing of fire support attacks (to include EW).
- Recommend use of TACAIR assets.[19]

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[19]FM 6-20-30, Appendix A.

The Air Support Operations Center (ASOC) is an Air Force facility designed to plan, coordinate and direct tactical air support within a Corps Tactical Operations Center (CTOC). It functions as the forward element of the Tactical Air Control Center (TACC) in the operational command channels of the Tactical Air Control System. The primary task of the ASOC is to assist in the execution of air tasking orders (ATO) and to provide army forces with the required tactical air support for ground operations. The ASOC is collocated with the CTOC to ensure maximum coordination of effort between air and ground forces. Other tasks include:

- Receives, plans, and coordinates army requests for immediate TACAIR.
- Acts as an advisory agency to the corps FSE.
- Keeps the TACC advised of the efforts needed to satisfy army TACAIR requirements.
- Coordinates with the associated corps FSE on the detailed integration of fixed-wing tactical air support with the fire and maneuver of the land forces.[20]

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[20]US Air Force, TAC Regulation 55-45, Tactical Air Force Headquarters and the Tactical Air Control Center (Langley AFB: Headquarters Tactical Air Command, 1988), 5-1 to 5-3.

The TACC is located near the Air Component Commander (ACC) headquarters. The Tactical Air Control System begins with the ACC and extends down through all operating air echelons. During Desert Storm this element was the Combined Tactical Air Control Center (CTACC) which controlled and coordinated all air missions assigned by the ACC and flown within the CENTCOM region. The air component commander of US Central Air Force (CENTAF) was responsible for the centralized control of all air resources in CENTCOM and managed these resources through the CTACC. The CTACC meets its mission requirements with the Combat Plans Division, the Combat Operations Division, the Combat Operations Intelligence Division and the Enemy Situation Correlation Element. These organizations plan, coordinate and execute air mission requirements through preparation of the ATO and supervision of the detailed execution of the ATO.[21]

Also located at the TACC is the Army Battlefield Control Element (BCE) which has an army representative located in each of the TACC divisions. This element ensures that land and air operations are synchronized by continuously monitoring and interpreting the land battle situation for the TACC. All BAI missions are coordinated through the BCE, and

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[21]FC 100-26, 2-7 and 2-8 and TACR 55-45, 5-1.

through their direct interface with the corps, they provide current FLOT, FSCL and airspace coordination information to the TACC. The continuous dialog between the BCE and the corps is critical to the synchronization with the TACC.[22]

The Airborne Battlefield Command and Control Center (ABCCC) is a specially equipped aircraft used by the Air Force during deployments for enroute and interim terminal control of forces. Once the Air Force Command Post is established and operational within the theater, the ABCCC will be used as the situation requires.[23] During Desert Storm, this airborne extension of the CTACC was used to direct and divert air interdiction (AI) and close air support (CAS) sorties. This included direction of assets into open kill zones, management of immediate air requests and coordination of corps deep fires beyond the FSCL.

ASSUMPTIONS AND LIMITATIONS

This study is limited in determining precise locations of units and FSCLs throughout the ground war by the

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[22]TACR 55-45, 4-4 and 8-9.

[23]TACR 55-45, 5-2.

availability of situation reports and after action reports in the residual documents. The comparison of FSCL locations and unit locations may therefore, in some cases, not be precisely correct, but will be as correct as available documentation permits. For the purposes of this study, the comparative locations of FSCMs and maneuver units are precise enough to draw the required conclusions as to the validity of FSCM usage.

This thesis will focus on the use of the FSCL within the VII Corps area of operations and will primarily show how it was used within the context of ground force operations and the interface of these operations with Air Force, Marine and Navy air operations.

Conclusions within this thesis are based on theater operations, joint and service doctrine demonstrated in the KTO.

METHODOLOGY

The methodology used in this thesis was the collection of facts regarding the use of the FSCL in the VII Corps sector during Operation Desert Storm and the comparison

of that use with the doctrine specified in Army and Joint doctrinal manuals. This comparison offers two perspectives.

The first perspective will focus on how the placement of the FSCL in relationship to the location of subordinate units of VII Corps affected their ability to conduct both close and deep operations. This comparison will examine placement as doctrinally specified for both defensive and offensive operations as it affected divisional and corps operations.

The second perspective will look at placement in relation to the deep operations being conducted by VII Corps and the coordination with their joint partner in the conflict, the Air Force. Examination through both Army and Air Force eyes will reveal the significance of the FSCL in meeting the commanders intent for execution of Desert Storm operations. The significance of this perspective is the coordination requirements and channels of communication to achieve this coordination. Additionally, the theater objectives for Iraqi ground force attrition and shaping prior to and during the ground offensive are a major factor in the placement during this conflict.

ANALYSIS AND INTERPRETATION

Through the comparisons made of the VII Corps FSCL as used during Desert Storm, analysis will focus on strict adherence to doctrine, deviations from that doctrine, and implications of deviation on Desert Storm operations and possible future joint operations. This analysis will consider the effect of FSCL placement from both an Army and Air Force perspective and consider their abilities to execute their portion of the fight. As appropriate, the use of other FSCMs within the theater will also be considered, especially when their use in combination with the FSCL impacted on the warfighting decisions and capabilities of VII Corps.

Where necessary, an interpretation of decisions made by senior warfighters will be validated through interviews with staff members present within the theater of operation. Where this is not possible, the author will specify that the given interpretation is solely that of the author.

Through analysis of FSCL placement and usage during Desert Storm, conclusions will be made as to the validity of current doctrine or modifications to doctrine as practiced during the conflict. This conclusion will take into account

the success of Coalition Forces in Desert Storm, while critically examining the implications for high intensity warfare with a more capable opponent.

The conclusion will also state a recommendation for future use of the FSCL, whether that be to continue as currently specified in doctrine or make modifications to current definition or to even possibly eliminate the FSCL altogether. Consideration will also be made of other FSCMs and their relationship to the FSCL in terms of future doctrine.

Finally, a consideration of FSCL use within the context of AirLand Operations will be included in the conclusion. This will draw on current doctrinal AirLand Operations thought with an appreciation for the technological capabilities recently demonstrated or available in the near future.

THE FIRE SUPPORT CHALLENGE

The fire support challenge which has emerged as a result of Desert Storm is the coordination of deep attack into the corps commander's deep operations area. Corps

planners determine what critical enemy capabilities must be engaged to shape the battlefield, allowing the commander to accomplish his mission. This targeting process uses a decide, detect, deliver methodology to determine which critical targets should be nominated as high payoff targets. These targets are those which if acquired and successfully attacked, contribute substantially to the success of friendly operations. The key to corps high payoff targets is that they are based on the concept of operation and the intended scheme of maneuver for the divisions within the corps.[24]

Corps deep operations in training previous to Desert Storm had been highly dependent on the engagement of HPTs by aerial platforms, normally Air Force assets. These fire support assets are not as responsive as ground systems due to the long lead time involved with the planning, issue and execution of the air tasking order which allocates all preplanned sorties. Although some aircraft may be diverted for immediate missions in support of the corps deep battle, this is the exception rather than the norm. Therefore, the corps commander and his planners would often find themselves

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[24]FM 100-15, 3-0 and 3-1 and US Army, FM 6-20-10, Tactics, Techniques and Procedures for the Targeting Process (Washington DC: Department of the Army, 1990), 2-4 and 2-5.

frustrated by an inability to provide immediate delivery of attack assets onto an identified HPT.

> Even [Battlefield Air Interdiction] BAI operations placed us "outside" the enemy's decision cycle. Although the corps commander could rely on BAI for deep attack, this asset was unable to respond quickly enough to alter the enemy decision cycle. This inability...left the corps in a reaction mode.[25]

This experience within VII Corps in Germany led to the development of training exercises which integrated the use of AH-64 attack helicopters with targeting assets to accomplish deep attack. On at least two occasions, the corps executed simulated deep attacks with the AH-64 to demonstrate the feasibility and timeliness of this advanced capability for acquiring, identifying, designating and engaging enemy deep targets. Significantly, VII Corps also integrated the still-in-development joint surveillance target attack radar system (Joint STARS) into their exercise on one occasion.

With the deployment of the Army Tactical Missile System (ATACMS), the corps commander has been presented with an organic asset which will provide accurate, responsive fire support for the engagement of HPTs, greatly increasing the probability of kill for moving targets. A challenge for fire

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[25]Richard D. West and Charles E. Motson III, "Decide, Detect, Deliver; Tactics and Training in VII Corps Artillery," Field Artillery Journal (March 1987): 9.

supporters, however, is the coordination with the tactical air commander to ensure no manned aircraft are flying missions in the target area or along the trajectory of the rocket. This coordination often took 30 minutes to two hours pending Air Force coordination during Desert Storm.[26]

The issue then is; how do we coordinate all fire support assets in an expeditious and timely manner to ensure the ability of the corps to fight deep operations? Current doctrine must be examined to determine if tactics, techniques and procedures are adequate to avoid unnecessary risk to friendly aircraft, while ensuring timely engagement of HPTs.

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[26]T.R. Smith, Chief, VII Corps FSE letter to Mike Hawk, BCTP, Subject: FSCL, March 21, 1991.

CHAPTER 2

> ....the military Services' inability, or unwillingness, to work together has led this Nation to military disaster or near disaster. This has happened not once, or twice, but repeatedly since our military Services were first required to coordinate their efforts. And the sad fact is that these problems persist.[1]
>
> Senator Barry Goldwater, 2 October 1985

LITERATURE REVIEW

A large body of U.S. Army doctrinal literature exists that pertains to the use of fire support coordinating measures (FSCM). Most are current manuals that have been republished within the last four years to support the AirLand Battle doctrinal concepts laid out in the 1986 edition of FM 100-5, Operations.

Joint doctrinal literature discusses the FSCL, several other FSCMs and joint airspace control. Joint Publication 3-09, Doctrine for Joint Fire Support in final draft dated June 1991, introduces the full family of Army

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[1]Barry Goldwater, "DOD Reorganization: An Historical Perspective," Armed Forces Journal International (October 1985): 12.

FSCMs as well as including several other measures currently used by the Marines and Navy. The approval and publication of this manual will establish and define fundamentals of joint fire support and the fire support system. It describes the joint force commanders' responsibilities for fire support coordination and establishes a common set of control measures, including FSCMs. It also provides broad guidelines for planning and execution of joint fire support.[2]

Background information on sister service application and understanding of FSCMs was drawn from their doctrinal manuals to develop the body of thought for their joint use.

DOCTRINE

Army Doctrine

Army FM 6-20, Fire Support in the AirLand Battle, is the Army's capstone manual for fire support. This manual establishes the principles of fire support in AirLand Battle doctrine. It establishes the doctrinal framework for an

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[2]Joint Chiefs of Staff, Publication 3-09, Doctrine for Joint Fire Support (Final Draft, Washington DC: Joint Chiefs of Staff, 1991), I-2,3.

understanding of the employment of fire support as an essential element of combat power.

To understand the evolution of efforts to coordinate and synchronize artillery, ground maneuver, and air operations in battle, it is instructive to follow fire support doctrine forward through time using the chronological record provided by field artillery field manuals (Figure 2-1). This summary will show the progression of thought which led to the development of fire support coordination measures (Figure 2-2).

Technological advances in artillery pieces and technical computational improvements in the ability to deliver massed indirect fires against point, area and linear targets, made their first impact during World War I. The British and the French attempted the coordination of fire and maneuver and quickly discovered how difficult it could be. The first FSCMs were a series of phase lines with artillery firing on the far side and infantry remaining on the friendly side. Fires could be lifted and shifted to subsequent phase lines while the infantry advanced in the wake of the fires. This proved less than satisfactory as communications

technology was not yet capable of providing liaison between moving forces and supporting artillery.

> The problem of rapid and dependable communication between attacking infantry and its supporting artillery is probably the most important with which communications personnel have to deal. Many lives have been lost and many attacks have failed to attain their maximum success on account of the lack of instant and unfailing communication between the combat battalion of infantry and its supporting artillery.[3]

Variations on these techniques to ensure that friendly fire did not cause casualties among the advancing infantry included sewing white panels on the backs of French soldiers and the use of colored flares and signal lamps by the Germans.[4]

The interwar years were important for the American Army, and especially the field artillery community. Technical procedures continued to improve, giving American artillerymen the ability to more closely synchronize fires with maneuvering ground gaining arms. Control of fires in

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[3]Joseph O. Mauborgne, "Radio Communications for the Field Artillery," The Field Artillery Journal XI (May 1921): 274-5.

[4]Jonathan M. House, Toward Combined Arms Warfare: A Survey of Twentieth Century Tactics, Doctrine and Organization (Fort Leavenworth: Combat Studies Institute, 1984): 20-21.

FIRE SUPPORT DOCTRINAL EVOLUTION

Publication	Date	Title
	28 Dec 1931	Field Artillery Field Manual, Vols.1&2
FM 6-20	10 Jul 1940	Field Artillery Tactics and Technique
FM 6-20 w/C1	2 Jan 1941	Field Artillery Tactics and Technique
FM 6-20	5 Feb 1944	Field Artillery Tactical Employment
FM 6-20	26 May 1948	Field Artillery Tactics and Technique
FM 6-20	22 Oct 1953	Field Artillery Tactics and Technique
FM 6-20	10 Dec 1958	Field Artillery Tactics and Technique
FM 6-20-1	27 Oct 1961	Field Artillery Tactics
FM 6-20-2	8 Jan 1962	Field Artillery Techniques
FM 6-20-1 w/C1	7 Mar 1962	Field Artillery Tactics
FM 6-20-2 w/C1	3 Jan 1963	Field Artillery Techniques
FM 6-20-1	1 Jul 1965	Field Artillery Tactics
FM 6-20-1 w/C1	11 Dec 1967	Field Artillery Tactics
FM 6-20-2	10 Mar 1970	Field Artillery Techniques
FM 6-20	30 Aug 1973	Field Artillery Tactics and Operations
FM 6-20	30 Sep 1977	Fire Support in Combined Arms Operations
FM 6-20 w/C1	9 Jan 1980	Fire Support in Combined Arms Operations
FM 6-20	28 Jan 1983	Fire Support in Combined Arms Operations
FM 6-20	31 Dec 1984	Fire Support in Combined Arms Operations
FM 6-20	17 May 1988	Fire Support in the AirLand Battle
FM 6-20-30	18 Oct 1989	Fire Support for Corps and Division Operations
FM 6-20-40	5 Jan 1990	Fire Support for Brigade Operations (Heavy)
FM 6-20-50	5 Jan 1990	Fire Support for Brigade Operations (Light)

Note: This is not an all inclusive list of field artillery manuals, but includes only those that contained information on fire support coordination.

Figure 2-1

relation to maneuver forces was achieved through the designation of zones of fire and the assignment of liaison officers to the maneuver headquarters. Zones of fire were an element of fire direction and their limiting lines could be delineated by natural terrain features or by lines indicated on a map. Artillery units were assigned zones in width which normally coincided with the zone of action or sector of the supported unit. In operations involving corps and larger units, zones in depth could be assigned to division, corps and army artillery which would include the area in front of and parallel to the front line of the friendly troops and extending into the enemy positions. The depths of the zones were contingent on the effective ranges of the artillery within each echelon, the amount of artillery and the number of missions expected to be fired. As a primary principle, all artillery would be prepared to mass fires throughout the entire depth of the zone. Liaison officers ensured the coordination of fires by supporting artillery for maneuver units. These techniques were used through World War II and are documented in the field manuals published through 1944.[5]

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[5]War Department, Field Artillery Field Manual (Washington DC: US Government Printing Office, 1931), 359-363; War Department, FM 6-20, Field Artillery Field Manual, Tactics and Techniques (Washington DC: US Government Printing Office, 1940), 110-114; War Department, FM 6-20, Field Artillery Tactical Employment (Washington DC: US Government Printing Office, 1944), 10-11 and 25-27.

The Evolution of Fire Support Coordinating Measures

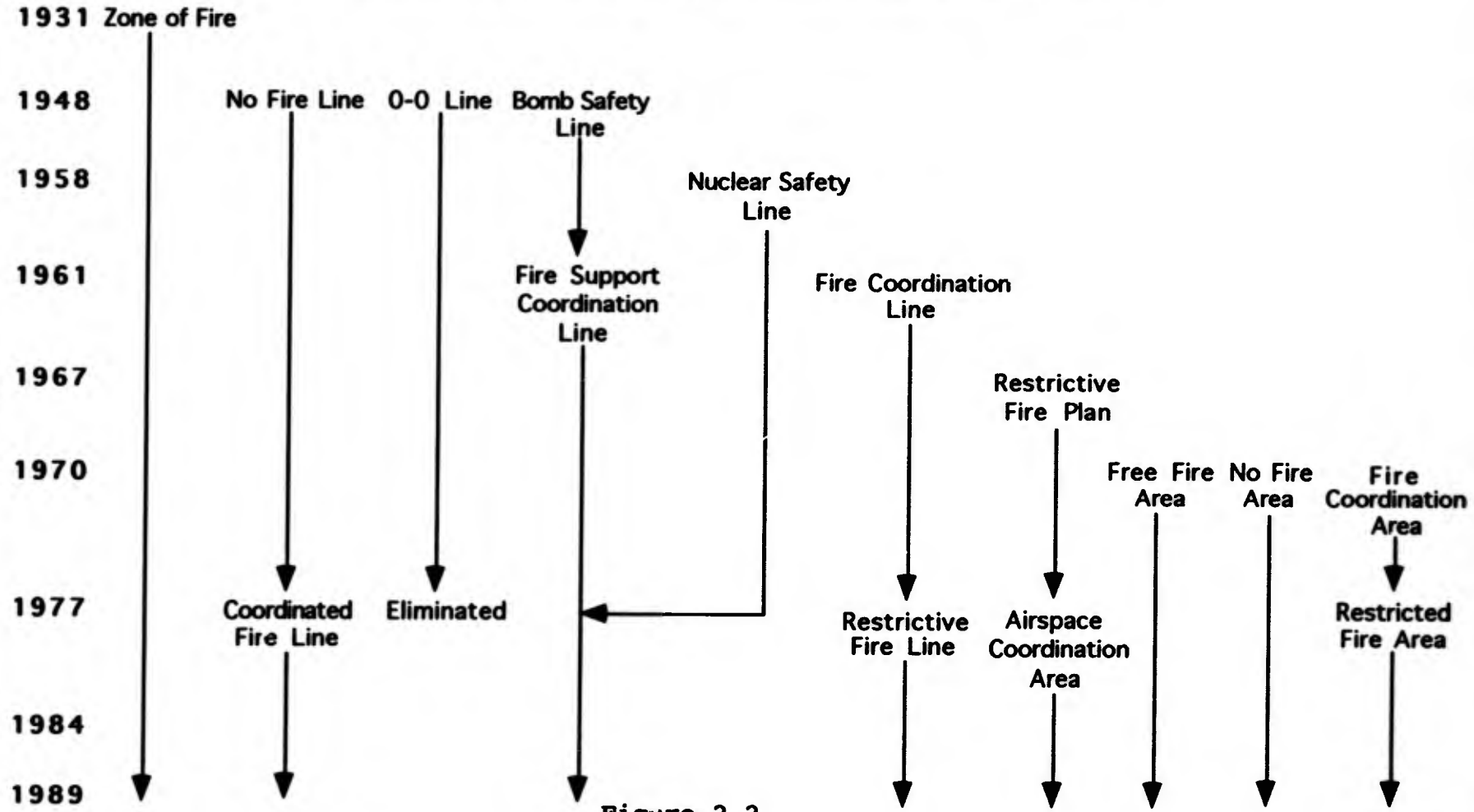

Figure 2-2

A new FM 6-20, published in May of 1948, captured the lessons of World War II with regard to the need for more defined coordination measures for the synchronization of fires and maneuver. These coordination measures included specified lateral and range limits for artillery units, and the use of no-fire lines, 0-0 lines, and bomb safety lines.

The most important of these coordination measures was the no-fire line which was established by front line units. It was designed to limit the proximity of impacting artillery by reinforcing artillery or by artillery of an adjacent unit. Fires short of the no fire line or in close proximity to maneuver boundaries were coordinated with the direct support artillery unit of the affected unit. The direct support artillery unit could fire short of the no fire line in its own sector when requested by the supporting unit through coordination with the artillery liaison within the maneuver headquarters. The no fire line was kept as close to the friendly front lines as possible depending on the accuracy of maneuver front line locations and the fluidity of the tactical situation.[6]

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[6]US Army, FM 6-20, Field Artillery Tactics and Technique (Washington DC: Department of the Army, 1948), 95-97.

The direct precursor to the FSCL was the bomb safety line. This line was a permissive FSCM beyond which tactical aircraft could engage targets without coordination with ground troops. Established along recognizable terrain, it was established as close to the forward line of troops as possible, depending upon the level of training and experience of the pilots.[7]

The 0-0 line was established to delineate areas of responsibility for observation by either corps or division artillery. Short of the line was an area of division responsibility while beyond the line, the corps focused its target acquisition assets. It was also designated along identifiable terrain and generally indicated the close battle area of the front line units, although it was short of the bulk of the enemy artillery units. This gave the corps artillery the responsibility for fighting the counterfire battle.[8]

These FSCMs remained in effect with minor refinements of their meanings and purpose until 1958 when the nuclear safety line was introduced to reflect the increased concern

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[7]Ibid., 98.

[8]Ibid., 98.

over fighting on a nuclear battlefield. Then, in 1961, the FSCL was introduced in FM 6-20-1, Field Artillery Tactics. The FSCL replaced the old bomb safety line and was defined as a no-fire line between corps and higher echelons and as a bomb line for ground and air forces. It was established by the corps commander to insure coordination of fires by forces outside the corps which might affect corps tactical operations. It was designed to be easily recognizable from the air and on a map.[9]

Also introduced in 1961, the fire coordination line was a line between two converging forces beyond which fire may not be delivered without coordination with the affected force.[10] This line recognized that nonlinear operations may occur on the battlefield and is the precursor of the restrictive fire line.

Slight modification to the FSCL definition was made in the 1965 edition of FM 6-20-1. No longer was the FSCL considered solely as a tool of a corps commander. Now it was established by the appropriate ground commander to insure

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[9]US Army, FM 6-20-1, Field Artillery Tactics (Washington DC: Department of the Army, 1961), 30-31.

[10]Ibid., 32.

coordination of fires not under his control but which might affect the tactical operations of his unit. Not only was it to be recognizable from the air if possible, but it was also normally coordinated with the appropriate tactical air commander and other supporting elements.[11]

The 0-0 line continued in use as a line to coordinate target search by corps and division assets. Front-line divisions searched short of the line (the close battle), while the corps fought the deep battle beyond the line. It was specified however that this arbitrary line did not restrict the zones of observation or attack of targets by either echelon, in consonance of course, with other existing FSCMs.[12]

By 1967, concerns about interoperability with NATO allies had led to agreement on certain FSCMs in the form of Standardization Agreements. These are international (NATO) agreements designed to facilitate inter-allied operations. Upon their ratification by the United States, they are binding upon US forces either wholly or by exception as

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[11]US Army, FM 6-20-1, Field Artillery Tactics (Washington DC: Department of the Army, 1961), 23.

[12]Ibid.

noted. Change one to FM 6-20-1 stated the agreement of NATO forces to an FSCL with broadened definition and object.

> The FSCL is a line which takes the place of a bombline. It is used in relation to air, ground or sea delivered conventional or nuclear weapons. It should be established by the appropriate land (normally the corps) Commander in consultation with the Tactical Air Commander or his Delegate. It is used to coordinate supporting fire by forces not under the control of the appropriate land force commander which may affect tactical operations.
>
> The FSCL should be as close to the forward elements as possible consistent with troop safety and the tactical situation. Furthermore it should be easy to define on a map and easily recognized from the air. When detached forces are beyond this FSCL, another all-around FSCL should be established around the detached force.
>
> A FSCL is not normally required for units lower than the corps. The current "No Fire Line" and boundaries will normally provide adequate control measures at these levels.[13]

Concern for maneuver forces was still the predominant criteria for the use of FSCMs, although the fire support coordinator (FSCOORD) was admonished that the principles of fire support coordination included measures to safeguard friendly troops, vessels, aircraft, and installations from friendly fire.[14] Also of note is the preference that the FSCL be located as close to friendly forces as possible,

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[13]US Army, FM 6-20-1, Field Artillery Tactics (Washington DC: Department of the Army, 1965; with Change 1, 1967), 23-24.

[14]Ibid., 21.

presumably to allow tactical air support the greatest area for engagement of enemy forces possible.

The no fire line is also specified in the STANAG as a related definition and its use is a matter of US DOD policy. US forces continued to use not only this no fire line, but also the fire coordination line and the 0-0 line. Concern for friendly aircraft was recognized with the adoption of a restrictive fire plan. Restrictive fire plans defined a three dimensional area into which friendly fires were forbidden in order to provide a safety measure for friendly aircraft.[15] The description of this FSCM can be seen as what is currently known as the airspace coordination area.

Combat experience in Vietnam provided the impetus for the next changes in FSCMs. The unusual circumstances of a counter-guerilla war had brought to light the need for measures to protect forces not engaged in conventional linear battlefield conflict. The presence of enemy forces and non-combatant civilians throughout the area occupied by friendly forces brought additional concerns for how to protect friendly personnel from needless exposure to friendly artillery fire. The Military Assistance Command Vietnam

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[15]Ibid., 23.

published new rules in a directive entitled *MACV Rules of Engagement*, which clearly laid out, in the absence of new FSCMs, how artillery fire would be conducted to ensure the safety of both friendly troops and innocent civilians.[16] While retaining with no changes to current definitions all previous FSCMs, the 1970 version of FM 6-20-2 added three new FSCMs, the free-fire area, the no-fire area and the fire coordination area. Significantly, both the free fire area and no fire area require coordination with the host country for establishment. The fire coordination area is an area with specific constraints imposed and into which fires in excess of those constraints will not be delivered.[17] This FSCM eventually became the restrictive fire area.

Protection of aircraft from indirect fires during Vietnam was also achieved with informal non-doctrinal measures. Rather than use the restrictive fire plan, air clearance centers were established on a geographic basis, primarily to route aircraft around areas in which indirect fires were ongoing. The problem of timeliness for both

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[16]David C. Ott, Vietnam Studies, Field Artillery, 1954-1973 (Washington DC: Department of the Army, 1975), 173-179.

[17]US Army, FM 6-20-2, Field Artillery Techniques (Washington DC: Department of the Army, 1970), 6-9 to 6-14.

transiting aircraft and artillery fires were noted, even though the centers were successful in precluding fratricide of friendly aircraft.[18]

The last significant change to FSCMs took place in 1977 with the publication of the new FM 6-20, Fire Support in Combined Arms Operations, a member of the new family of How-to-Fight manuals. These manuals were generated by the revolution in tactical doctrine pioneered by General William E. DePuy in the publication of FM 100-5, Operations in 1976. Although the tactical doctrine of the "active defense" was soon replaced with the AirLand Battle doctrine of today, the work of the field artillery community and the FSCMs as published in 1977 have remained valid and in use through Desert Storm.

FSCMs were designated as belonging to either the permissive or restrictive categories. Permissive measures included the coordinated fire line (which replaced the no fire line), the FSCL (which now included the restrictions of the nuclear safety line), and the free fire area. Restrictive measures were significantly modified with only

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[18]Keith Painter, "A Case for a General", Field Artillery Journal, (May-June 1974): 63.

the no fire area remaining from the 1970 changes. New restrictive measures included the restrictive fire area (took the place of the fire coordination area), the restrictive fire line (replaced the fire coordination line) and the airspace coordination area (old restrictive fire plan).[19] Definitions for each of these currently accepted fire support coordination measures is found in Chapter One.

Recognition of the three distinct arenas of the battlefield (close, deep, and rear) and the different focus of operations that each echelon would be waging within those areas, led to new operational concepts and some new nuances for the FSCL in the current family of doctrinal publications. The FSCL is no longer intended to be placed as close as practicable to the forward line of own troops to allow unlimited attack by aerial platforms just beyond friendly troops. The FSCL is now intended to be placed <u>beyond</u> the area in which the corps or establishing headquarters intends to shape its deep operations fight.[20] This deep shaping applies in both offensive and defensive operations and is oriented on the engagement of enemy HPTs.

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[19]US Army, <u>FM 6-20, Fire Support in Combined Arms Operations</u> (Washington DC: Department of the Army, 1977), H-12 to H-15.

[20]FM 6-20-30, 1989, F-3.

Fire support coordinators are also warned of three conditions that should be met prior to the establishment of a corps FSCL.

- A portion of the corps deep operations area does not require selective targeting to shape the deep operations fight.
- The expeditious attack of targets beyond the FSCL will support the operations of the corps, the attacking unit, or the higher headquarters of the attacking unit.
- The corps and its supporting units are willing to accept the possible duplication of effort which may result from dual targeting beyond the FSCL.[21]

Air Force Doctrine

Basic Air Force doctrine, found in Air Force Manual 1-1, while not specifically addressing FSCMs, provides guidance on coordination within doctrinal parameters of the Air Force missions which most directly affect friendly surface forces.

Air interdiction is intended to delay, disrupt, divert or destroy enemy forces before they engage friendly forces in

[21]Ibid.

the close battle. These operations are performed at such distances from friendly ground forces that detailed coordination and integration with friendly maneuver and fires is not normally considered necessary.[22]

Battlefield air interdiction is air interdiction against enemy targets which are not in close proximity to but are capable of a near term effect on friendly forces. These missions require more detailed coordination with the ground commander who is identifying and selecting the targets for attack.[23]

Close air support provides fire support against enemy forces in close proximity to friendly forces. These missions require detailed coordination and planning to ensure they are integrated with friendly ground maneuver and fires.[24]

Additional guidance which specifically addresses fire support coordination measures is found in the body of

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[22]US Air Force, AFM 1-1, Basic Aerospace Doctrine of the United States Air Force (Washington: Department of the Air Force, 1984), 3-3.

[23]Ibid., 3-4.

[24]Ibid.

doctrinal literature primarily used by forward air controllers and those personnel involved in the tactical employment of aircraft in air-ground operations. This literature discusses FSCMs and other control measures, and uses the Joint Pub 1-02 definition of the FSCL as the Air Force definition.[25]

Multi Command Manual (MCM) 3-1 also acknowledges an understanding of the problems and concerns inherent in the coordination and synchronization of air-to-ground and surface-to-surface fires.

> Artillery and tactical airpower are complimentary means of firepower. Normally ground forces have extensive artillery support. Because artillery support is more continuous and time-responsive than CAS, land-force elements are adept at using artillery, depend on it heavily, and are reluctant to impose firing restrictions.[26]

This same line of reasoning can be extended from the reluctance to impose restrictions in the close operations area to apply to coordination with AI and BAI in the deep operations area. MCM 1-1 also states that use of standard

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[25]US Air Force, MCM 3-1, Volume VIII, Mission Employment Tactics, Tactical Employment, Forward Air Controller (FAC) (Washington: Department of the Air Force, 1988), 1-2.

[26]Ibid., 7-37.

separation plans will simplify the application of airpower and not impose undue restrictions on artillery coordination.[27]

It is recognized by some in the Air Force that there is a "doctrinal gap" with regard to the terms close air support and battlefield air interdiction.[28] This gap is clearly not within the purview of this thesis and could serve as the subject of another thesis. It is important to note however, that the use of FSCMs is intimately related to this ongoing discussion of Air Force missions and their relationship to the ground commander.

Marine Corps Doctrine

Marine Corps doctrine clearly recognizes the importance of FSCMs to effective fire support coordination and control. Marine commanders understand that the purpose of FSCMs is to facilitate the rapid engagement of targets while ensuring maximum feasible safeguards for all elements of the friendly forces. Marine Corps doctrine recognizes the

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[27]Ibid., 7-38 to 7-41.

[28]Gary L. Dikkers, "Battlefield Air Support (BAS), A Doctrinal Definition," Air Land Bulletin 90-4, 31 December 1990, 3-7.

complete family of both restrictive and permissive FSCMs contained in Army doctrine.

Marine Corps doctrinal interpretation of the FSCL generally follows that found in Army doctrine.

> The FSCL is a line beyond which all targets may be attacked by any weapon system (including aircraft and special weapons) without endangering friendly troops or requiring additional coordination with the establishing headquarters. The effects of any weapon system may not fall short of this line.[29]

Additional guidance reveals that the FSCL has two purposes. The first is to provide sufficient control of air-ground operations by ground commanders, ensuring safety and coordination and also to preclude duplication of supporting fires. Secondly, it provides aircraft with an understanding of the geometry of the battlefield, ensuring a clear understanding of the degree of control or coordination required before the attack of ground targets.[30]

The apparent differences in this Marine Corps definition as opposed to the Army definition fall into two

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[29]US Marine Corps, Fleet Marine Force Manual 7-1, Fire Support Coordination (Washington DC: Department of the Navy, 1981), 2-12.

[30]Ibid., 2-12.

areas. The first is the latitude provided by the Marines for engagement of targets beyond the FSCL. Any weapon system may attack a target beyond the line provided the effects do not fall short of the line. There is no requirement that the fires must be delivered from a force that is organic to or supporting the Marine force. This means that adjacent forces are permitted to engage targets of opportunity beyond the FSCL, but in the zone of action of the Marine force, without coordination. This situation occurred during Desert Storm when Marines engaged targets in the VII Corps zone without prior clearance or coordination.[31] The second difference is the lack of a requirement to attempt coordination with the air component prior to delivery of surface-to-surface fires beyond the FSCL. The commander of the Marine Air Ground Task Force owns both the air and ground forces with which he is fighting the battle, and the coordination of these assets is simplified by his coordination and synchronization of these complimentary assets in his fire support coordination center. What is not clear is how additional air support from other services would be integrated and coordinated.[32]

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[31]Desert Storm Special Study Project, Final Report, Volume III, Operational, (Fort Leavenworth:Combined Arms Center, 1991), III-3-9.

[32]Ibid., 2-12 and 2-13.

Navy Doctrine

Naval doctrine specifies the considerations for support of ground maneuver forces by naval gunfire. All FSCMs found in Army and Marine Corps doctrine are listed and described.

> [The FSCL is described as] a line established by the appropriate ground commander to ensure coordination of fire not under his control but which may affect current tactical operations. The FSCL is used to coordinate fires of air, ground and sea weapons systems using any type of ammunition against surface targets. The FSCL should follow well defined terrain features. The establishment of the FSCL must be coordinated with the appropriate tactical air commander and other supporting elements. Supporting elements may attack targets forward of the FSCL, without prior coordination with the ground force commander, provided the attack will not produce adverse effects on, or to the rear of, the line. Attacks against surface targets behind this line must be coordinated with the appropriate ground force commander.[33]

Navy doctrine further specifies four purposes for the FSCL. The first is the facilitation of attack on targets across the FSCL, the second is ensuring the safety of ground forces from air attack, the third is maximizing weapons' capabilities, and finally it ensures aviators understand the

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[33]US Navy, NWP 22-2 (Rev B) Supporting Arms in Amphibious Operations (Washington DC: Department of the Navy, 1990) 7-7.

geometry of the battlefield and the degree to which they will be required to coordinate prior to ground attack.

The significant difference between Navy and Army doctrine is the lack of a requirement to attempt coordination of fires with the air component prior to delivery of surface to surface fires. Navy doctrine indicates that "normal fire support planning and coordination ensures that air and naval gunfire are not unintentionally delivered on the same target." The implications are that naval gunfire support is normally provided against targets in such a way that normal coordination will prevent duplicative or fratricidal concerns. It is noted that if the trajectory of naval gunfire could endanger Marine Corps air assets, coordination *should* (italics added) be made with the landing force.[34]

Joint Doctrine

Spurred by the failure of the 1980 Iranian hostages rescue attempt, the bombing of the Marine headquarters in Beirut, Lebanon in 1983 and general dissatisfaction with military conduct of the Grenada rescue operation, Congress enacted the DOD Reorganization Act of 1986. This legislation,

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[34]Ibid, 7-7.

designed to shift power from the military departments to the joint chiefs of staff and the unified and specified commands, has served to focus attention on joint warfighting with the consequential publication of principles, doctrine and military guidance to govern the joint activities of the armed forces. These joint publications are by no means complete, but are still appearing in test, final draft and proposed final form as the JCS continues to promote unity of effort in the national defense system.

Admittedly, doctrine provides no guarantee of success for solving future problems. However, it provides a commonly understood framework with which to develop solutions to warfighting challenges.[35] Joint doctrine is authoritative, but not directive. Commanders are given the latitude to exercise their best judgement in the application of joint doctrine to mission accomplishment, however published joint doctrine will be followed unless exceptional circumstances dictate otherwise. Conflicts found between joint publications and other US (service component specific) publications during joint military operations will be resolved in favor of the joint publication. Once approved, the joint doctrine provides

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[35]Joint Chiefs of Staff, Publication 0-1, Basic National Defense Doctrine (Washington DC: Joint Chiefs of Staff, 1991), iv.

the national position on combined doctrine. Service doctrine is expected to be consistent with the approved joint doctrine to support joint training and employment of forces.[36]

Joint doctrinal implications for deep operations and the FSCMs needed to adequately control these operations can be found in four Joint Publications. None have reached final publication, and are therefore not in use within the joint community as doctrinal guides. It is appropriate to discuss these manuals at this point, in order to indicate the direction of their current thought, even though they will most likely be modified as all joint partners submit suggestions for change in the final products. The key publication is Joint Pub 3-09, Doctrine for Joint Fire Support which provides doctrine and procedures for executing fire support, including fire support coordination. Supporting publications include Joint Pub 3-03 to guide joint interdiction operations, Joint Pub 3-03.1 which discusses joint precision interdiction and Joint Pub 3-52 for using airspace in joint operations.

The significance of Joint Pub 3-09 is the focus on joint fires to support the joint force commander's (JFC)

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[36]Joint Pub 1-01, I-3 and I-4.

operational or campaign plan. All fires are synchronized in accordance with the priorities established by the JFC. When conflicts arise between fire support requirements they are resolved to meet the JFC's guidance for the campaign plan. FSCMs are established to ensure that fire support will not jeopardize troop safety, interfere with other attack means, or disrupt operations of adjacent units.[37]

The definition of the FSCL in Joint Pub 3-09 is identical to the definition found in Joint Pub 1-02 with the addition of three sentences also found in the army doctrinal definition.

> The attack of targets beyond the FSCL by the establishing ground commander *should* be coordinated with the air component commander. This coordination is defined as informing and or consulting with the supported air component commander. Inability to effect this coordination will *not* preclude the attack of targets beyond the FSCL. (Italics added).[38]

Also specified is the placement of the FSCL which should be beyond the area in which the ground commander intends to influence his operation, i.e. the deep battle area.[39]

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[37]Joint Chiefs of Staff, Publication 3-09, Doctrine for Joint Fire Support (Final Draft, Washington DC: Joint Chiefs of Staff, 1991), II-9 to II-11.

[38]Ibid., D-8.

[39]Ibid., D-9.

DESERT STORM HISTORICAL MATERIALS

The predominance of the material used to research this thesis was from the historical files, after action reviews, duty logs, operations plans and orders and professional journal articles of participants in Operation Desert Storm. The VII Corps After Action Review is a detailed collection of documents which captures the historical perspectives of all of the units which fought in the VII Corps during the war. The quality of the work varies widely depending on the unit which prepared the report. The 3d Armored Division and 2d Armored Cavalry Regiment reports are extremely thorough and comprehensive, providing extensive facts to follow their progress on the battlefield. The reports of the 1st Armored Division, 1st Infantry Division and 1st Cavalry Division, while not as detailed in the unclassified versions, still provide a great deal of useful information on their combat experiences. This material has been gathered by the Study Group preparing the Army Lessons Learned document and by the Center for Military History Project at Fort Leavenworth preparing the Army history of Operation Desert Shield/Storm. Collection of pertinent information focused on those documents which verified the actual locations of VII Corps FSCLs during the conflict such as operations orders,

fragmentary orders, duty logs and historical summaries. Also critical are the physical location of ground maneuver units in relation to these FSCLs during the war. These records are not as complete and require substantial reconstruction efforts to form a complete picture of the fast-paced operations.

Significant numbers of articles within professional journals have appeared which capture the essence of many different aspects of the combat experience in Desert Storm. The problems of fire support coordination have been a recurring theme and examples of problems encountered in the operation are provided for consideration throughout these articles. As appropriate, vignettes drawn from these articles will be included in the discussion of Desert Storm operations. This will provide the perspective of the soldier on the ground concerned for timely delivery of fire support.

The other critical documents required for this thesis are those which discuss the implementation of the FSCL in the context of air-ground operations and the coordination requirements which were added for Desert Storm. Independent corroboration through interviews was accomplished as needed

to provide clarification of information and additional details not covered in the after action reports.

Available literature is sufficient to provide the source material required to draw valid conclusions in this thesis. Desert Storm historical material, when analyzed and combined with doctrinal literature, provides the resources to compare actual usage of FSCMs, and particularly the FSCL, with doctrinal intent. This comparison provides a basis for determining the validity of current FSCMs and their applicability to AirLand Battle combat operations in a Southwest Asia contingency operation. This comparison can be further developed to make conclusions concerning the applicability of the FSCL in US combat operations within other theaters of varying intensities which might include multi-corps operations and joint or combined forces.

CHAPTER 3

> What we're going to see, especially with the long-range capabilities coming into the artillery, is the corps commander's initiating and controlling much of fire support. He now has the intelligence and the long-range systems to do that.[1]
>
> General John W. Foss, August 1990

CORPS OPERATIONS

Fundamental warfighting doctrine for the corps is found in FM 100-15, Corps Operations. Doctrine within this manual is supplemented by the unedited coordinating draft of FM 100-15-1, Corps Operations Tactics and Techniques and various other US Army functionally specific field manuals such as FM 6-20-30, Tactics, Techniques and Procedures for Fire Support for Corps and Division Operations. The concepts and principles found within these doctrinal manuals provide the framework for the employment of a US Army corps in combat operations. The discussion of doctrinal guidance and comparisons drawn of FSCL use in this thesis will be based on the doctrine contained within these US Army warfighting

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[1]John W. Foss, "The Challenges of Our Changing Times," Interview in Field Artillery (August 1990): 6.

manuals. This chapter will review the battlefield structure of the corps, the relationship between targeting and shaping of the battlefield and how the use and placement of the FSCL contribute to deep operations.

The doctrinal framework found in FM 100-15 is the primary guide to the corps commander and his staff as they conduct training in peacetime to ensure their ability to deploy, fight, sustain and win in AirLand Battle. Adherence to this doctrine is often measured during warfighting exercises such as Battle Command Training Program. In fact, the lessons learned from this training are those which the corps commander and his staff carry with them as they are committed into combat. It is therefore instructive to review this framework upon which corps operations are based.

The corps commander will normally fight his corps as part of a larger joint and/or combined force with the primary responsibility of translating the echelons above corps campaign plan into corps tactical operations. The corps commander must clearly understand the intent of the commander's two echelons above him as he formulates his plans to set the conditions for the battles which will result in attainment of theater operational objectives.

Corps operations will be planned within the close, deep and rear operations battlefield structure (Figure 3-1). Operations are planned understanding that the outcome of corps close operations will ultimately decide the battle. Deep and rear operations are therefore designed to create conditions which will favorably impact on the execution of close operations.

DEEP OPERATIONS

Deep operations at corps level are activities directed against enemy forces not currently engaged in, but capable of influencing, future close operations. The corps commander is interested in the application of combat power against deep high payoff targets (HPT) that assist in the shaping of the battlefield for the close battle. Through the use of various fire control measures and boundaries, he designates responsibility and control of the battlefield to assist in the execution of deep operations. Deep operations may be executed in combination or separately by maneuver, fire support or command, control and communications countermeasures (C3CM). The corps FSCOORD is given the authority and responsibility to control deep fires, including C3CM, while the maneuver commander of the committed maneuver

force normally controls deep maneuver operations. In the offense, deep attack will normally be conducted with lethal and nonlethal fires to isolate, immobilize and weaken the enemy in depth to sustain the momentum of the attack. In the defense, deep attack may be conducted by fires, deep maneuver and/or C3CM to prevent the enemy from massing his forces in support of his own plan to defeat the friendly defenses.[2]

CONCEPT OF OPERATIONS

Corps deep operations are the result of determining what objectives the EAC commander and the corps commander want to accomplish through the synchronized application of resources. Using the battle management methodology of decide, detect, deliver, the corps commander will make specific choices on how he intends to shape the battlefield to his benefit. The considerations predominant to the corps commander are the intent and concept of operations of the EAC commander, how to prevent the enemy from executing his operation as planned and how corps can shape the close battle through application of fires, maneuver and C3CM into the depths of the enemy array to achieve the commander's intent.[3]

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[2]FM 100-15, 3-0 to 3-3.

[3]Ibid.

CORPS AIRLAND BATTLE
BATTLEFIELD STRUCTURE
(Extracted from FM 100-15, Figure 3-1)

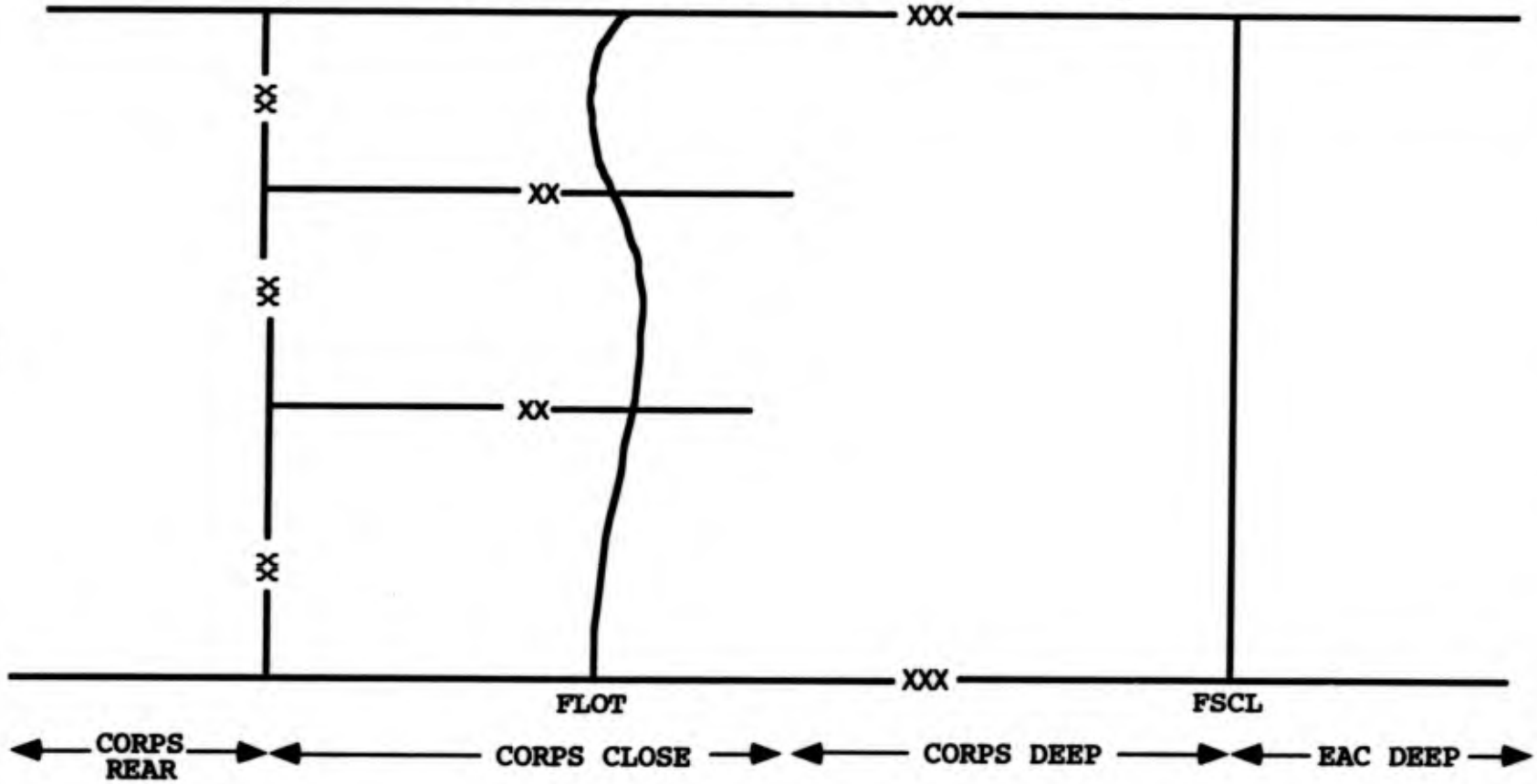

Figure 3-1

Deep ground maneuver and attack helicopter assets can seize objectives and attack follow-on forces. Field artillery, TACAIR and naval gunfire can deliver lethal fires to attack follow-on forces and disrupt tempo. C3CM assets can contribute to deception, operations security, and electronic countermeasures to deny the ability of the enemy to concentrate, desynchronizing his intended battle plan.

The decide, detect, deliver methodology is a targeting process that begins with the Intelligence Preparation of the Battlefield (IPB). During IPB, enemy doctrine is integrated with weather and terrain to determine and evaluate enemy capabilities, vulnerabilities and probable courses of action. Doctrinal and situational templates are developed which project enemy actions and activities on the battlefield. Using the situational templates, the corps staff conducts target value analysis to prioritize potential targets as high value targets which the enemy commander requires to successfully accomplish his mission. These high value targets are then further refined into a prioritized list of high payoff targets which must be acquired and successfully attacked to ensure the success of corps

operations. It is HPTs which are the heart of the decide, detect, deliver methodology.[4]

Decide

The decide phase provides the focus and priorities for the collection management and fire planning process, enabling the corps commander to select the HPTs that best complement his concept of operations. During the decide phase, the corps planners in the targeting cell coordinate with the fire support, intelligence, operations and plans cells to develop priorities for target attack based on the tasking of target acquisition assets, information processing, the selection of an attack means and the requirement for post-attack assessment. These priorities are developed from the corps mission, the commander's concept of operation and intent and his initial planning guidance with respect to target priorities. The targeting cell develops a high priority target list which specifies which targets should be acquired and attacked, target selection standards that specify the accuracy requirements to produce attackable targets, a collection plan that explains when and where targets should be found and who can find them and lastly an

[4]Ibid.

attack guidance matrix which provides guidance on how targets should be attacked once they are acquired. These products are presented to the commander for his approval and final targeting guidance as well as his priority intelligence requirements and information requirements.[5]

Detect

The detect phase executes the collection decisions made during the decide phase. Target acquisition assets collect combat information to confirm targets, and pass this information to the intelligence analysts on the corps staff who process the information to produce valid targets. These targets are then passed immediately to the targeting team who determine if the target is an HPT, its priority and if it meets the target selection standards. If the target meets the commander's criteria, it is passed to a fire support system for target attack.[6]

The target acquisition systems available to the corps commander include both aerial and ground based sensors. He is able to see farther with his aerial systems, which include

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[5]FM 6-20-10, 2-1 to 2-8.

[6]Ibid., 3-1 and 3-2.

the systems normally available from the Military Intelligence (MI) Brigade. Normally, the MI Brigade allocates most of its ground-based sensors to corps subordinate units and utilizes the airborne systems as the source for most intelligence, target development and poststrike assessment data generated at corps level. Airborne signals intelligence (SIGINT) systems such as Guardrail can intercept and direction find very high frequency (VHF) radios out to 100 kilometers beyond the FLOT, and Quicklook can intercept and direction find radar emissions out to 100 kilometers. These systems will often provide the first indication of enemy movement and will be followed up with side looking airborne radar (SLAR) to determine how closely the enemy is following the templates developed during IPB. Available to provide imagery intelligence is the OV-1D Mohawk which provides moving target indicators with SLAR out to 140 kilometers and photoimagery out to 90 kilometers. Two other systems intended for use by the corps are joint surveillance and target attack radar system (Joint STARS) and unmanned aerial vehicles (UAV). Joint STARS provides real time sensor data by direct link to ground station modules located at the corps headquarters. It will provide early warnings of vehicle and troop movements up to 200 kilometers beyond the FLOT in all weather conditions, and provide single-pass coverage of one million square

kilometers on an eight hour mission. The system can detect, locate, classify and track moving targets using a wide area surveillance/moving target radar and fixed targets using a terrain imaging synthetic aperture radar.[7] UAVs will also provide real-time video imagery of moving or stationary targets to a ground control station. Current remotely piloted vehicles (RPV) used by the Navy and Marine Corps have a range out to 40 nautical miles from a portable ground station. Design parameters for the UAVs require a range of over 100 kilometers to allow the corps commander to adequately exploit their capabilities for intelligence and target attack in deep operations.

The ground based SIGINT systems include the MLQ-34 TACJAM, the TRQ-30, a manpacked system, the TRQ-32 Teammate and the TLQ-17A Trafficjam. Each of these systems is an intercept and jamming system with a range out to 30 kilometers beyond the FLOT, which is why they are usually allocated to corps subordinate units to assist in their deep operations targeting. Corps also has human intelligence

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[7]David Hughes, "Electronic Systems Division Accelerates New Systems Deployments, Upgrades," Aviation Week & Space Technology (February 4, 1991): 58 and Edward H. Kolcum, "Joint-STARS E-8s Return to US;20-Aircraft Fleet Believed Assured," Aviation Week & Space Technology (March 11, 1991): 20.

capabilities in the long range surveillance units and attached Special Operations Forces that are capable of moving out to the depths of the deep operations area and providing real time information to assist in verifying situational templates and triggering attack assets for target engagements. Counterintelligence units also provide information through the targeting of enemy collectors and the interrogation of enemy prisoners of war.

Deliver

The deliver phase is the execution of target attack guidance to engage the corps HPTs. The attack of targets requires tactical and technical attack decisions. Tactical attack decisions specify the time of the attack, the desired effect on the target and the attack system to be used. The technical decisions translate the tactical decisions into the precise delivery means, the number and type of munitions, the unit to conduct the attack and the response time of the selected unit.[8]

The tactical attack decisions are normally the most critical. Time of attack will be based on whether the target

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[8]FM 6-20-10, 4-1.

is a planned target or target of opportunity. Planned targets confirm a templated assumption from the intelligence preparation of the battlefield about what the enemy will do in a given situation with a known set of equipment, capabilities and doctrine in a specific area of operation. Target sensors serve to confirm a forecast enemy activity in accordance with the projected engagement areas or time frames. Once the enemy activity triggers the attack, the targeting team verifies the enemy target set as the planned target, reaffirms the decision to attack and issues the execution request to the designated attack system. Targets of opportunity are HPTs that are acquired by a sensor outside the forecast expectations. These targets are evaluated by the targeting team to determine the activity of the target, the target loiter time (perishability) and the relative value of the target in relation to planned targets currently being processed. If for example, the target is an HPT such as a chemical capable SCUD which is high on both the EAC and corps high payoff target lists, then the targeting team will review the availability and capabilities of attack systems which can either be diverted to this target or can be alerted to immediately execute an attack.[9]

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[9]Ibid., 4-1 to 4-3.

With only the Lance tactical missile system available prior to Desert Storm, the corps commander depended on air support to provide a long range, accurate and lethal deep strike ability against both planned targets and targets of opportunity. With a targeting planning cycle that looks out 72 hours to generate an allocation of sorties in an air tasking order, the ability to engage HPTs depended heavily on accurate templating of enemy abilities and intentions, accurate target location acquisition and updates from sensors and air superiority to ensure aircraft availability. The inability to guarantee any of these three might lead to the impotence of the corps commander in achieving his deep operations objectives. Responsive deep strike systems that are organic to the corps now exist in the form of ATACMS and the Apache attack helicopter. Both of these systems provide the corps commander with the ability to maintain a short notice attack system to strike critical HPTs as acquired. It is misleading to assume that Apache pilots are waiting on strip alert to conduct cross-FLOT deep operations at the whim of the corps targeting cell. But their response time and abilities are not tied to the air tasking order, and preplanned contingency deep operations can provide this asset in a relatively rapid response to high value target sets. It is in actuality only the ATACMS that can deliver lethal and

accurate fires beyond 100 kilometers within two minutes of a firing order.

The effects the commander wants to have on the target are expressed as delay, disruption or limiting the target based on either time or space. Delay of the target indicates that a benefit can be gained by attacking the target to delay its arrival in the close operations area. Disruption prevents the enemy target from performing its combat function. This could be achieved through continuous suppression, neutralization or destruction of the target by lethal means, or the application of nonlethal C3CM. Limiting the target redirects the enemy unit to a portion of the battlefield where it can be better handled or where the terrain is not suitable to his purposes.[10]

But what about the effectiveness of the attack systems? Which attack systems with what kinds of munitions meet the attack criteria, or are most effective against hard and soft, moving and stationary, personnel and equipment targets? All available attack systems should be considered to meet the attack criteria. Assets include ground maneuver forces and attack helicopters, lethal fires such as cannon

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[10]Ibid., 4-3.

artillery, multiple launch rocket system (MLRS), ATACMS, naval gunfire, TACAIR (CAS and BAI) and nonlethal C3CM offensive electronic assets.

The selection of the attack system is made during the decide phase for planned targets to ensure the system is available and can conduct the attack when the enemy triggers the appropriate sensor. Targets of opportunity acquired in the detect phase are considered against all available attack assets based on desired effects on the target, payoff of the target and the degree of risk incurred through the use of any particular attack system against the target.[11]

The technical attack decisions are intended to support the amount of damage specified for the target. Suppression temporarily prevents the enemy system from accomplishing its normal mission, neutralization hampers or interrupts movement or use of a system and renders it ineffective or unusable until some degree of repair or replacement of parts or systems is accomplished by the enemy and destruction totally eliminates the ability of a system to be used or repaired. Technical attack decisions assign

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[11]Ibid.

responsibility for target attack to a specific attack system, with specific ordnance at a specified time.[12]

THE FIRE SUPPORT COORDINATION LINE

The use and positioning of the FSCL in relation to the FLOT and to support corps operations is situationly dependent, but normally follows the basic guidelines in FM 100-15. There are several overarching considerations when determining the need for an FSCL. Placement should support the theater campaign objectives and EAC and corps commanders' concept of deep operations. Additionally, their concept of the operation, specifically in the shaping of the battlefield through deep operations may be intimately tied to use of an FSCL. The FSCL should always be located beyond the area in which the corps intends to shape its deep operations fight. The corps commander may intend to canalize, divert, delay or destroy the enemy forces through the conduct of airborne, air assault or attack helicopter operations; or commit ground maneuver forces into the deep battle area. The corps commanders concept of the deep operation will specify clearly defined responsibilities for specific friendly forces, selective targeting against deep target priorities

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[12]Ibid.

and coordinated fires to efficiently integrate the many systems available to conduct deep attack.

The EAC and/or theater commander have the ability to project significant lethal and nonlethal air attack assets deep into the enemy rear. These air assets provide a responsive, precise attack means to engage targets which support strategic, operational and tactical objectives. The use of these assets is significantly affected by the use of an FSCL. Although doctrinally a permissive measure, it has provided not only a "no bomb line" short of which air assets would coordinate with an owning headquarters prior to target attack, but also a measure of safety for aircraft who considered the area beyond the FSCL free from interference due to the previously restricted range of ground attack systems. The ability of ground based systems to now project attack weapons through this airspace beyond the FSCL creates either an additional coordination requirement to ensure the safety of aircraft, or the delimitation of another block of terrain for the sole use and control of the corps commander. But if the FSCL is doctrinally expected to be beyond the deep battle area of the corps commander, what necessitates the attack of enemy targets beyond the FSCL by ground based systems? This is perhaps key to the FSCL problem. If the

corps commander can adequately meet his detection and delivery requirements into a deep battle area short of the FSCL, then coordination for ground attack beyond the FSCL is not an unreasonable expectation by the air component. For the corps commander has defined where he intends to fight the deep battle by placement of an FSCL. The EAC commander will ensure that the theater campaign objectives are not limited by the placement of an FSCL which interferes with the ability of his aircraft to strike deep operational targets. If he requires that the FSCL be placed in such a fashion that it limits the ability of the corps commander to conduct deep operations, he must acknowledge the responsibility to assist the corps commander in shaping his fight through the allocation of air assets to the corps.

FM 6-20-30 specifies three conditions and six fundamentals that guide the decision maker in considering employment of the FSCL. The conditions that should be met before an FSCL is established are:

- A portion of the corps deep operations area does not require selective targeting to shape the deep operations fight.

- The expeditious attack of targets beyond the FSCL will support the operations of the corps, the attacking unit, or the higher headquarters of the attacking unit.
- The corps and its supporting units are willing to accept the possible duplication of effort which may result from dual targeting beyond the FSCL.[13]

These conditions indicate a corps sector deep enough to contain numerous targets whose attack support EAC deep operations and presumably, theater campaign objectives. Therefore, freedom of targeting and attack in this deep operations area would benefit not only EAC, but also corps. The area and targets which will support corps deep operations must therefore be relatively closer to the FLOT and still vulnerable to the shaping which the corps commander desires to gain advantage in close operations. Alternately, the corps commander may desire to maximize destruction of enemy systems by opening a large area to attack by EAC which facilitates the destruction of any located enemy units and systems.

The fundamentals of FSCL placement are:

- Type of operation--offensive or defensive.

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[13]FM 6-20-30, F-3.

- Deep operations with maneuver.
- Nature and location of threat.
- Target acquisition capabilities.
- Allocations of air support.
- Future operations.[14]

While these fundamentals are not further defined in FM 6-20-30, I will attempt to expand the possible interpretations and considerations implied by these fundamentals. This will assist in understanding the use of the FSCL in Desert Storm within the VII Corps area of operation.

Type of Operation

All operations will consider the physical location of subordinate units on the battlefield, especially the depth to which they can be expected to operate from their current positions.

The type of operation will dictate the degree of control which the corps commander desires to exercise in his deep operations area as he shapes the battlefield for future

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[14]Ibid., F-4.

close operations. This is stated in terms of centralized versus decentralized control. If the corps commander is fighting a threat with many systems spread over a large area in the deep operations battle area he may be less concerned with centralized control of specific target engagements for shaping the fight. He could allow subordinate and supporting commanders to attack targets across the FSCL at will as they locate and identify HPTs, maximizing the destruction of enemy units and systems. Conversely, if the corps commander has very specific targeting and attack objectives in mind that require precise and centrally controlled execution to ensure adherence with his concept and intent for shaping the fight, he may place the FSCL much farther out, requiring all targets acquired within that area to be coordinated with his staff prior to execution. Centralized versus decentralized control is the difference between the levels confirming that the attack is still within the commander's attack criteria.[15]

The scope of the deep operation can be expressed as magnitude of effort and size of the area in which the corps commander intends to shape the battlefield. A very large area will require an extensive collection effort and may be

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[15]Jon C. Schreyach, "Deep-Attack System of Systems", Field Artillery, (December 1989): 51.

beyond the capabilities of the corps. Reducing the area of direct concern through placement of the FSCL allows acquisition and attack assets to focus more precisely on corps objectives. However, the corps may require a very large effort over an extended area, and through the addition of EAC assets to the suite of normally available systems is fully capable of executing a deep battle over extended distances.

The allocation of fire support assets which are capable of deep fires can have a direct impact on the size of the area which the corps will seek to influence. Allocation of fire support assets to the corps will be based on the type of operation which it is to perform as well as the importance of its area of operation to the theater campaign. Allocation of target acquisition and fire support assets (to include aviation) to subordinate corps units is dependent on the depth to which they are operating. Great depth with a relatively close FSCL will provide the opportunity for these units to significantly influence the area beyond the FSCL.

In the defense, the FSCL is normally located relatively close to the FLOT, possibly within range of divisional indirect fire assets, but beyond the area occupied

by the covering force. This maximizes the opportunities of engagement of enemy systems approaching the close battle area by removing restrictions of coordination. This situation might be especially useful if the air component has established air superiority and is able to fly air interdiction missions with relative impunity. This may not always be the case, however, as the corps commander may desire to shape his close battle through selective engagement of targets and areas which allow the enemy to focus his attacking assets in accordance with the corps commander's desires. By pushing the FSCL farther out, the corps commander ensures that all attacks on the approaching enemy force short of the FSCL must be coordinated through his headquarters and meet his intent for the shaping of the close battle. This shaping may require selective targeting and coordinated fires to ensure that the enemy is encouraged to support the corps commander's intent.

In the offense, the FSCL is normally located farther from the FLOT. This is especially critical in a fast moving situation in which the lead maneuver elements are rapidly achieving depth as they develop the situation. The FSCL should clearly be far enough beyond these elements that friendly air does not confuse them with enemy targets.

Although ideally placed on identifiable terrain, both ground and air components have the capability of determining location to a sufficient degree of accuracy with available systems that this requirement is not critical.

Deep Operations with Maneuver

Deep operations may be conducted with maneuver elements as well as fires and C3CM. If maneuver forces are operating in the deep operations area, the placement of the FSCL must be beyond their area of operation to ensure their maximum protection during conduct of the operation. These could include airborne or air assault insertions against special high value targets, attack helicopter operations, deep ground maneuver with heavy forces or special operations forces in direct action or reconnaissance missions. Deep operations with maneuver elements are normally quite complex and entail significant risk. They will be expected to operate with a high degree of autonomy and be capable of self sufficiency for the duration of the operation. Assistance will probably be available only from tactical air or ATACMS. Regardless of the type or size of the force involved, the corps planners must take the activities and location of the force into account as they examine proper placement of the

FSCL to ensure adequate protection of these forces involved in deep maneuver operations. Frequently, additional FSCMs will be appropriate as well, particularly restrictive measures which will clearly delineate for all supporting units the areas which require special considerations.

Nature and Location of Threat

The primary considerations of the threat are the degree of control required to shape the enemy deep for future close operations and the facilitation of fires against HPTs. Large, Soviet style armies with multiple echelons of forces, require more shaping to set the parameters for the close battle than smaller forces with limited assets and less depth. This is not to imply that these smaller forces do not require careful application of firepower against certain targets to ensure success for the corps. Elimination of command and control facilities, air defense assets and other high payoff targets will provide an edge in the close combat area to the corps. But larger armies will probably require a more significant and specific targeting and attack effort to adequately affect the future close battles.

The ability to facilitate highly responsive fires against time sensitive targets of opportunity may be crucial, especially in a fluid combat environment in which both forces may be moving into positions and areas to influence their own battle plans. Time sensitive refers to both battlefield targets posing an imminent threat to friendly units (an enemy rocket artillery unit preparing to deliver a chemical strike), and located HPTs with limited loiter time. Loiter time may be extremely limited for units on the move into new positions and require immediate engagement when they are located to ensure success. Anticipation of enemy actions may dictate placement to allow the corps maximum opportunity to affect the enemy forces as they position or reposition to conduct close operations. Duplicative effort through dual targeting by the corps and its supporting units is a key condition that must be accepted when an FSCL is implemented and placed within the range of subordinate unit acquisition and attack systems.

Finally, the enemy ability to engage friendly aviation systems through ground based air defense or counter-air aviation should be a consideration. High threat air environments will necessarily reduce the amount of cross-FLOT friendly air that can be expected. The FSCL may be placed

closer to allow a larger amount of lethal and non-lethal fires to be delivered beyond the FLOT by the corps and its subordinate units without concern for their effect on friendly air operations.

Target Acquisition Capabilities

The application of fires, maneuver and C3CM into the deep battle area is necessarily dependent on the ability of the corps to employ acquisition systems that provide an accurate assessment of enemy activities. The first consideration is how deep the corps can see with its own organic acquisition systems. Airborne systems are available that can gather targeting information out to 100 kilometers beyond the FLOT. A number of ground based systems are also available, but their range is limited to about 30 kilometers beyond the FLOT.[16] Additional target acquisition assets may be allocated by EAC to provide greater range, timeliness and precision. A system which is intended to be normally tied into the corps acquisition suite of sensors is JSTARS, an airborne platform with significant acquisition capabilities as recently demonstrated in Desert Storm.

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[16]US Army, FM 34-1, Intelligence and Electronic Warfare Operations (Washington DC: Department of the Army, 1987), 2-44.

Finally, what are the intended counterfire operations and who has been designated with responsibility for their execution? The counterfire responsibilities may be retained by the corps artillery with sensors and attack systems dedicated solely to this effort, predicating an FSCL farther away from the FLOT, while in other cases the counterfire battle may be fought at all echelons within the corps, requiring a closer FSCL.

Allocations of Fire Support

The amount of tactical air support in the form of AI that may be flown as BAI in support of the corps will affect the FSCL placement. A substantial theater level AI campaign that takes into consideration corps targets in the development of target lists may require an FSCL placed closer to the FLOT to allow more freedom for deep aviation which is being controlled through the theater commander to support the operational campaign plan. Alternately, the theater may allocate some portions of its air assets directly to the corps to allow the corps commander to fight his deep operations to support corps future close battle plans. The corps commander might place his FSCL farther from the FLOT to retain maximum control over this BAI effort. Of course,

affecting either option is the status of the counterair campaign and the relative success of the air component in establishing air superiority. If air parity or superiority has not been achieved, not only will fewer assets be available for air-ground attack, but fewer aircraft will be venturing over the FLOT to conduct these types of missions.

Future Operations

The use and placement of the FSCL must take into consideration the future operations of the corps. Placement must facilitate and support these future operations. The initiation of offensive action after a period of defense will require pushing the FSCL farther out prior to the attack. Friendly subordinate units will require maximum flexibility in a movement to contact, while ensuring their protection from friendly fires. The subsequent planned offensive movement of subordinate units should be considered. Establishment of defensive positions after seizure of objectives may require the FSCL to be brought closer to the FLOT, permitting aggressive engagement of any enemy forces moving to counterattack. Regardless of the type of operation however, the corps must plan for the initial FSCL and a series of on-order FSCLs which support the concept of the

operation. Previously identified and disseminated on-order FSCLs provide a reference point for all headquarters involved in the operation, even though the FSCL requirements may change once the close battle is initiated.

What should be evident from the foregoing discussion of FSCL placement considerations is that they are precisely that--considerations. The corps commander will decide if and where an FSCL is used to support corps operations based on the best judgement and recommendation of the FSCOORD. There is no formula, no checklist which will provide the yes or no answer for the FSCL. The FSCL is dependent upon METT-T and the experience and judgement of the key decision makers. The predominant imperative appears to be the degree of control which the corps commander desires to exercise over corps deep operations and the ability of the corps to acquire and attack targets within that area.

The FSCL Process

The determination of fire support coordination measures is a function of the normal activities of the personnel in the Corps FSE. Typically, FSCLs will be recommended to the corps commander during the development of

AN FSCL CHECKLIST

Doctrinal Principles

Permissive fire support coordination measure.

Established by corps or higher commander.

Facilitates fires by all attack systems against surface targets.

Must be coordinated with supporting elements.

No adverse effects short of line from fires beyond line.

Attacks short of FSCL must be coordinated with establishing commander.

Located beyond deep operations area to be shaped.

Should follow defined terrain feature.

Air component should be informed of surface fires beyond FSCL.

Conditions for Establishment

Portion of deep operations area does not require selective targeting.

Expeditious attack of targets beyond FSCL supports operations.

Duplication of targeting and attack beyond FSCL is acceptable.

Fundamentals for Placement

Type of operation.
- -offense/defense
- -centralized/decentralized control

Deep maneuver operation.

Nature and location of threat.

Target acquisition capabilities.

Allocation of air support.

Future operations.

Figure 3-2

the fire support portion of the corps operations plan. Members of the corps main CP fire support cell will make recommendations through the Deputy FSCOORD during the planning for future and deep operations with the plans cell. Once the plans are approved for execution, the main command post fire support cell monitors the progress of the close battle and the execution of deep operations in consonance with the operations cell. As combat operations progress through the depth of the battlefield, the main fire support cell should closely monitor the location of the FSCL in relation to the close fight and ensure that the appropriate changes are made, normally to pre-determined on-order FSCLs that support the scheme of maneuver and battle flow.

Although a doctrinal mechanism is difficult to discern, dissemination of the FSCLs is initially made through the publication of the corps operations plan and normal distribution of that plan to all subordinate, supporting and supported headquarters (HQ). Subsequent dissemination of on-order or new FSCLs should be by message through both maneuver and fire support channels. The fire support cell should ensure that direct voice or digital communication information concerning FSCMs is made first with the BCE at the TACC to inform the Air Force, followed by notification of

subordinates and finally the higher HQ. The fire support representative within the corps army airspace command and control (A^2C^2) element is charged with this responsibility for distribution to the BCE and division A^2C^2 elements.[17] This information is especially critical for the supporting air component who must ensure that this control measure is subsequently provided to all aviation control elements. Experience in Desert Storm indicated that the Air Force required three hours with current command and control facilities and communications to ensure that all concerned agencies were informed.[18] Obviously, the main fire support cell must be closely monitoring the battle and projecting anticipated FSCL changes far enough into the future to ensure that all concerned elements are notified in a timely manner.

AIR/GROUND SYNCHRONIZATION AND COORDINATION

Attack synchronization and coordination should be achieved through the fire support cell in the corps main CP as part of the deliver function. BAI missions will be

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[17]US Army, FM 100-103, Army Airspace Command and Control in a Combat Zone (Washington DC: Department of the Army, 1987), 5-9.

[18]Desert Storm Special Study Project, III-3-14.

coordinated at the component level during planning and if short of the FSCL will be coordinated and controlled jointly by the BCE located at the TACC and the ASOC adjacent to the fire support cell in the corps main HQ during execution. Missions beyond the FSCL, but still within the corps boundaries should be monitored by the BCE and reported to the corps head-quarters by the corps liaison section at the BCE. Coordination should normally be accomplished through army communications systems between the various command and control nodes.[19] All attacks involving army or air force systems must be coordinated through the A^2C^2 system.

A^2C^2 SYSTEM

The A^2C^2 system is linked to the TACS to disseminate and employ positive and procedural control for the use of airspace in the corps area of operation. There are nine commonly used airspace control measures which reserve airspace for specific airspace users, restrict and control actions of airspace users, and require airspace users to accomplish specific actions.

> The objective of A^2C^2 is to ensure the most effective employment of combat power by those airspace users whose unrestricted use of airspace

[19]TACR 55-45, 8-9.

> might result in the loss of friendly air assets. Conversely, A^2C^2 must integrate air assets into the ground battle without unduly inhibiting the application of ground-based combat power.[20]

The integration of airspace control throughout the theater is accomplished by the airspace control center located in the TACC. The BCE provides A^2C^2 personnel to the airspace control center to ensure the synchronization and deconfliction of ground-based combat power with aviation assets.

Within the corps, there are A^2C^2 elements at all CPs. Each of these is responsible for the coordination and deconfliction of airspace within the corps area of operation. The A^2C^2 element in the main CP is responsible for airspace control in deep operations. To accomplish this coordination, this element is composed of representatives from the G3 operations section, ADA element, army aviation element, fire support element, Air Force tactical air control party, air traffic services liaison element, air and naval gunfire liaison company and as needed, representatives of the G2 and G4 sections. The corps main CP A^2C^2 element is collocated with the fire support cell and maintains direct communication with the ASOC. This element coordinates airspace use with

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[20]US Army, FM 100-103, Army Airspace Command and Control in a Combat Zone (Washington DC: Department of the Army, 1987), 1-4.

the BCE and divisional A^2C^2 elements. This coordination should ensure the timely and accurate synchronization of the many users of corps airspace, facilitating enemy target attack by air and ground systems while providing maximum safety from fratricide.

SUMMARY

The corps fight is based on integration of close, deep and rear operations and support of EAC theater objectives. The corps controls engagements in close operations by denying the enemy the ability to concentrate combat power. This is achieved through deep operations against enemy forces arrayed in depth on the battlefield to alter the tempo of their operations. Enemy targets which best accomplish this objective are identified as high payoff targets and targeted using the decide, detect and deliver methodology. The FSCL is a FSCM which assists the corps commander in defining the corps area of operation and fires against targets in the deep operations area. The definition of corps and EAC deep operations areas and the engagement of targets in deep operations by ground and air-based attack systems is the coordination issue which must be resolved.

CHAPTER 4

> Our Army's triumphs--Panama, the cold war, Desert Storm--were the result of relentless actions by our Army to evolve the best doctrine for the times and the responsibilities assigned. Now we must use the confidence born of battlefield success and the sure knowledge that doctrine must continue to evolve...we must maintain continuity while remaining ahead of change.[1]
>
> General Frederick M. Franks Jr., October 1991

DESERT STORM

Operation Desert Storm commenced at 0300 hours local time, 17 January 1991, with overwhelming firepower in the form of sea-launched Tomahawk cruise missiles, air-launched cruise missiles from B-52s, AH-64 attack helicopters, and hundreds of aircraft striking key targets throughout Kuwait and Iraq. Successive waves of allied aircraft destroyed command and control headquarters, Scud missile sites, radars, air defense sites, airfields and aircraft. An efficient and rapid combined and joint air/ground campaign ejected the Iraqi invaders from Kuwait following 43 days of combat.

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[1]Frederick M. Franks Jr, "After the OPFOR, the Medina Ain't Nothin'!" Army (October, 1991): 74-75.

CENTCOM COMMANDER OBJECTIVES

General H. Norman Schwarzkopf stated the objective of Operation Desert Storm in his public announcement to the members of CENTCOM on the morning of 17 January 1991.

> This morning at 0300C we launched Operation Desert Storm, an offensive campaign that will enforce United Nations resolutions that Iraq must cease its rape and pillage of its weaker neighbor and withdraw its forces from Kuwait.[2]

CENTCOM Operations Order (OPORD) 91-001 dated 17 January 1991 described how General Schwarzkopf intended to achieve this objective through the application of military power. In this order, General Schwarzkopf clearly listed each of the key theater military objectives that must be attained and his concept and intent for ensuring their attainment.

° Attack Iraqi political-military leadership and command and control.

° Gain and maintain air superiority.

° Sever Iraqi supply lines.

° Destroy known chemical, biological and nuclear production, storage and delivery capabilities.

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[2]H. Norman Schwarzkopf, Public Announcement (17 January, 1991) quoted in Association of the United States Army Special Report, The US Army in Operation Desert Storm (Arlington, VA: Association of the United States Army, 1991), 11.

- Destroy *Republican Guard* forces in the KTO.
- Liberate Kuwait City.[3]

These are the objectives that Lieutenant General John J. Yeosock then translated into a mission for all Army Forces, US Central Command (ARCENT), with the statement "USARCENT forces attack G-Day, H-Hour in zone to destroy the *Republican Guards Forces Command (RGFC)*."[4]

VII CORPS COMMANDER CONCEPT AND INTENT

Lieutenant General Frederick M. Franks Jr. restated the VII Corps mission to his subordinates as:

> On order, VII Corps Combined Corps attacks to envelop and penetrate Iraqi defenses and destroy the *Republican Guard Forces* in zone; be prepared to defend northern Kuwait border to prevent re-seizing Kuwait.

To achieve this mission, LTG Franks specified eight key points in his commander's intent.

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[3]Department of Defense, Conduct of the Persian Gulf Conflict, An Interim Report to Congress (Washington DC: Department of Defense, 1991), 2-3.

[4]VII Corps, "The 100 Hour War," undated, A briefing packet prepared by VII Corps describing corps operations in Desert Storm.

° Swift and violent series of attacks to destroy *RGFC*; minimize friendly casualties.

° Attack moving Iraqi forces through depth of their formation with maneuver, fires and air.

° First phases deliberate and rehearsed; maximum forces moving toward the *RGFC*. Minimum casualties, minimum time.

° Deliberate breach at initial point of main effort; done with precision and synchronization resulting from precise targeting and continuous rehearsals. Build combat power rapidly on the far side.

° Economy of force northeast of breach to defeat tactical reserves.

° Point of main effort passes to enveloping forces to destroy *RGFC* in fast-moving battle with zones of action and agile forces attacking by fire, maneuver and air.

° CSS must keep up-no pauses.

° Strike hard and continuously and finish rapidly.[5]

VII Corps published the concept of the operation in OPLAN 1990-2, Operation Desert Saber, on 13 January 1991.

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[5]Ibid.

LTG Franks supported the concept of operation with guidance to VII Corps Artillery for development of the concept of fires.

° Priority of fires to 1st Infantry Division (1ID(M)) for the breach; transition to 2d Armored Cavalry Regiment (2ACR), 1st Armored Division (1AD)/3d Armored Division (3AD) envelopment.

° Support the deception effort by weighting fires across the front while emphasizing Wadi Al Batin.

° Support the psychological operations (psyops) campaign; "crack him" and emphasize technological superiority.

° Fix and attrit mobile reserves.

° Reduce capabilities of screening forces (2ACR/1AD/3AD).

° Assist in destruction of *RGFC*.[6]

Based on this guidance, the corps artillery commander developed the concept of fires. The concept of fires consisted of five phases, of which the first was deployment

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[6]VII Corps Artillery, "Operation Desert Storm, A Fire Support Perspective," Briefing prepared by VII Corps to describe fire support operations in Desert Storm.

and occupation of assembly areas prior to initiation of hostilities. Combat phases were to prepare the battlefield; support the breach; fix and attrit mobile reserves and finally, assist in destruction of the *RGFC*. No clear distinction, apart from the type of targets on the HPT, was made between deep operations and close operations.

Five objectives described the preparation of the battlefield. The first objective, to support deception operations, was achieved initially by weighting fires to Wadi Al Batin with the 1st Cavalry Division (1CD) and its supporting artillery, the 42d Field Artillery Brigade (42 FAB). This was followed by artillery raids by each of the artillery brigades throughout the VII Corps front and the targeting of Iraqi "eyes" (observation posts and radars). The second objective was to target the Iraqi will to fight with a psyops theme of the lethality of coalition weapon systems which ties psyops and fires together. Precision guided munitions (Air Force and Copperhead) struck point targets such as observation posts (1CD Copperhead strike) and radars (Air Force Shrike Antiradiation missiles). The lethality of allied munitions was amply demonstrated by targeting a variety of Iraqi units and systems with dual purpose improved conventional munitions from MLRS and cannon

systems, and ground and air delivered scatterable mines. Logistics sites were a particular target to make the Iraqi soldier miserable through degraded life support necessities. The third objective, to deny leadership and disrupt command and control, was achieved by attacking communications nodes and command and control facilities during offensive air operations and with artillery raids. The fourth objective, to reduce defensive capabilities, was achieved by attacking HPTs with air and artillery raids. The last objective, to destroy chemical delivery capabilities, was achieved by nomination of artillery targets for air interdiction to destroy 90 percent of the Iraqi artillery. The last three of these objectives were clearly in the deep operations realm as well as the close battle area of the initial breach site.

Supporting the breach consisted of three objectives. The first objective is to ensure no chemical munitions are used on allied forces during the breach. This is achieved through a targeting and intelligence effort to destroy 90 percent of the artillery in range of the breach site. The second objective is to suppress direct fire and destroy any indirect fire on the breach. This is achieved through resourcing the breach site with an overwhelming amount of firepower. Two division artilleries and three field

artillery brigades provided nine battalions of 155mm, four battalions of 203mm, two battalions and two batteries of MLRS and one battery of ATACMS prepared to fire 40,000 rounds of stockpiled ammunition. Priority of CAS and AI is to the breach site and one FA brigade manages all rocket artillery and target acquisition assets to provide proactive and reactive counterfire. The last objective is the degradation of the Iraqi infantry division occupying the deliberate breach site by destroying local mobile reserves and attack of the front line troops. This effort included heavy targeting during the air campaign, including three B-52 strikes and one BLU-82, 15,000 pound bomb and numerous artillery raids and attack helicopter sorties. Finally, 28,000 rounds of artillery is allocated for a two and a half hour preparation to be fired immediately prior to the commencement of breaching operations. These objectives are most closely identified as corps close battle objectives, with divisional fire support assets capable of ranging and influencing for future operations.

Fixing and attriting the mobile reserves is achieved by two objectives. Destroy front line infantry division local mobile reserves and destroy the tactical reserves, an

armored brigade. The tactical reserves became known as the "make them disappear" brigade based on the corps commanders specific guidance. This is achieved by including these reserves as HPTs for the nomination of AI targets, psyops B-52 strikes and leaflets. An on order attack helicopter deep attack is also planned on the tactical reserve armored brigade.

The last fire support phase, assist in the destruction of the *RGFC*, is the single most important objective for the success of VII Corps. Significant AI effort is directed to the destruction of this force during the air campaign and the completion of that destruction will occur in the combined arms air/ground battles on 26, 27 and 28 February.

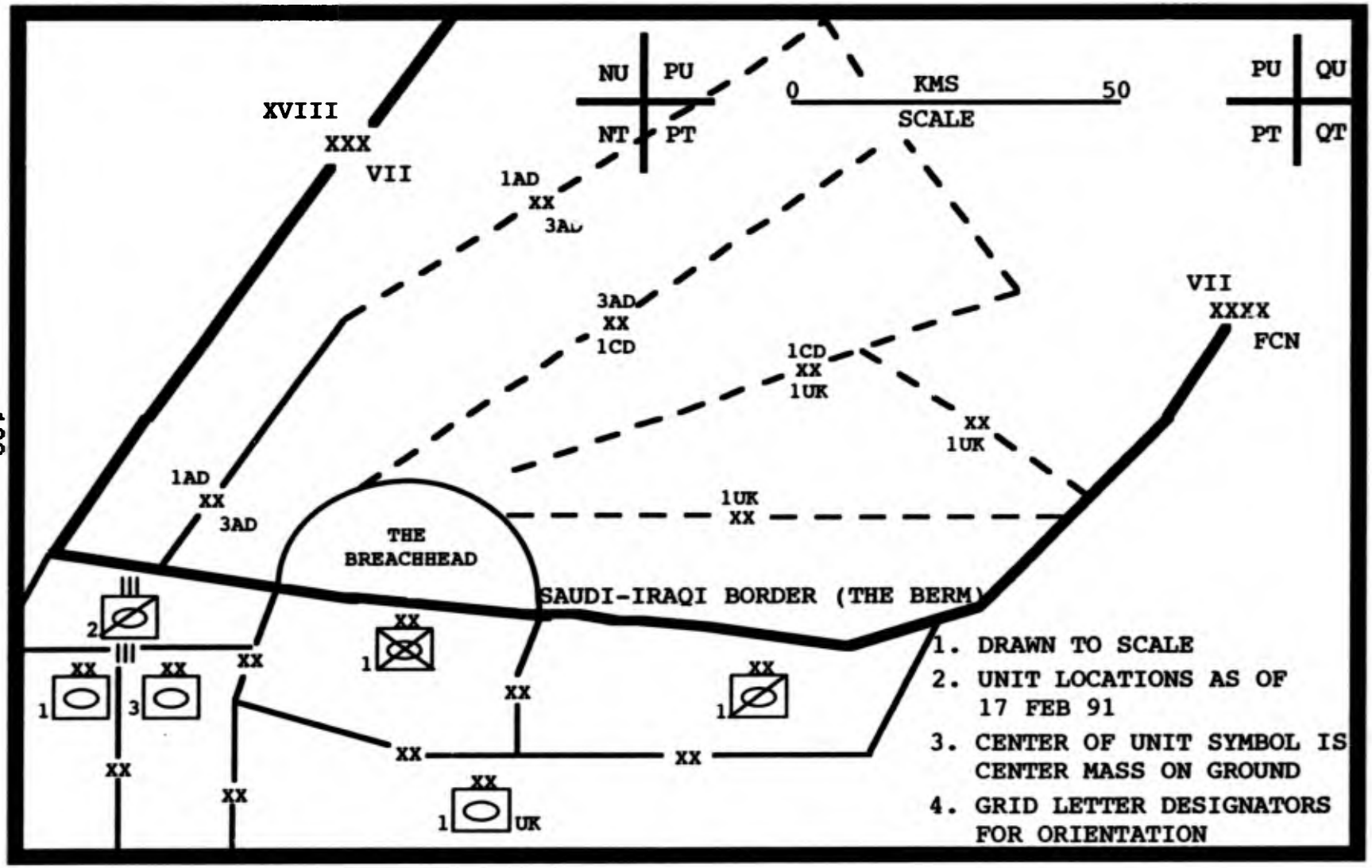
BATTLEFIELD ARCHITECTURE

The initiation of offensive air operations found VII Corps units spread from tactical assembly areas deep in the Saudi Arabian desert to the coastal ports at Ad Dammam and Al Jubayl. The final combat units closed on the tactical assembly area on 9 February. Training and rehearsals on all

aspects of the upcoming combat operations and especially breaching operations received close attention.

On 15 and 16 February, a full-up rehearsal of the attack brought VII Corps units, arrayed in combat formations, from their tactical assembly areas southeast of Hafir Al Batin to their final assembly areas along the Saudi-Iraqi Berm. The berm was an eight to ten foot high dirt berm through which gaps would be cut to allow initial penetration.

By 17 February, the VII Corps, occupying its final assembly areas, made last preparations for the attack into Iraq. The VII Corps occupied positions west of Wadi Al Batin (Map 4-1), with 2ACR on the left, 1ID(M) in the center preparing for the deliberate breach and 1CD on the right. 1AD and 3AD were poised to the south of 2ACR for the envelopment, while 1st Armored Division (United Kingdom) (1AD(UK)) occupied positions behind 1ID(M) to facilitate their movement through the breach head and to the east to block and destroy the Iraqi tactical reserves. 1CD continued to demonstrate a main attack up the Wadi Al Batin. VII Corps would attack in zone on G+1 (25 February) following the attacks into Kuwait on G-Day by the Coalition partners and the Marines. This delay would continue to reinforce the deception plans and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THE
BREACHHEAD
SAUDI-IRAQI BORDER (THE BERM)
2
1
3
XX
UK
1. DRAWN TO SCALE
2. UNIT LOCATIONS AS OF 17 FEB 91
3. CENTER OF UNIT SYMBOL IS CENTER MASS ON GROUND
4. GRID LETTER DESIGNATORS FOR ORIENTATION

Map 4-1

hopefully start the Iraqi reserves moving in the direction of the breach sites in Kuwait. The attack was designed to attack as far west in zone as possible to envelop the Iraqis, penetrating and rapidly outflanking their defenses to facilitate closing with and destroying the *RGFC*.

The artillery organization for combat stressed decentralized control, with artillery weighted to the corps main efforts by phase as described by the corps commander. All available corps artillery brigades were assigned reinforcing missions to the divisions with only the ATACMS battery retained in general support of the corps as a deep fires asset. The five fundamentals of artillery organization for combat were accomplished by corps planners as they placed the artillery firepower at the direction of the committed maneuver units. Corps retained the ability to use AH-64 attack helicopters, ATACMS and air support to shape the deep battle area and had planned for their employment in several on order fragmentary orders (FRAGOs).

THE BATTLE

For ease of analysis, the VII Corps battle will be considered in four phases, which do not precisely correspond

to either the corps OPORD or corps artillery phases. The first phase, beginning with offensive air operations on 17 January, consists of preparation of the battlefield almost solely through airpower and lasts until 12 February, the day prior to the initiation of artillery raids. The second phase consists of the ground forces preparation of the battlefield which includes the extensive use of artillery raids from 13 to 23 February. The third phase is the commencement of the ground war with the breach and penetration on 24 February. The final phase is the defeat of the tactical reserves, the theater reserves and the *RGFC*, through the cease fire on 28 February. Each of these phases can be treated as a unique part of the VII Corps experience in Desert Storm and will describe the fires objectives for that phase, description of tactical events with emphasis on fire support, use of the FSCL to support maneuver and fires objectives, and comparison with the three conditions to be met prior to the establishment of an FSCL. Analysis will then also consider the application of the six FSCL employment considerations to draw conclusions concerning the usefulness and doctrinal employment of the FSCL by phase in VII Corps Desert Storm operations.

Phase 1, 17 January to 12 February

The war began for the VII Corps commander and his staff when 1CD moved into the corps sector under attachment orders effective 13 January. Concerned that the Iraqis might attempt a spoiling attack south along the Wadi Al Batin toward Hafir Al Batin, CENTCOM placed the two brigades of 1CD and a brigade of the 101st Airborne Division under the control of VII Corps. 42 FAB provided reinforcing fire support to the 1CD artillery and remained with the troopers until mid-February.

During this first phase, VII Corps continued to deploy forces into theater and prepare for combat operations. The ability of the corps to execute deep operations during this period was marginal, although planners already had developed their HPTs, and nominations for AI were being submitted daily to begin the deep operations for shaping the battlefield. Getting targets on the ATO was not easy however, as theater targets seemed to have higher priority. AI was something that could not be counted on, and on a daily basis, one to five of the corps nominated HPTs made the ATO.[7]

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[7]VII Corps Fires AAR, 2.

On 26 January, 1CD repositioned to positions about 25 kilometers south of the Saudi-Iraqi border (the berm) following the shift of Syrian forces to the east into the Joint Forces Northern Command sector directly south of Kuwait. The first VII Corps FSCL in Desert Storm was published in VII Corps Frago 94-91, dated 26 Jan 91, as the artillery moved within range of Iraq that afternoon. This on-order FSCL essentially carved out a 20 kilometer deep area directly in front of the 1CD positions and beyond the berm. It supported preplanned kill boxes positioned in the 1CD sector which would be ranged by corps artillery units in the event of an Iraqi spoiling attack.

Implementation of this FSCL did not occur. Offensive air operations quickly established air supremacy, and after devastating the theater strategic targets, moved into the operational and tactical targets phases. Gen. Schwarzkopf intended that Iraqi forces in the Kuwait Theater of Operation (especially the *Republican Guards Forces Command*) be reduced in capability by at least 50 percent prior to the ground offensive. This was accomplished by attacking the ground combat forces and supporting missile, rocket and artillery units; interdicting supply lines and destroying command, control and communications using B-52 strikes, TACAIR and

naval surface fires. As intended in his concept, the preparation of the battlefield confused, suppressed, damaged and destroyed sufficient Iraqi forces to open the window of opportunity for ground offensive operations.[8]

The first implemented FSCL lay along the Saudi Berm specified in VII Corps Frago 113-91, dated 7 Feb 91. Clarification on the meaning and location of the FSCL was contained in Frago 116-91, dated 10 Feb 91, which specified that firing across the FSCL requires (emphasis added) coordination with the air force. Coordination is defined as informing and/or consulting with supporting tactical air controllers for deconfliction of air and ground fires. Brigadier General Creighton Abrams, VII Corps Artillery Commander, indicated that corps planners understood that the FSCL had become a restrictive rather than a permissive fire control measure.

> Because [the Air Force] absolutely would not fly short of the FSCL before G-Day, we kept the FSCL in close to facilitate air attack of division and corps high priority targets. This caused two problems. Every fire mission or AH-64 attack beyond the FSCL had to be carefully and painstakingly cleared with the Air Force. Even counterfire required this lengthy process. Equally bad, air sorties beyond the FSCL were completely the domain of the Air Force.

[8]CENTCOM OPORD 91-001

VII Corps could nominate targets beyond the FSCL, but could never be sure they would be attacked.[9]

FSCL Analysis, Phase 1

Although problems appear evident from the VII Corps perspective, did this FSCL placement during the period 17 January through 12 February meet the three conditions of FSCL use? This is a matter of perspective, also. With regard to the first condition, although all of the corps area could be argued to have contained forces which required selective targeting, CENTAF offensive air operations targeted many of the same HPTs in meeting CENTCOM priorities to set the conditions for the ground offensive as were specified in the corps deep targeting priorities. The second and third conditions for FSCL use were met by the FSCL along the berm. The Air Force flew with near impunity in the deep area and significantly degraded the capabilities of the Iraqis, meeting the CENTCOM Commander's guidance, and whether by design or accident, supporting HPTs selected by ARCENT and VII Corps. Many of the targets on the corps phase II high payoff target list were being struck, albeit with theater AI sorties as opposed to corps BAI sorties. This approach to air

[9]VII Corps Fires AAR, 2.

support by CENTAF differed significantly from the corps experience in Europe. European exercise experience for VII Corps taught them to plan for and expect BAI for use between the FSCL and a RIPL. In the desert, CENTAF indicated there was no BAI, only CAS and AI.[10] This might be reflective of the opinion of some Air Force officers that BAI is a subset of AI and allocation of BAI sorties to the Army detracts from the theater air objectives. The location of the FSCL appears to have greatly assisted the decision to eliminate allocation of BAI sorties to the corps. Duplication of effort did not appear to be a significant worry with large amounts of air going deep daily into Iraq and Kuwait in accordance with ATOs targeted against enemy assets based on current theater intelligence gathering and assessments.

The restrictive nature of the FSCL did not have a major impact on corps operations during this phase. Only the engagement of ATACMS targets posed problems, but seven of the 14 targets engaged during this period were generated by ARCENT, and ten of the targets were ground to air systems which assisted the air component in conducting successful offensive air operations. Coordination from the corps FSE

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[10]Smith, 2; Corps Fires AAR, 4.

through the BCE to the TACC was proving to be lengthy and normally took 30 minutes to two hours pending air force clearance. HPTs with short dwell times became missed opportunities.[11]

Review of the fundamentals of FSCL placement does not indicate any irregularities. As a defensive operation for the VII Corps commander until the ground offensive commenced, the FSCL was positioned close to the FLOT to allow maximum firepower in as large an area beyond the FLOT as possible. Granted, that should have included ground based fires, but the close-in FSCL allowed maximum freedom of action for the primary deep killers-the aircraft. Deep operations with maneuver involved only isolated and well coordinated SOF reconnaissance missions which could be handled with no fire areas as appropriate. The Iraqi forces were spread throughout the theater in dug-in positions and with the early elimination of the Iraqi ground to air threat, became lucrative targets for offensive air. National and theater intelligence assets provided near real time data on the enemy, allowing the air planners to target precisely. Air support allocations directly to the corps were proving to be

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[11]VII Corps Artillery, Corps Fires After Action Report (Executive Summary) (VII Corps, 15 March 1991), 4.

limited due to the synchronization and control of air at CENTCOM.

> Naturally, we received intelligence updates continually, and we used these as well as battle damage assessment reports based on fighter armament recording devices and reconnaissance to build our ATOs. It was true coalition as well as joint, aerial warfare. Everyone's requirements were taken into account. The CENTAF staff which built the ATOs consisted of officers provided by each of the US and allied services. These measures made certain that it was an allied effort, coordinated at every echelon.[12]

Key corps HPTs were being hit during offensive air operations over time, although the inability to directly influence the selection and attack of targets proved frustrating to the corps commander.[13] "[Army] concern was battlefield prep and not having enough say in it. Army wants more control of air for corps commanders."[14] Regardless of who was actually controlling and fighting deep operations, the future ground offensive operations of the corps would prove to be more than adequately supported by the highly successful offensive air operations against the Iraqis in the Kuwait Theater of Operations.

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[12]Charles A. Horner, "Desert Shield/Desert Storm: An Overview," Air Power History (Fall 1991), 8.

[13]Cherrie interview, 4 November 1991.

[14]Memorandum, US Air Force, XOXWD, Subject: Trip Report from Joint Doctrine Center (JDC) visit to Desert Storm locations," 30 April 91.

Phase 2, 13-23 February

Fires' objectives during this phase were to neutralize HPTs, support the deception effort, reinforce the psyops campaign and win the counterfire battle. This would be achieved using the artillery raids, AH-64 low-risk feints and demonstrations and CAS/AI (BAI) targeting. The HPTs, in priority, were fire support, especially multiple rocket launchers and FROGs, and all artillery within range of the breach site; reconnaissance, surveillance and target acquisition (RSTA) assets which included moving target and counterbattery radars, drones and observation towers; brigade, division and corps command and control; tactical air defense artillery; logistics sites; maneuver units with emphasis on first echelon breach defenses and local anti-tank reserves and finally transportation assets such as heavy equipment transporters.

VII Corps conducted an aggressive artillery campaign against the front line Iraqi soldiers during these final days leading up to the ground offensive. From G-10 to G-1, each division artillery and artillery brigade had the opportunity to plan and conduct at least one artillery raid with available artillery battalions. Initially, the emphasis in

the 1CD sector supported the main attack up the wadi deception plan. 1CD, working with 42 FA Bde and 11th Aviation Brigade, planned and executed an AH-64 feint with associated suppression and destruction of enemy air defense systems by the artillery. 1ID, the controlling headquarters in the breach area, initiated raiding on G-5 to prepare the breachhead area. Artillery raids and attack helicopter operations became daily events across the VII Corps front as Desert Storm moved inextricably to its denouement.

Preparation of the battlefield during this phase was achieved by designating the berm as the FSCL, but moving it out beyond the area to be attacked during the raids prior to first rounds down range. This technique, while cumbersome for coordination, worked adequately to protect aircraft from inadvertently flying into the raid area. Once the raid had been concluded, the FSCL would move back to the original location along the berm, again opening the area beyond the FSCL to allow aircraft to continue to reduce the combat capabilities of Iraqis in the breach area.

FSCL Analysis, Phase 2

FSCL use during this phase had taken on the characteristics which ensured maximum theater air support into the corps deep area due to an inability for corps to adequately forecast and request BAI based on the theater air control by CENTAF. Knowing that air could provide the most firepower into the deep area, and knowing that the Air Force was reluctant to fly short of the FSCL due to fratricide concerns and the unwillingness to coordinate an already massive air effort, corps artillery planners deliberately maintained the FSCL in close to facilitate unfettered air access to the Iraqis across the berm who represented VII Corps division and corps HPTs.[15] This conceded that the area beyond the FSCL did not require selective targeting by corps to achieve the corps commanders objectives in shaping the deep operations area. Clearly, corps planners were also willing to concede expeditious attack and possible duplication of effort beyond the FSCL to the air component to ensure that air serviced the corps targeting priorities, albeit indirectly.

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[15]VII Corps Fires AAR, 2.

FSCL placement still met the requirements of a defensive posture, although battlefield preparation for future offensive operations was a significant consideration. The FSCL was manipulated as needed to allow ground and air attack systems separation yet complementary operations. Ideally this should have been achieved through the use of airspace coordination areas and joint synchronized attacks, but joint simultaneous target attack did not appear necessary to an air component enjoying maximum freedom of airspace and seemingly limitless time to prepare the battlefield.

The lessons being learned during these pre-ground offensive operations are the lessons that most fire supporters remember from Desert Storm. The FSCL was a restrictive FSCM and the area beyond the FSCL belonged to the air component.

> Fire support measures were not doctrinally applied. The corps FSCL was too restrictive. It was positioned too close and used more as an RFL. It hindered engagement of targets of opportunity and counterbattery targets. It resulted in most preplanned CAS missions being flown as AI. It denied the division commander the ability to direct CAS/artillery fires onto his priority targets.[16]

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[16]1st Cavalry Division, Executive Summary of Operation Desert Storm, 10 April 91, 12.

Clearing fires beyond the FSCL was difficult and the easiest ground delivered fire support was preplanned with the FSCL moved to accommodate the fires. The air component waged its own war with little thought of synchronizing fires short of the FSCL, let alone with the ground forces. Air was not massed short of the FSCL due to the concern for fratricide, the requirement for missions to be under the direct control of a forward air controller and a hesitation to use AI into areas short of the FSCL, even if cleared by the ground commander.[17] The deep battle area started right beyond the berm, and with the exception of selective targeting using ATACMS and artillery raids, the corps commander had little impact on the deep operations area if the air component did not service his prioritized targets.

Although the corps had accepted the restrictive nature and closeness of the FSCL to the FLOT as expedient for offensive air operations, they fully expected and planned for a more decentralized deep operations phase in which more doctrinal application of corps deep operations would occur. Key planners had been led to believe that on "cross-over" day, by which a certain attrition level of Iraqi forces had

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[17]Corps Fires AAR (Executive Summary), 5.

been achieved during offensive air operations, the corps would begin the final preparation of the battlefield for ground offensive operations with the FSCL pushed farther out and AI sorties allocated directly to the corps for deep targeting.[18] Tentative planning with AFCENT referred to this period as Phase IIIB, Preparation of the Tactical Battlefield, scheduled from G-8 to G-Day. A VII Corps plan prepared to support this phase showed a two phased operation from G-8 to G-4 directed against fire support, RSTA, CPs, maneuver and air defense HPTs and G-4 to G+1 against fire support, maneuver, command and control, air defense, RSTA and logistics sites. These deep fires would primarily target the mobile tactical reserves and the Iraqi *12th Armored Division* with the expectation that corps would receive significantly higher volumes of air for corps to plan AI. Cross-over day never occurred and this was such a source of frustration, that VII Corps representatives visited CENTCOM several days prior to ground operations commencing to again argue their rationale for corps controlled deep operations. Their visit and concern were noted by LTG Horner based on the report of

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[18]Cherrie, interview on 9 March, 1992 and VII Corps Artillery Memorandum, Subject: Feedback on AFCENT Phase IIIB Conference", 30 Jan 91.

his operations deputy, MG Corder, but cross-over day never materialized.[19]

Phase 3, 23-24 February

Fires objectives during this phase included a massive preparation to defeat enemy artillery and suppress direct fire systems capable of influencing the breach to ensure rapid tempo of breaching operations, destruction of HPTs and defeat of local reserves. High priority targets were all artillery capable of influencing the breach; corps, division and brigade command and control to disrupt commitment of the reserves; front line troops, local and tactical reserves moving on the breach and attack helicopters; RSTA; tactical ADA; and EW jammers. The concept of fires to achieve the fires objectives included CAS and AI air attack against tactical reserves moving to block the breach, EW jammers to disrupt Iraqi command and control, and a two and a half hour "steel rain" artillery preparation followed by close support fires, counterfire and priority SEAD. This plan reflected the synergistic capabilities available to the VII Corps fires planners, and the attempts to integrate all available fires.

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[19]Cherrie interview, 9 March 1992.

Success in the east by the Marines on G-Day (24 February) allowed VII Corps to launch the attack into the breach and the envelopment by 2ACR, 1AD and 3AD a day earlier than the planned 25 February attack. 2ACR had cut 43 lanes and crossed the berm on the 23d, penetrating about 15 kilometers into Iraqi territory with limited contact before halting to await G-Day. Commencing at 0538 on the 24th, 1ID pushed ten kilometers north in zone across the berm with two brigades abreast. Following notification of an accelerated attack into the breachhead, at 1430 an abbreviated thirty minute preparation delivered 6136 cannon rounds and 414 MLRS rockets into the Iraqi positions. The result of the preceding weeks' preparation of the battlefield and the intense artillery preparatory fires were no counterfire, little resistance and few allied casualties as 1ID stormed through the breach. 2ACR, 1AD, and 3AD moved to contact in the west and by 2100 hours lead elements had penetrated 40 kilometers (PL Dixie) into Iraq. 1ID continued to secure the breach area out to PL Colorado and prepared to pass 1AD(UK) through to the east to block and destroy tactical reserves. The first days' operations had gone better than anyone had expected and the preparation of the battlefield had clearly been executed nearly to perfection. The 11th Aviation Brigade remained poised to execute a deep cross-FLOT

operation against any tactical reserves which might move to counterattack into the 1ID zone.

FSCL use during the ground offensive took on a distinctly different flavor. Corps planners had developed a series of on order FSCLs which corresponded to corps phase lines (PL) and were prepared to keep the FSCL well out in front of the lead maneuver units to prevent fratricide and control CAS sorties to shape the battlefield (Map A-1). (FSCL diagrams are found in Appendix A). VII Corps planners intended to decisively and precisely control the deep battle area as the ground offensive moved forward. This is the traditional interpretation of FSCL use, with the FSCL beyond the area the corps commander intended to shape as his forces fought their way through the close battles.

The first FSCL which supported the ground phase was pushed 25 kilometers out from the berm and was disseminated in VII Corps Frago 136-91, dated 231200 Feb 91. This FSCL was effective 231200C Feb 91 and was located along PL Apple from NT 242500 to PT 775500. This is also confirmed in the 6-41 FA, 210th FA Brigade (210 FAB), duty log.[20] The

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[20]6-41 FA TOC Duty Log, Operation Desert Storm, Entry 447, 100-101.

implementation of this FSCL corresponded to a nine minute artillery preparation by 210 FAB at 1330 on the 23rd and subsequent berm crossing operations by 2ACR (Map A-2). Based on the progress of 2ACR, the FSCL was pushed out another ten kilometers effective 240300C Feb 91 in Frago 137-91, dated 241100 Feb 91, to 60 E-W grid line (NT 3160 to PT 8360) and identified as FSCL #1 (Map A-3). This FSCL is also confirmed in the 6-41 FA duty log.[21] This widened the buffer between the lead 2ACR elements and the FSCL to about 20 kilometers, providing an added measure of safety to the ground units from friendly air attack and giving them more room to employ their organic assets given the restrictive nature of firing across the FSCL. The implementation of FSCL #2 is confusing, but is confirmed as being effective at 1500 on the 24th by several entries in the VII Corps Main G3 Operations duty log. FSCL #2 was first identified in Frago 137-91 as being established along a line NU 7520 to PU 1820 to PU 5290 to PT 5220 effective 240600C Feb 91. Although this appears to indicate the FSCL would move at 0600, it actually became effective at 1500 as confirmed by duty logs in VII Corps, 2ACR and 1AD. The 3AD artillery log showed this FSCL being received at 241748 with an effective date time group of 241645 Feb 91! This is presumably 11 hours and 48 minutes after the fact, or

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[21]Ibid., Entry 448, 101.

by their understanding, one hour and three minutes. The 2ACR duty log indicates that at 241328, the FSCL would be PL Smash at 1500. This equates to the trace of FSCL #2, at least with regard to the 2ACR zone of action. The 1AD Division Artillery duty log places the FSCL along PL Pear (which is correct for the location of the FSCL in the 1AD zone) effective 1500. At 241442, 2ACR received a message from the corps commander warning them to stay south of the 60 grid line (the current FSCL) until the new FSCL became effective at 1500. 1ID breaching operations commenced at 1500, and moving the FSCL out at this time would also open up the area forward of the breach to their attack (Map A-4). Frago 137-91 also established a free fire area that encompassed the Iraqi tactical reserves to encourage fire support assets to engage any target located within this area.

FSCL Analysis, Phase 3

Through the designation of the HPTs to support the initial breaching operations and penetration, as well as the locations of the three FSCLs used during this phase, the corps met the three conditions for FSCL employment. A large portion of the corps area did not require selective targeting during this phase and future operations were facilitated by

air attack of HPTS in the deep operations area as acquired and identified by AI sorties. This especially assisted targeting of tactical and operational reserves as they reacted to the allied attack. Expeditious attack of HPTs beyond the FSCL continued to have a major impact on the ability and desire of Iraqi forces to come out of their holes to mount significant resistance to the allied attack. The degree of dual targeting that might occur over the FSCL was low considering that only aircraft were involved and were being directed by Joint STARS and the ABCCC to current and active targets.

With the implementation of FSCL #2, a pattern began to develop of discrepancies between VII Corps FRAGOs and unit duty logs, not only in time of activation, but also location of future FSCLs. This may show a possible dissemination problem or a disconnect between the Corps Main and Tactical CPs in designation of future FSCLs. The importance of a clearly defined doctrinal procedure for FSCL placement and movement in consonance with corps battle management seems obvious in retrospect.

Review of the fundamentals of FSCL placement show how based on the offensive nature of the ground operations, corps

began to push the FSCL farther out to facilitate both current and future operations. Maneuver, especially the 2ACR and its aviation unit, were pushing deep quickly to see the battlefield for the corps. Organic acquisition capabilities gave the corps the ability to see deep and to direct CAS onto HPTs that would most affect the rapidly progressing close ground operations. The 2ACR with an OA-10 forward air controller were directing the CAS for the corps in zone. The allocation of CAS gave the corps the ability and need to open up a portion of the battlefield in which to precisely direct this capability.

FSCL placement during this phase supported the corps fight by opening up sufficient maneuver room for the ground forces and use of CAS while continuing to allow AI to go in deep to influence future close operations. Considering the restrictive nature of the FSCL in terms of air/ground operations, the corps did an admirable job of managing the terrain using coordination measures to gain maximum benefit from available attack assets within the established parameters. Doctrinal application was still not being achieved however, and some frustration was being felt in the

Corps Tactical Operations Center with the lack of "turf" in front of the corps in which to shape the battlefield.[22]

Phase 4, 25-28 February

The fires objectives of phase 4 oriented first on delay, disruption and attrition of the tactical reserves, support of breach expansion and defense of the corps shoulders, lethal counterfire against any active Iraqi artillery and support to ensure rapid tempo and movement of 2ACR, 1AD and 3AD. Finally, the preeminent objective was the destruction of the *RGFC*. Achievement of the fires objectives would be accomplished by using AI and CAS against deploying forces or stationary reserves, AH-64 cross-FLOT operations and aggressive artillery counterfire. Destruction of the *RGFC* would be based on how the *RGFC* responded to the corps attack. Their options were to defend, withdraw or attack and the corps objective was to destroy them regardless of the option chosen. Fires would include massive CAS and AI, AH-64 cross-FLOT operations and artillery fires once maneuver elements were within range of the *RGFC* positions. HPTs in order of priority during this phase included division, corps and

[22]Cherrie interview, 9 March 1991.

brigade command and control facilities to prevent guidance for and synchronization of defensive efforts; fire support, particularly rocket and missile systems and artillery battalions; maneuver forces prioritized by attack helicopters, advance guards of Iraqi forces moving to contact, the tactical reserves and any *RGFC*; air defense artillery organic radars and *RGFC* firing systems; engineer units; RSTA and heavy equipment transportation assets.

Through the night of the 24th 2ACR held in a hasty defense along Phase Line Dixie, 40 kilometers into Iraq and due north of the breachhead. 1ID had consolidated along PL Colorado and prepared to continue the attack to secure the breachhead and pass 1AD(UK) to the northeast. With action commencing at 0600 on the 25th, 2ACR attacked to the northeast while 1ID attacked to complete securing the breachhead. The FSCL #3 was pushed to the east at 0600 in Frago 138-91 dated 242000 February 91 from PU 6050 to PT 6050 to PT 8050 (Map A-5). The VII Corps Main G3 Operations duty log places it from PU 6073 to PT 6050 to PT 8050 effective at 0600. 3AD does not acknowledge receipt of this FSCL, while the 2ACR duty log records it along the 50 Northing and the 6-41 duty log shows it 30 kilometers north from PU 6050 to PT

6080 to PT 8080.[23] 3AD and 1AD continued movement behind 2ACR. By 1200, 1ID was passing 1AD(UK), 2ACR had pushed aggressively out to PL Smash and 1AD and 3AD were beginning to make their moves to pass northeast of 2ACR. Significant ground action occurred along PL Smash as 2ACR hit the Iraqi *12th Armored Division* and to the northwest as 1AD located significant infantry formations of the Iraqi *26th Infantry Division* in the vicinity of Al Busayyah. Progress by 2ACR necessitated another movement of the FSCL to keep it well in front. Frago 138-91 had designated QU 1250 to PT 6996 to PT 6940 (PL Lime) as on order FSCL #4. The Corps Main G3 Operations log places this FSCL from PU 2461 to PU 6961 to PT 6950 to PT 8050. This FSCL became effective at 1500, although the 3AD artillery AAR disputes this location and designates a straight line from the boundary with 18th Airborne Corps down to PT 6950 and then east along the former FSCL (Map A-6). 1AD AAR indicates that this FSCL ran along PL Orange, which was essentially the boundary between VII Corps and XVIII Airborne Corps! Verifying the actual location has proven impossible due to the differences between the VII Corps Frago and duty log, the 3AD artillery AAR and the 1AD AAR. This could well be indicative of the problem noted by the ARCENT

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[23]6-41, Entry 498, 106; and 2ACR Operations Log Summary, 5.

Deep Operations Cell that both the corps main CP and corps tactical CP made changes to the FSCL that were not coordinated and were different in location. 2ACR continued engagements vicinity PL Smash while the remainder of the corps moved east to join the fight along PL Smash.

Anticipating the fight moving rapidly beyond PL Smash once the armored divisions arrived, Frago 139-91, dated 25 February, moved FSCL #5 to PU 9050 to PT 9080 to PT 6080 to PT 6050 to PT 7750 at 0400 on the 26th (Map A-7). 6-41 shows an abbreviated version of this FSCL from PU 9050 to PT 9067.[24] Once again, 3AD disagrees with this version of the FSCL and instead shows a north-south line along the 90 grid line from the northern corps boundary to the southern corps boundary, although the 1CD duty log shows the VII Corps version received at their CP at 0642 on the 26th. The VII Corps G3 Operations log shows all subordinate commands, except 1AD(UK), being notified of the new FSCL at 0400. The 26th saw the fight joined in earnest along the entire VII Corps front with action from north to south by 1AD, 3AD, 2ACR and 1AD(UK). The FSCL as described by the VII Corps Frago carved out a portion of the 1AD(UK) sector back toward the west, that included objectives seized by the British on the 26th.

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[24]6-41, Entry 533, 112.

The action across the front led to the movement of the FSCL again at 1700 to ensure it continued to provide sufficient space for the close battle. Established as on order FSCL #6 from QU 2042 to QT 2094, it is verified as going into effect at 1700 on the 26th, but being received by 3AD at 2106, over four hours after implementation (Map A-8). The situation at 2230 found 1AD and 3AD engaging a blocking force of *RGFC* forces attempting to allow other *RGFC* units farther east to flee the battle area in a northern direction, while 2ACR passed 1ID through to continue the attack into the Iraqi *12th Armored Division*. VII Corps now had four heavy divisions on line for the battle against the *RGFC*. VII Corps committed an AH-64 battalion to a deep night attack against targets identified by Joint STARS along the 3AD attack axis. Making two attacks against armored vehicles, probably elements of the Iraqi *10th Armored Division*, at 2300 and 0300 in the Objective Minden area, the battalion demonstrated the depth and agility provided by attack helicopters to the corps deep fight.

Frago 144-91, dated 262400 February 91, established FSCL #7 along the QU-QT 50 north-south line effective 0300 on the 27th, and is confirmed by the 2ACR and 3AD AARs (Map A-9). Heavy action continued throughout the 27th as all four

divisions pushed forward, crushing resistance by the operational reserves. The continuing confusion at CENTCOM level over the moving of FSCLs and their use by four different corps finally led to the implementation of a CENTCOM FSCL by General Horner, the J/FACC, which was published in Frago 066 at 271900Z by ARCENT and established a Third Army FSCL that moved the final FSCL out to the Kuwaiti coastline, up to the Euphrates river and on out to the west (Map A-10).[25] Speculation that this FSCL might have been intended to stop what was being viewed in some quarters as a slaughter of fleeing Iraqis along Highway 8 out of Kuwait City to Basrah is unconfirmed. With the depth of this final FSCL, no future FSCLs were warranted for the duration of the ground war and offensive operations ceased at 0800 on the 28th with the theater military objectives as described by General Schwarzkopf achieved.

FSCL Analysis, Phase 4

As VII Corps inexorably fought through the shattered Iraqi defenders, the need to selectively target all of the deep operations area diminished at a rate comparable to the

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[25]JULLS Number 13359-99900(00006) submitted by ARCENT G-3, Deep Operations, Major Combs.

number of Iraqi units reduced to combat ineffective. Continued air attack of targets over the FSCL were directed with precision by Joint STARS, in one case reducing a unit forming to attack VII Corps by 80 percent before it could get into action.[26] This ability to expeditiously exploit the capability of airborne sensors against any moving targets beyond the FSCL continued the preparation of the battlefield for the armored columns of VII Corps. Dual targeting was a possibility, but with the success being enjoyed by the combined firepower of the air and ground forces, it was a limited concern.

Application of the fundamentals of FSCL placement, while intended to support a rapidly moving offensive operation, on several occasions did not keep pace with the maneuver progress. The intent to push the FSCL well out, not only to prevent fratricide but to control CAS sorties, was clear in the mind of the corps artillery commander.[27] Deep operations with AH-64 attack helicopters did occur on the night of the 26th on Objective Minden, which straddled the

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[26]Grant M. Hales, "The Tactical Air Command and Operation Desert Storm: A Case Study of Tactical Aircraft Employment," Air Power History (Winter 1991): 46.

[27]VII Corps Fires AAR, 3.

current FSCL. An attempt to synchronize a joint attack with air assets did not come to fruition, the TACC choosing instead to shut off the area to fixed wing aircraft, possibly to prevent fratricide. The FSCL was moved out beyond the objective as the second AH-64 attack went in at 0300. The Iraqis became increasingly confused and disorganized during the ground offensive. FSCL management allowed fixed wing aircraft to continue attacks against targets of opportunity, while generally holding it out far enough to permit the divisions full use of their suite of weapons into the divisional deep area. This was not always successful as noted by the S-3 of an MLRS battalion supporting 3AD.

> On several occasions, firing elements were laid and ready to fire on Iraqi targets, only to have the mission ended because of problems coordinating airspace with the Air Force. Unique to this operation was the use of the fire support coordination line (FSCL) as a *restrictive* fire control measure, which was particularly vexing. Placing the FSCL close to the forward-line-of-own-troops (FLOT) necessitated clearing all fires with the Air Force. The time consumed in this process severely impeded the battalion's ability to respond.
>
> In one instance, the battalion was passed 10 targets while moving and told to fire when within range. Closing into position, 1-27 FA reported ready to fire with eight of the 10 targets in range and received instructions to stand by for airspace coordination. After waiting more than an hour, clearance was granted to fire on only two of the targets.[28]

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[28]Mark S. Jensen, "MLRS in Desert Storm," Field Artillery (August 1991): 33.

This experience, while perhaps a problem as 3AD closed to within the range of the current FSCL, demonstrates the importance of the placement of the FSCL. Using doctrinal FSCL permissive parameters, these problems would not have occurred, but given the restrictive nature of FSCL use in Desert Storm, it was critical that the FSCL be maintained beyond the range of organic divisional weapon systems. Corps target acquisition assets were capable of looking beyond the FSCL throughout the ground offensive, an ability that assisted in "getting the read" of Iraqi intentions. The Joint STARS downlink gave the corps a picture of the battlefield that no other corps has had during a conflict. Real time viewing of the corps area of operation as well as the area of interest are a significant addition to the target acquisition capabilities of a corps. Air allocations in the form of CAS were available to the lead maneuver units, and the FSCL locations facilitated the use and control of these assets. Finally, the corps planners made every effort to facilitate future operations by attempting to keep the FSCL far enough out to facilitate the operations of the maneuver units and protect them from air to ground fratricide while maintaining the ability of the air component to service targets. This was a difficult balancing act which was not reflective of the doctrinal intent of the FSCL.

FSCL use and placement during the ground combat phase for VII Corps, while not affecting the end result of decisive victory over the Iraqi forces arrayed in zone, did show signs of the restrictive requirements which had been placed on the corps. Several instances of artillery fires against Iraqi forces on the far side of the FSCL being delayed or canceled while coordination took place with Corps have been recorded. A permissive FSCL would have facilitated fires in these cases, but overall, the restrictions do not appear to have significantly altered the tempo or success of operations. This was due largely to the recognition of the corps that they must use the FSCL to their best advantage, especially considering that the Air Force did not want to have to coordinate their operations.[29] The most significant affect of FSCL placement during the final phase occurred when the VII Corps was unable to finish destruction of fleeing Iraqi forces as related in Chapter One. When General Horner established the theater wide FSCL and restricted aircraft from flying short of the FSCL, he prevented the VII Corps from blocking the Iraqi forces moving rapidly northward to escape the Coalition.

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[29]Cherrie interview, 9 March 1992.

COMPARISON

How then, does FSCL use in the VII Corps during Desert Storm, compare with the doctrinal intent described in chapter four? The predominant characteristic was the restrictive nature of this FSCM. Fires across the FSCL by surface to surface means were required to be coordinated with representatives of the air component prior to delivery. This treatment of the FSCL gave it the characteristics of two other FSCMs. First and foremost it was a restrictive fire line which prohibited fires across the line without coordination with the effected force. On the friendly side of the FSCL this was the corps, and the air component dutifully cleared all fires short of the FSCL with corps. On the far side of the FSCL this was the air component, and the corps cleared all fires through the TACC prior to delivery. The other characteristic was that of the old bomb safety line. Tactical aircraft could attack targets at will across this line, but could attack targets short of the line only when requested or cleared by the ground component. The Desert Storm Special Study Project concluded that the coordination requirement by the Air Force implied that the area beyond the FSCL was Air Force responsibility.[30]

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[30]Desert Storm Special Study Project, III-3-11.

With these characteristics in mind, and the placement of the FSCL along the Saudi Berm to open maximum freedom of operation for aircraft beyond the line, it becomes clear that the VII Corps Commander was hindered in his ability to fight deep operations to shape the battlefield for future close operations.

> We did not feel we had accomplished all we needed to. In hindsight it worked out fine. But it wasn't clean. We weren't sure all targets had been serviced and we were frustrated because we wanted to do it systematically.[31]

The corps commander was left with the ability to influence deep operations only through the target nomination process through ARCENT to CENTAF. But as BG Abrams indicated, BAI, which was AI in Desert Storm, was never something you could count on.[32]

AIRLAND BATTLE AND CORPS DEEP OPERATIONS

The bottom line, from the perspective of VII Corps, was that the corps commander had not been given the time, assets or opportunity to prosecute deep operations in accordance with AirLand Battle doctrine. The control of air

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[31]Cherrie interview, 9 March 1992.

[32]VII Corps Fires AAR, 2.

at CENTCOM level and the aggressive offensive air operations designed and prosecuted by General Horner in accordance with the guidance of the CENTCOM commander, made deep operations an operational level fight with the theater preparing the battlefield for ground offensive operations. The CENTCOM commander had established the goal of rendering the Iraqi army ineffective as a precondition to the initiation of ground offensive operations. The commencement of the land battle only after the battlefield had been properly prepared during the air campaign was intended to reduce coalition casualties, achieve maximum combat efficiency and minimize the prospects of a prolonged war.[33] But in setting this goal and turning over responsibility for the achievement of this goal to the J/FACC, the CENTCOM commander took away from the corps commanders a portion of their doctrinal fight. The FSCL was an undesirable FSCM with little utility within the context of the air battle being waged by CENTAF.

The frustration felt by VII Corps at not being able to conduct deep operations is captured in the fires after action report. It perhaps also captures the possible lack of realization on the part of the corps that deep operations

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[33]Report to Congress, 2-6 to 2-8.

were not their concern, at least prior to the initiation of the ground offensive, and that CENTCOM was setting the conditions for the land battle.

> [There is a] significant disconnect between USAF and Army views on use and meaning of various [FSCMs]. USAF views the area beyond the FSCL as their area of responsibility. [It is] extremely difficult to coordinate ATACMS and Apache attacks beyond [the] FSCL, within [the] Corps area of responsibility.[34]

Post conflict briefings by VII Corps stated that doctrine is solid, but some refinements in tactics, training and procedures is needed. These included better joint understanding of FSCMs, options for synchronization of close/deep operations and ways to integrate significantly improved corps deep capabilities (ATACMS, AH-64) with impressive air capabilities.[35] Similarly, the Desert Storm Special Study Project found that a lack of commonly understood joint fire support doctrine and parochial interpretations of FSCMs had caused significant problems for fire support coordination.[36] And at the heart of these issues is the use of boundaries and FSCMs to define

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[34]Corps Fires AAR

[35]VII Corps Artillery "Operation Desert Storm, The Artillery Fight" and "Air-Ground Operations, Operation Desert Storm" Briefings.

[36]Desert Storm Special Study Project, III-3-2 to III-3-3.

responsibility and control over portions of the battlefield. The FSCL "in no way establishes territorial jurisdiction for the air component commander, nor restricts fires by any fire support asset supporting the establishing ground commander."[37]

AIR/GROUND SYNCHRONIZATION

As described above, After Action Reports from Desert Storm are replete with examples of the inability of the air and ground components to effect coordination to synchronize their operations. What is especially distressing about this inability is that the architecture to command, control and coordinate as described in chapter one was in place with only minor modifications. The only significant modification was the use of the ABCCC to coordinate all air activity in the theater, and use should have significantly increased the ability to synchronize. The ASOC at the VII Corps main and tactical CPs had direct contact with the ABCCC and the ability to directly coordinate and deconflict (Figure 4-2). Used in tandem, Joint STARS and the ABCCC provided a great

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[37]Ibid., III-3-11.

Desert Storm Air Control System

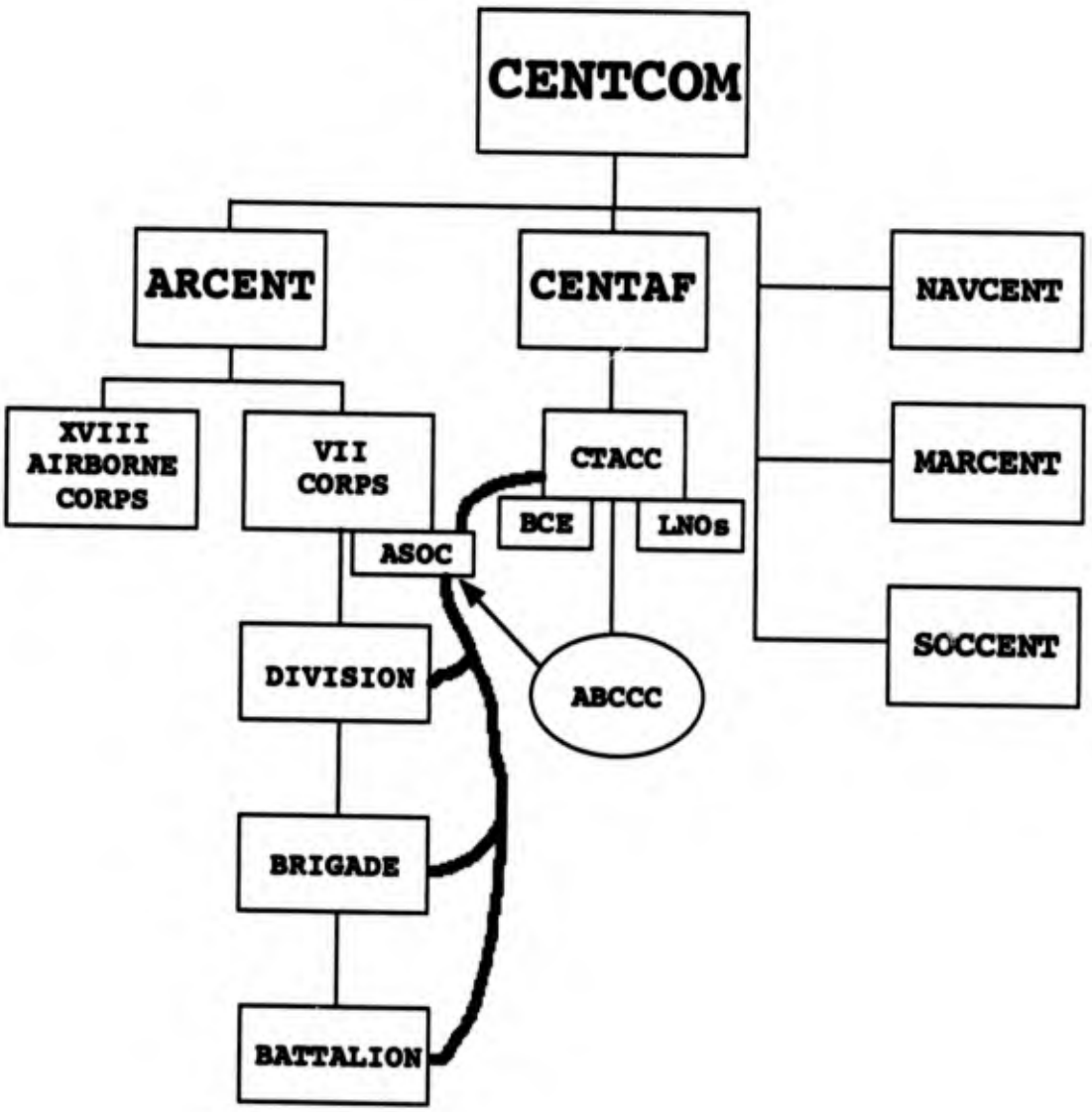

Figure 4-2

hunter/killer team at the operational level that could have provided the same capabilities to the corps commander.[38]

Interviews with LTG Horner following Desert Storm best describe the Air Force point of view. He indicated that apportionment was a myth and that everything was target driven. Apportionment was decided based on what targets were on the ATO and where they fell in relation to the FSCL.[39] The land components were then obviously faced with a no win situation. The FSCL had been located close to the FLOT to increase sorties against HPTs, but as long as targets were over the FSCL, they would be included in the theater AI campaign and the corps commander would get no sorties for his deep battle. Further, Horner believes that ground guys think that pushing the FSCL out further will result in them getting more sorties, when just the opposite is true. The natural tendency is for air to go where there are fewer control restrictions.[40] What the ground commanders really want is more input to the ATO with decisions on what targets are engaged in what sequence to support the concept of operation.

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[38]General Franks, interview quoted in U.S. Air Force, XOXWD, Memorandum, Subject: Trip Report from Joint Doctrine Center (JDC) visit to Desert Storm locations, 30 April 91.

[39]JDC Memorandum.

[40]Ibid.

The allocation of BAI to the Corps Commander for deep operations is not as emotional an issue if the Corps Commander is still achieving his deep fires objectives through the theater targeting process. Timely feedback on target effects also becomes an indispensable requirement as the corps refines targeting to continue striking HPTs in priority.

The FSCL issue for the Air Force appears to be one of control versus coordination. Less control for aircraft to allow them to coordinate only through air channels is their preferred method of operation. Synchronization of air and ground attack is practiced and achievable but requires additional controls and increases the danger of fratricide.

The Army perspective on FSCL use is also one of control versus coordination. The Army does not want to have control restrictions on deep battle capable systems that are the only systems the corps commander can count on for deep attack. Informing the air component of firing over the FSCL is fine, but waiting for a positive response that firing is cleared is not acceptable. One of the principle points arising from the Joint Doctrine Center trip was that the Army will resist any requirement to coordinate fires beyond the

FSCL in the form of ATACMS or attack helicopters with the JFACC.[41] Desert Storm has already set the precedent for FSCL use that many may view as a model for future doctrinal modification.

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[41]Ibid.

CHAPTER 5

> Air and ground commanders must be constantly on the alert to devise, and use, new methods of co-operation . . . . There can never be too many projectiles in a battle. Whether they are thrown by cannon, rockets, or recoilless devices is immaterial. The purpose of all these instruments is identical--namely, to deluge the enemy with fire. Nor is it necessary that these projectiles be discharged on the ground.[1]
>
> General George S. Patton, Jr., 1945

CONCLUSION

The use of the FSCL during Operation Desert Storm was not in accordance with established Army or Joint fire support doctrine, which specifically identify the FSCL as a permissive measure. The reason for this deviation appears to be the desire by the Air Force not to coordinate use of the deep operations area with the ground component, giving them defacto territorial jurisdiction beyond the FSCL. The management of battlefield preparation at theater level prior to initiation of the ground offensive made this a viable option from the air component perspective. Air controllers

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[1]George S. Patton, Jr., War as I Knew It (Cambridge: Riverside Press, 1947), 357.

find operations in a stressful environment simplified when no additional coordination is required with the ground component. An additional consideration for the air component was the desire to avoid fratricide.

The AirLand Battle corps commander has demonstrated that he now has the ability to engage targets with surface-to-surface systems in a domain previously exploited only by the Air Force. Previously, his deep operations (battlefield interdiction) were prosecuted by the Air Force using BAI sorties, IAW the priorities and targets provided by the corps targeting cell. Once air superiority or parity was achieved, the ground commander could expect an allocation of sorties to fight deep operations. This allocation would be generally acceptable to engage stationary targets which had been acquired, targeted and confirmed as still in place when the sortie is generated. But with mobile HPTs, as many which affect the corps close fight are, the corps commander wanted the ability to reach out and touch them immediately, to ensure their destruction. In Desert Storm, he was given that ability with ATACMS and attack helicopters. But with that ability came the realization that the gun-target line now moves directly through an area in which Air Force aircraft are frequently engaged in battlefield air interdiction

missions. These two categories of attack systems were intended to be complementary, with both used to shape the battlefield in the deep operations area, not to be totally separated in application. More frustrating to the corps commander, the distinction between theater operational sorties and corps tactical sorties (operational versus tactical fires) has become blurred and with finite attack systems, priorities most often went to the operational level commander. So even with the achievement of air supremacy in Desert Storm, the expected allocation of air sorties to wage deep operations at corps level never materialized. The corps commander is still capable of fighting deep operations, albeit limited, with organic assets, even without the expected allocation of sorties. But in Desert Storm, not only were the sorties not forthcoming, but an area of the battlefield that should have been his deep operations area was restricted to his attack unless coordinated and approved by the air component. The JFACC had realized that the "big sky, little bullet" theory[2] is of little comfort to a pilot who is already focused on not only his target but additionally on the enemy reactions to his presence. The

[2]"Big sky, little bullet" implies that the danger of striking an aircraft in the sky with a projectile lobbed from a ground system is exceedingly small when considering the vastness of the area used by the aircraft and the small size of the projectile.

corps commander found that although he had finally been provided with the assets to conduct complementary deep operations with organic and air component assets, both capabilities were effectively denied by no allocation of BAI sorties and the application of a non-doctrinal FSCM, which in tandem denied his ability to fight deep operations.

The control versus coordination parochialism in deep operations airspace management, and the American public's expectation of limited casualties on the battlefield, forces the reevaluation of our doctrinal precepts of FSCMs and the methods by which fires are intended to be coordinated on the battlefield to achieve synergism with air, ground and sea weapons.

VALIDITY OF DOCTRINE

It is possible to adequately address the concerns of fratricide within the structure of current FSCMs and boundaries, yet in so doing, a much greater degree of sophistication must be practiced to allow joint attack of targets beyond the FSCL. The easy approach has been physical removal of systems from the path of the projectile when a target is located. This requires a considerable amount of

clearance and coordination as was practiced and demonstrated during Desert Storm. It is also possible to accomplish deep operations airspace management with the current suite of command, control and communications facilities and equipment.

Army FSCM doctrine, and by extension joint doctrine, for it closely mirrors Army definitions, has shown weaknesses in battlefield application that were handled in Desert Storm by new definitions of use and employment. The predominant weakness in FSCL doctrine is the treatment of an area of the battlefield predominantly used by aircraft as an unrestricted firing area for ground based systems. This deliberate interpretation and treatment of a portion of the battlefield is anathema, for all of our FSCMs have their genesis in the desire to reduce friendly casualties while controlling the effects of all types of weapons systems within the parameters of maneuver boundaries. While parochialism may blind each service to the reality of the situation, the solutions as applied in Desert Storm met this significant weakness.

The Army and Joint definition of the FSCL are satisfactory as long as the FSCL is placed at the limit of the organic weapons capabilities of the corps, and additional assistance for deep operations shaping can be expected in the

form of BAI sortie allocations from the JFACC. The corps commander has defined his area of operation as the area short of the FSCL. The FSCL then becomes a dividing line between corps tactical operations and EAC operational battle. The FSCL delineates the outer edge of the corps deep battle area and defines an area of operation in which all fire support must be coordinated in accordance with the corps commander's priorities. If the attack is in the corps area, it is coordinated with the corps. Corps target acquisition systems are oriented on the corps area of operation in accordance with the corps commander's priorities, and the decide, detect, deliver methodology has taken the corps commander's guidance and laid out the mechanisms for shaping the fight to ensure the success of the corps.

Our doctrine for the FSCL was suitable when BAI was the only attack asset the corps commander had for deep operations and he could expect an allocation of BAI sorties for tactical fires. With the increased capabilities inherent in new target acquisition and attack systems, the Army has grown beyond the intent and definition of the FSCL. Our FSCM doctrine requires changes to adequately address the new generations of equipment and weapons that form the framework to pursue AirLand Battle, and soon, AirLand Operations.

VALIDITY OF FSCL MODIFICATIONS IN DESERT STORM

The FSCL was only a symptom of the larger joint problems of control versus coordination of indirect fires and target attack and the establishment of boundaries to define and control responsibilities within a given three-dimensional area on the battlefield. During Desert Storm, the FSCL became a "boundary", dividing the battlefield into an area controlled by the Army short of the FSCL, and controlled by the Air Force beyond the FSCL. This control also extended to the development and coordination of targets. Although clearly a point of contention for many Army personnel, the end result achieved is the most important consideration when examining this use of an FSCL. The end result was the successful preparation of the battlefield, by offensive air operations fought to a large extent without appropriate coordination with the ground components. This preparation achieved the results desired by Corps Commanders as demonstrated by their forces attaining decisive ground victory with minimal casualties on an extremely lethal battlefield. Success is therefore defined as the attainment of military victory by joint and combined theater forces with minimal casualties and relative efficiency.

The treatment of the FSCL as a restrictive FSCM, in essence a boundary, was successful during Desert Storm. It is important, however, not to draw the wrong conclusions from this success. Although successful, this use merely reinforced some joint doctrinal problems that must be recognized and resolved. Drawing conclusions on the successful non-doctrinal use of the FSCL is dangerous for several reasons. First, as noted above, although Desert Storm is considered a military victory, the achievement of this victory may bear no resemblance to the campaigns required to achieve victories in future conflicts against indeterminate foes. The capabilities and warfighting expertise of future enemies may be inferior or comparable or exceed Iraqi capabilities and therefore provide a significant challenge as compared to the overwhelming success noted by allied forces in the gulf. The time available for allied forces to prepare for a future conflict may be limited, and the ability to modify existing doctrine necessarily impossible due to the inability to disseminate and train to the changes at all required levels. If faced with the prospect of a "come as you are" war, the forces must come trained and with a common understanding of joint doctrinal precepts. This is the only way to ensure success for forces that must fight as they enter the theater.

There are, however, several conclusions to be drawn from Desert Storm that are valid for consideration of joint doctrinal modification or addition. First, there must be joint doctrinal agreement on the use and meaning of fire support coordination measures and most specifically the FSCL. Secondly, the engagement of targets beyond the FSCL by surface-to-surface fires must be coordinated and cleared with the supporting air component to eliminate the danger of fratricide to aircraft. Third, acquisition, targeting and attack responsibilities must be clearly defined at the various tactical and operational levels, not only to prevent duplication of effort and squandering of scarce resources but to ensure focus on all elements of the enemy across the breath and depth of the theater of operation and synchronization of effort. Fourth, authority for establishment, and the process for changing, reporting and coordinating locations of FSCLs must be standardized and made more timely.

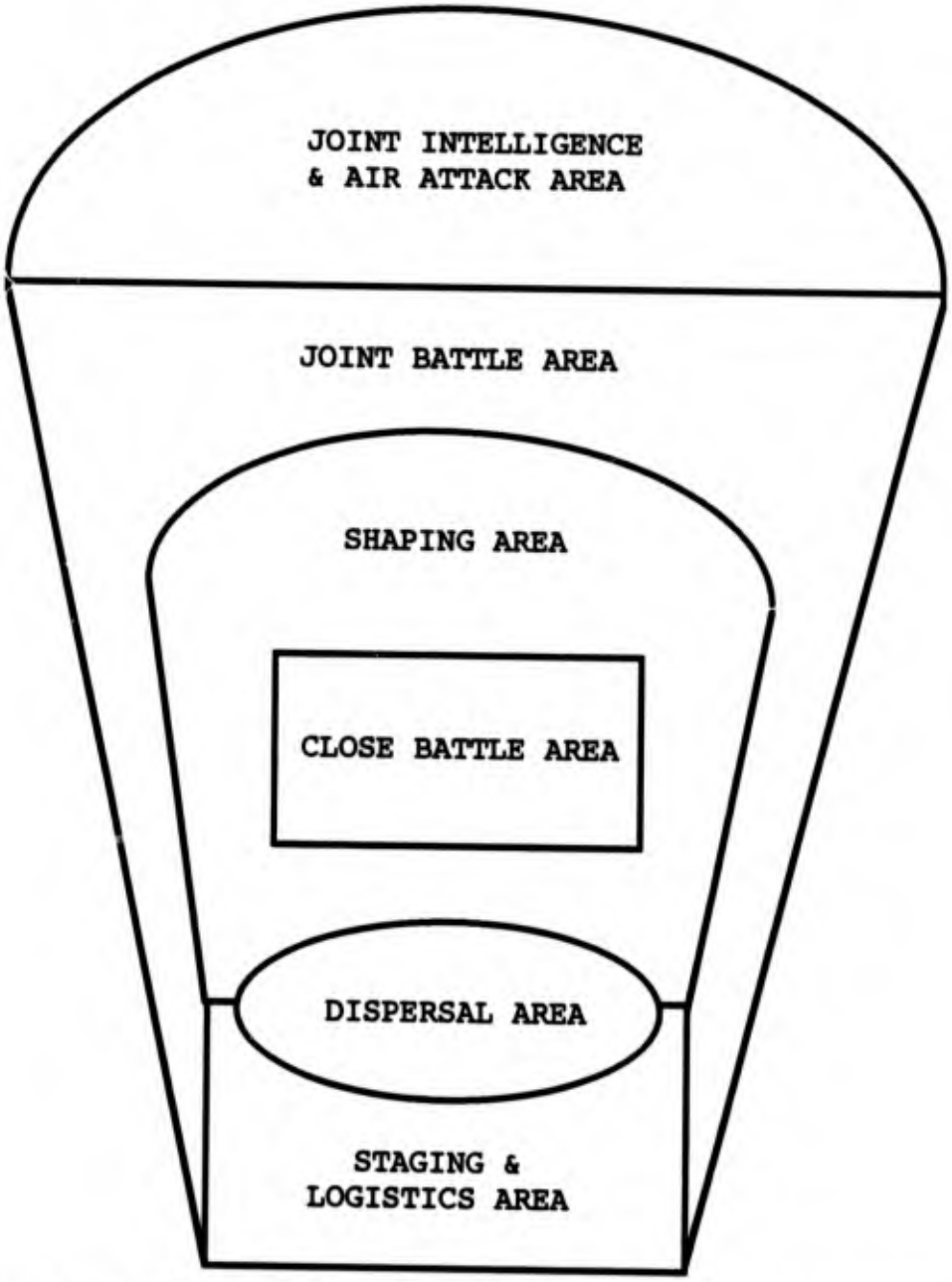
IMPLICATIONS FOR AIRLAND OPERATIONS

Examination of the evolving operational concept of AirLand Operations presents a great concern to the informed warfighter who understands the implications of joint

operations which are a key condition of AirLand Operations. Although often expected to be nonlinear, the extended battlefield is defined by several areas that define activities and the enemy rather than terrain (Figure 5-1).

The areas of primary importance to the corps are the joint battle area, the shaping area and the close battle area. The joint battle area is where Army and Air Force capabilities overlap and the conditions for decisive operations must be established. Focusing joint fires and intelligence will set the conditions for decisive maneuver in the close battle area. Clearly, if Army and Air Force systems are jointly involved in target acquisition and attack in this area, a very sophisticated coordination and synchronization effort must take place. A single fire support coordinator must be responsible for the integration of all joint systems in this joint battle area fight. His synchronization effort will be made extremely difficult on a non-linear battlefield, but must somehow include boundaries and FSCMs which clearly define control and responsibility. Comparatively, this joint battle area could be considered the area where the EAC and corps deep operations overlap. It is at the depth of the Army weapons systems, which currently include ATACMS and attack helicopters, but in the future will

AIRLAND OPERATIONS EXTENDED BATTLEFIELD



(Extracted from TRADOC PAM 525-5, AirLand Operations)

Figure 5-1

include additional long-range smart and brilliant weapons. The shaping area must be large enough to locate and develop the enemy situation, continuing to set the conditions for the ensuing close battle. A corps would consider this area the deep operations area where the corps commander would complete the shaping of the battlefield through the engagement of HPTs that complement his concept of close operations. This area also requires a single fire support coordinator to control and synchronize all lethal and non-lethal fires. Allocated and organic assets will be controlled and synchronized to set the conditions for decisive maneuver. This FSCOORD must also operate within boundaries and FSCMs that clearly delineate control and responsibility for the coordination of fires in a specific area.

The critical point to be resolved for AirLand Operations from a fire support standpoint therefore is the establishment of a single coordinator or manager of all fires at each echelon within the theater. The color of the uniform is immaterial as long as one individual has the responsibility, ability and authority to synchronize all available assets into the campaign. And even on a non-linear battlefield, boundaries and/or FSCMs must provide control and responsibility for the synchronization of fire and maneuver

to achieve decisive results. Current FSCMs do not adequately address all of the requirements of non-linear, lethal operations on the battlefield of the future.

OPTIONS

There are four options for dealing with the FSCL problems which occurred during Desert Storm. The first and easiest is to ignore the problem of the FSCL and the bigger issue of control and coordination of which it is just a symptom. This assumes that the next time US forces must deploy to a joint fight, the use of the FSCL will work out in the end to provide a satisfactory resolution to the conflict.

The second option is to recognize that a joint problem exists, but that the use of the FSCL as currently described in doctrine is correct. The solution is to then ensure that joint fire support doctrine supporting this FSCL use is published and then trained by all joint members. VII Corps had frequently trained in BCTP to doctrine with the supporting air component in Europe and were frustrated to find that in the CENTCOM theater of operation, the air component was not following established doctrine. Independent service interpretations are thus resolved in favor of the

joint doctrine which assumes that the FSCL can be a viable and necessary FSCM for AirLand Battle. This use of current doctrine places the burden on the Air Force to clear aircraft from the path of surface-to-surface fires immediately upon notification of intent to fire by a corps.

The third option is to recognize that a joint problem exists which the FSCL is incapable of adequately addressing by its current interpretation and use. The solution might require an adjustment in interpretation and definition to form a doctrinal basis which will resolve the joint problems of fires in the deep operations area. This new definition would recognize the incongruity of an FSCM which is designed to control and expedite fires, yet creates a situation in which uncoordinated ground delivered fires share airspace and endanger aircraft conducting interdiction missions. This requires that the definition and doctrine be changed to require coordination and clearance of surface-to-surface fires beyond the FSCL with the supporting air component.

The fourth option is to recognize that a joint problem exists which the FSCL is incapable of addressing in any form, and that the FSCL should be eliminated from the lexicon of US warfighting doctrine. Broader joint solutions

are then required to address the division of the battlefield into areas within which complementary systems are controlled by a single commander to achieve decisive results on the battlefield.

RECOMMENDATION

The FSCL is merely a symptom of a larger joint fires issue that requires agreement between all services to be resolved. This thesis was concerned with the tactical and operational use of the FSCL in VII Corps during Desert Storm and the impact of its use on air and ground operations, yet has hopefully revealed the more significant joint fires issues which demand investigation and resolution in joint doctrine.

From an Army perspective, the current definition of the FSCL is adequate if applied doctrinally, providing a satisfactory capability to the corps commander to shape the close battle through deep operations. This requires that the FSCL be placed at the limit of corps organic attack systems and that the corps be allocated BAI to assist in the shaping of the battlefield. To make this interpretation more feasible suggests that an additional FSCM be added to

distinguish between division and corps deep operations. Corps in training and war have designated a line (the battlefield coordination line in Desert Storm) which delineates planning and execution responsibilities for acquisition and attack of targets between division and corps.

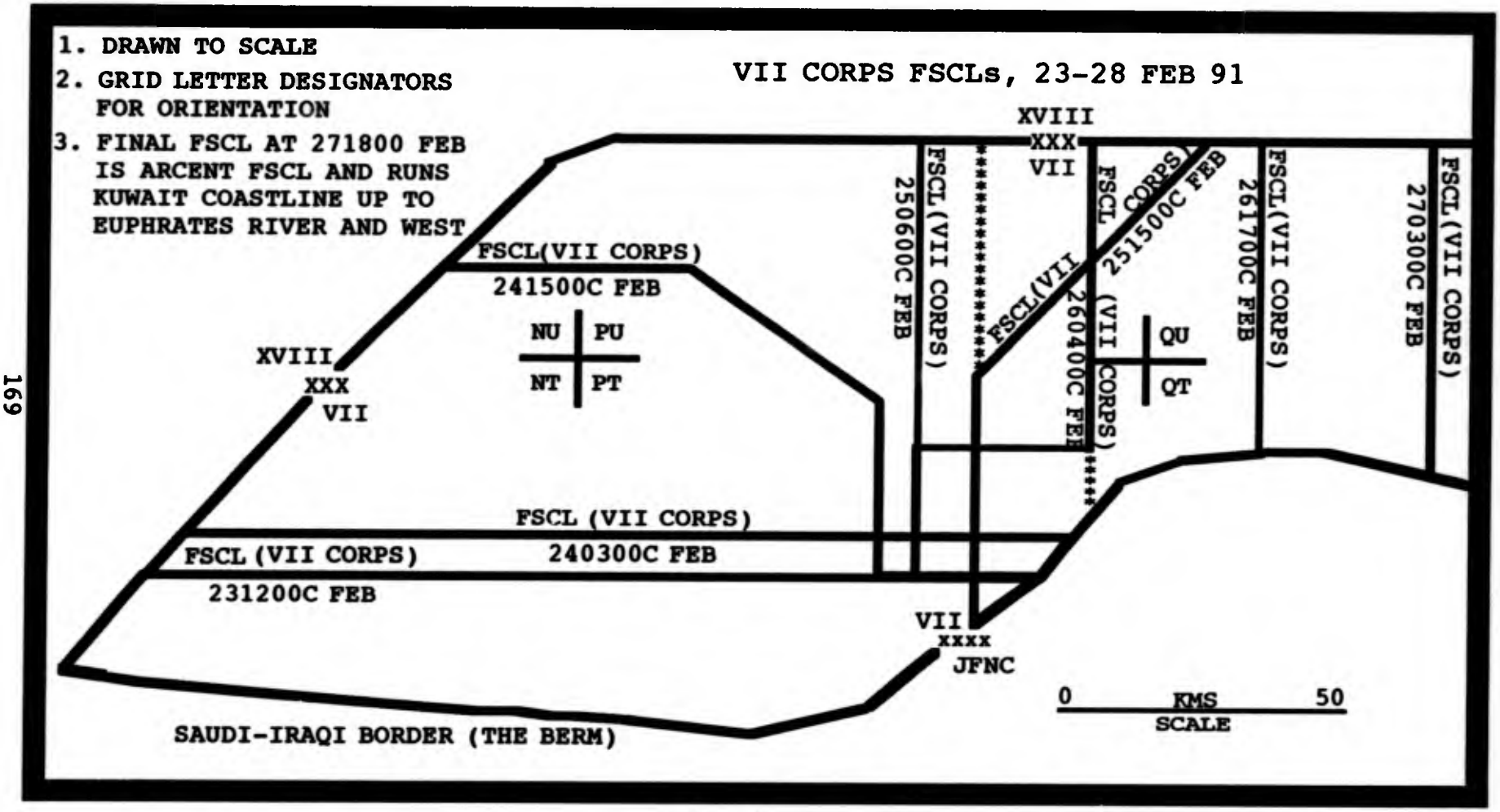
With the FSCL at the limit of Army attack systems ranges, the air component would have full control of the airspace beyond the FSCL. In the event the corps commander might be required to engage targets beyond the FSCL, he would coordinate with the air component. Short of the FSCL, the corps commander would own and coordinate the ground and airspace, and all sorties into this area would be coordinated through the BCE to the A^2C^2 element at corps. The corps FSCOORD would be the controller and coordinator of all fires into the corps area of operation based on the priorities established by the corps commander. This assumes that the theater commander is willing and able to allocate adequate sorties to the corps commander to shape the deep operations area and that the theater commander is also willing to coordinate through the corps to deliver operational fires into the corps area of operation as necessary to meet theater fires objectives.

From an Air Force perspective this solution is feasible, dependent on the status of the counterair campaign, enemy ground to air capabilities, priorities established by the theater commander to meet his campaign objectives, and the assurance of coordination of fires beyond the FSCL. But is this the right solution to satisfy the FSCL dilemma?

I would submit that it is not, and that the FSCL should be defined differently. The use of FSCMs to open up areas to permissive fires is an outdated concept that was based on linear battlefields and Army weapon systems with minimal range which could be easily separated in time or space from aircraft engaged in deeper operations. The increased range and lethality of weapon systems available to the corps commander, mandated by the interpretation of deep operations against a Warsaw Pact type aggressor in AirLand Battle doctrine, have taken US combat forces to a new level of capability. This capability, coupled with the potential for nonlinear conditions described in AirLand Operations, militate against the current FSCL definition. The FSCL must include in doctrinal application the <u>requirement</u> for all surface-to-surface fires beyond the FSCL to be coordinated and cleared with the supporting air component. Corps Commanders should specifically define three dimensional areas

of the battlefield in which they will fight close, deep and rear operations that support the achievement of the objectives specified by their higher commanders. This would necessitate some assurance from the theater commander that the corps commander could depend upon the allocation of air sorties to complement his operations. The intelligence and attack systems that would permit a corps commander to exercise this concept exist today, and the future systems that are scheduled for near term deployment only serve to complement this capability.

The ability to achieve common warfighting goals through the teamwork of the joint partners is a critical capability which US forces must learn to exercise with greater precision as the armed forces are downsized. Synchronization of all the systems available in the joint arena during future combat operations can be achieved only through agreement to joint warfighting doctrine and training by the joint team members. Unity of effort and unity of command are indispensable components of success, and delineation of specific areas of the battlefield by boundaries, unfettered by vague FSCMs, will ensure that commanders are capable of fighting and winning in AirLand Battle, and soon, AirLand Operations.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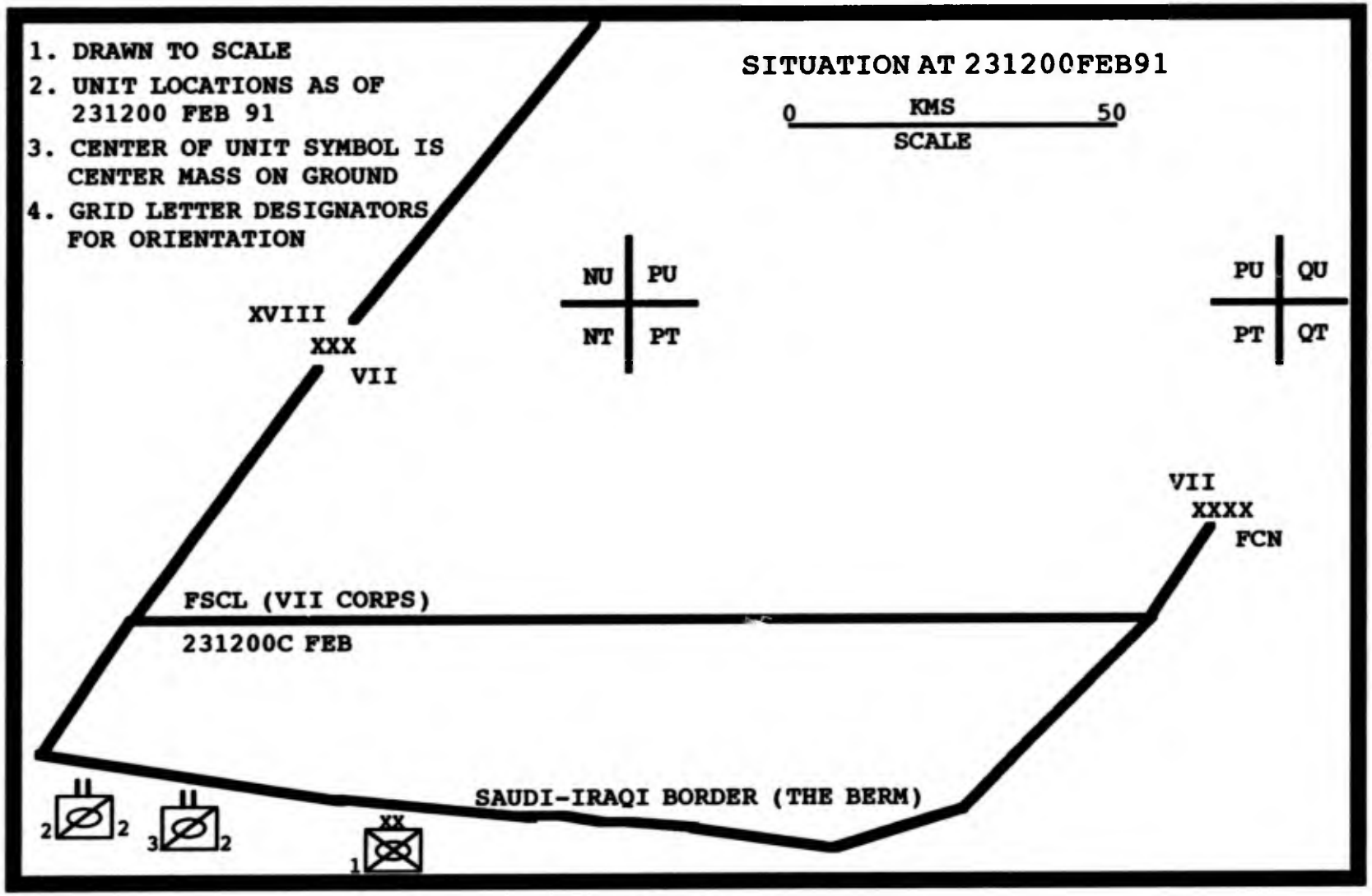
Map A-1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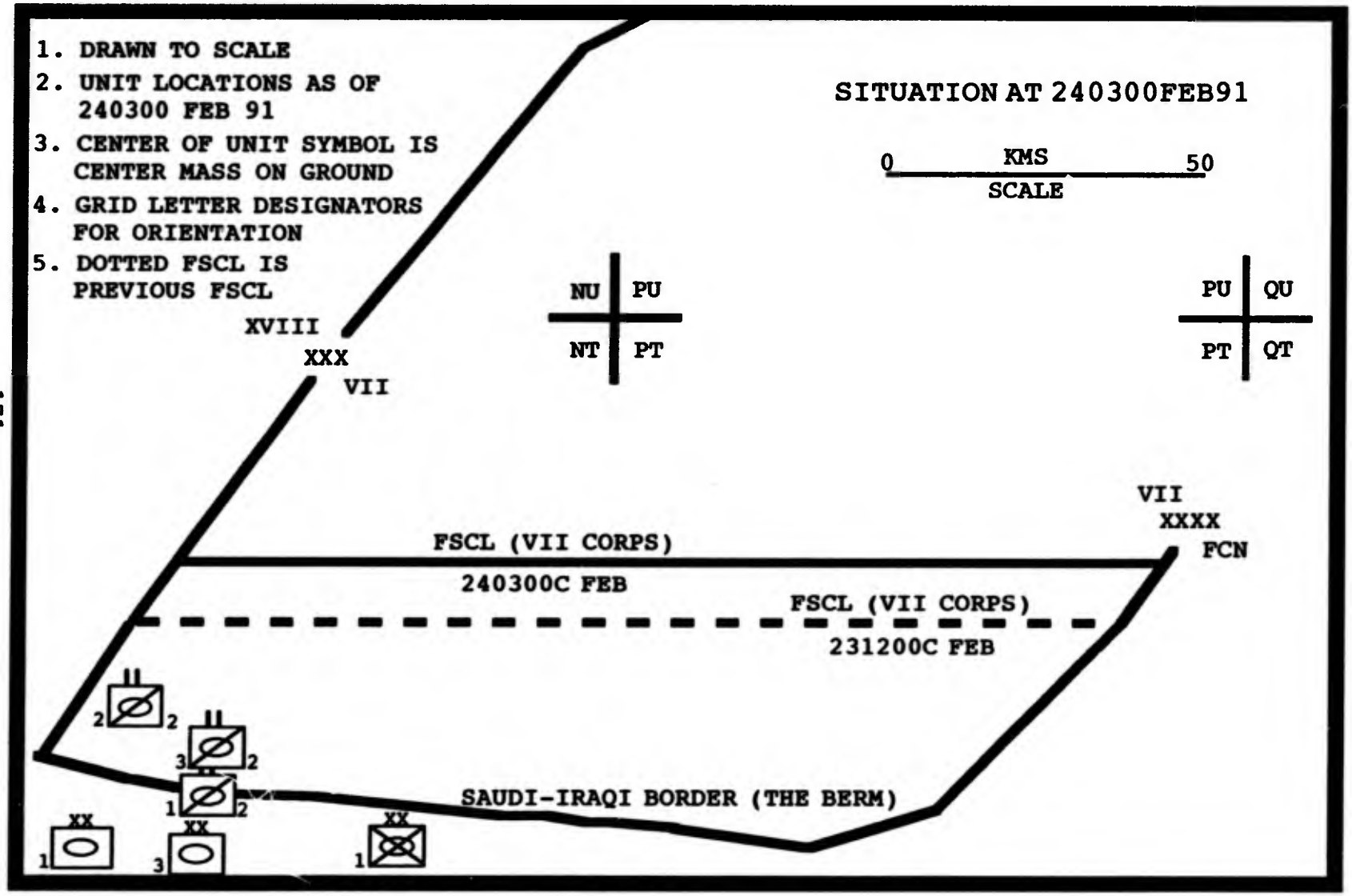
Map A-2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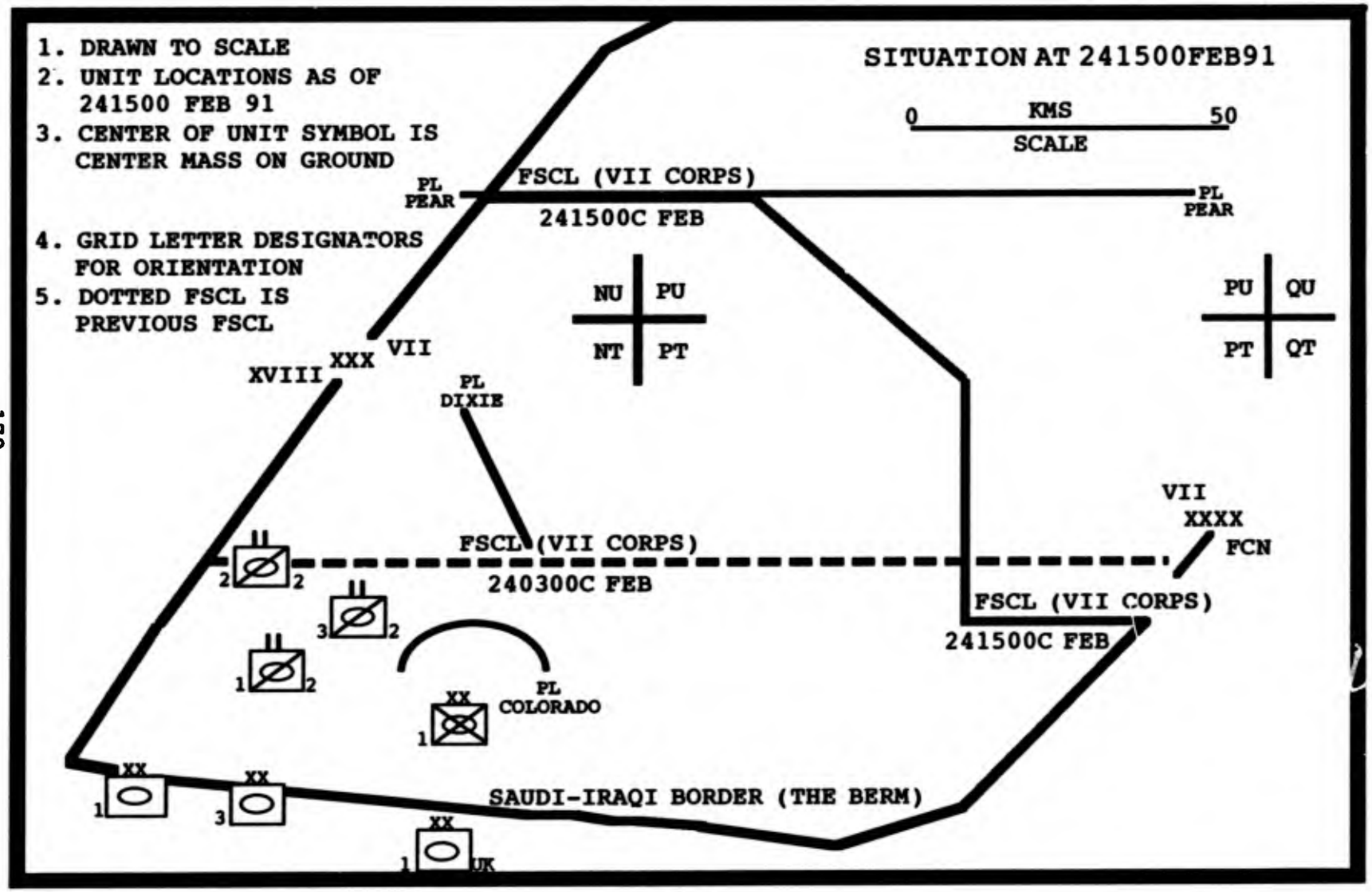
Map A-3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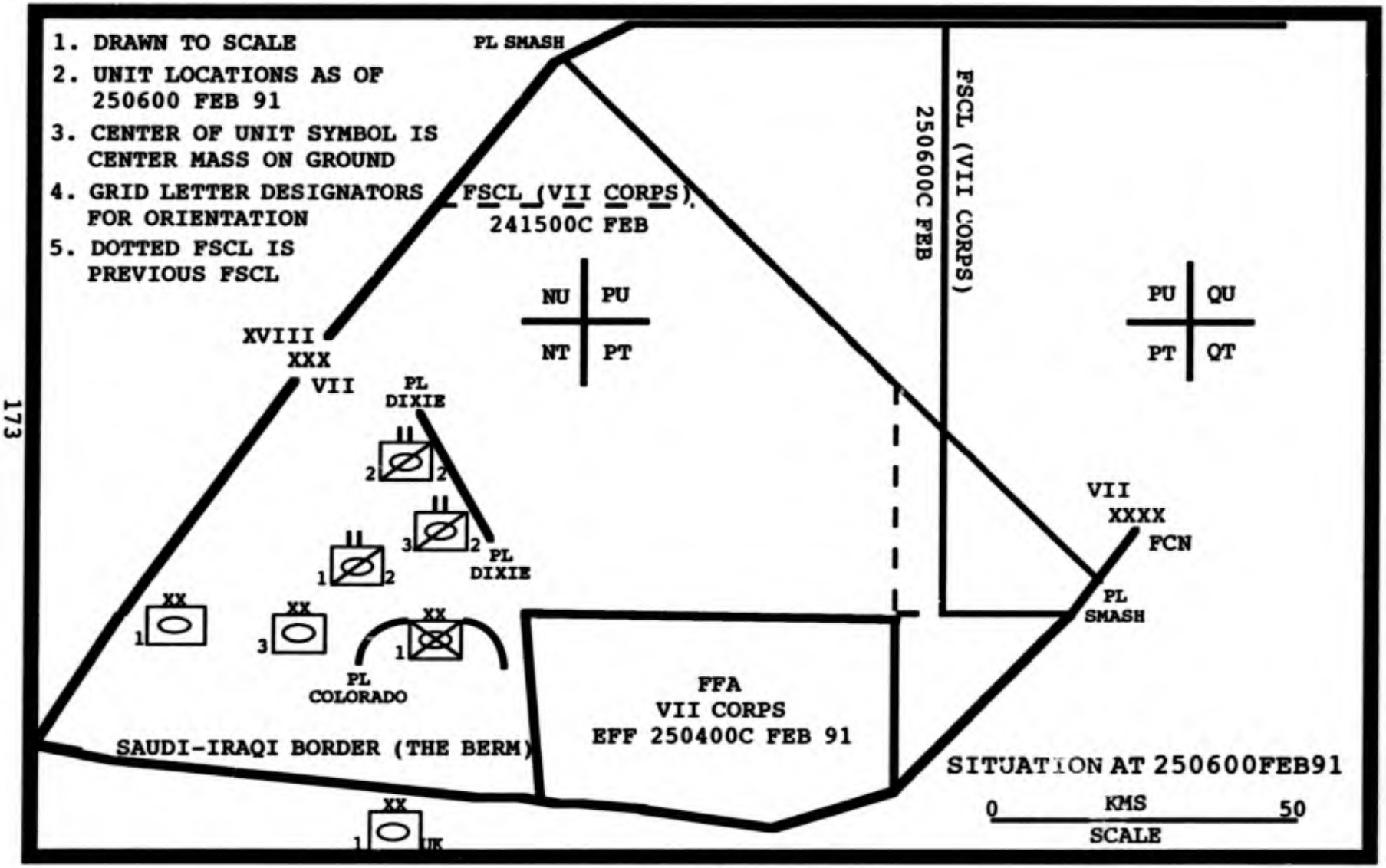
Map A-4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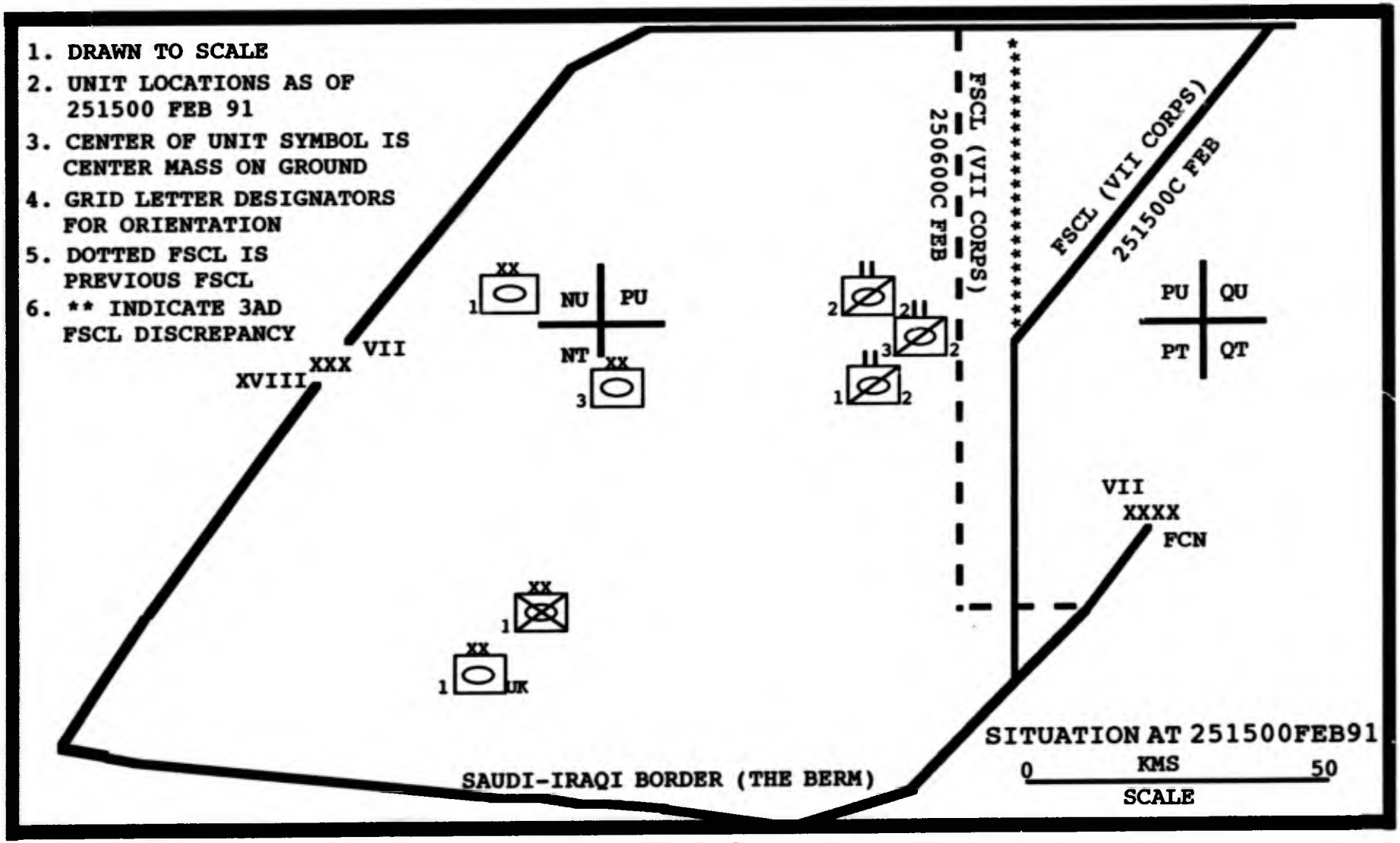
Map A-5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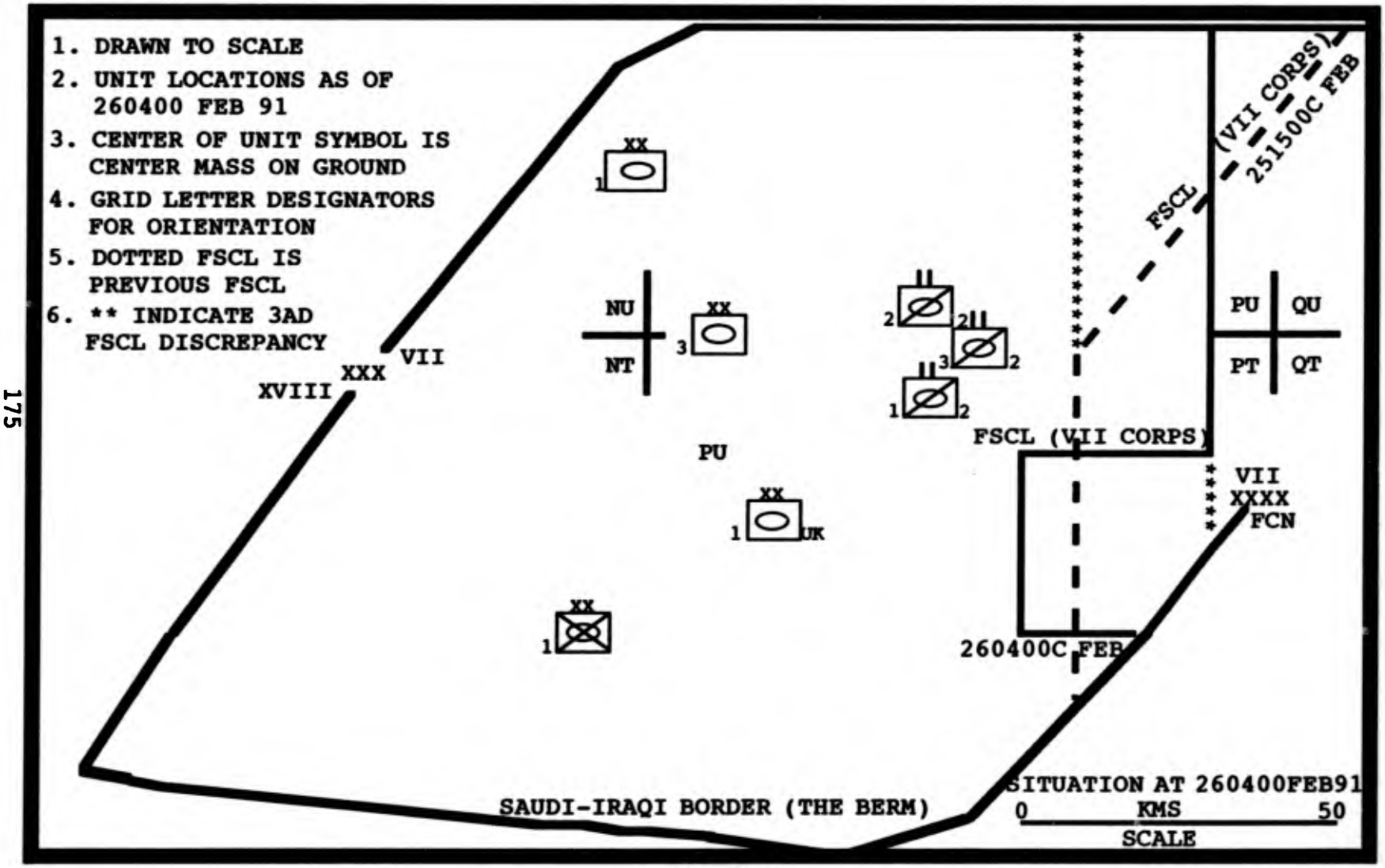
Map A-6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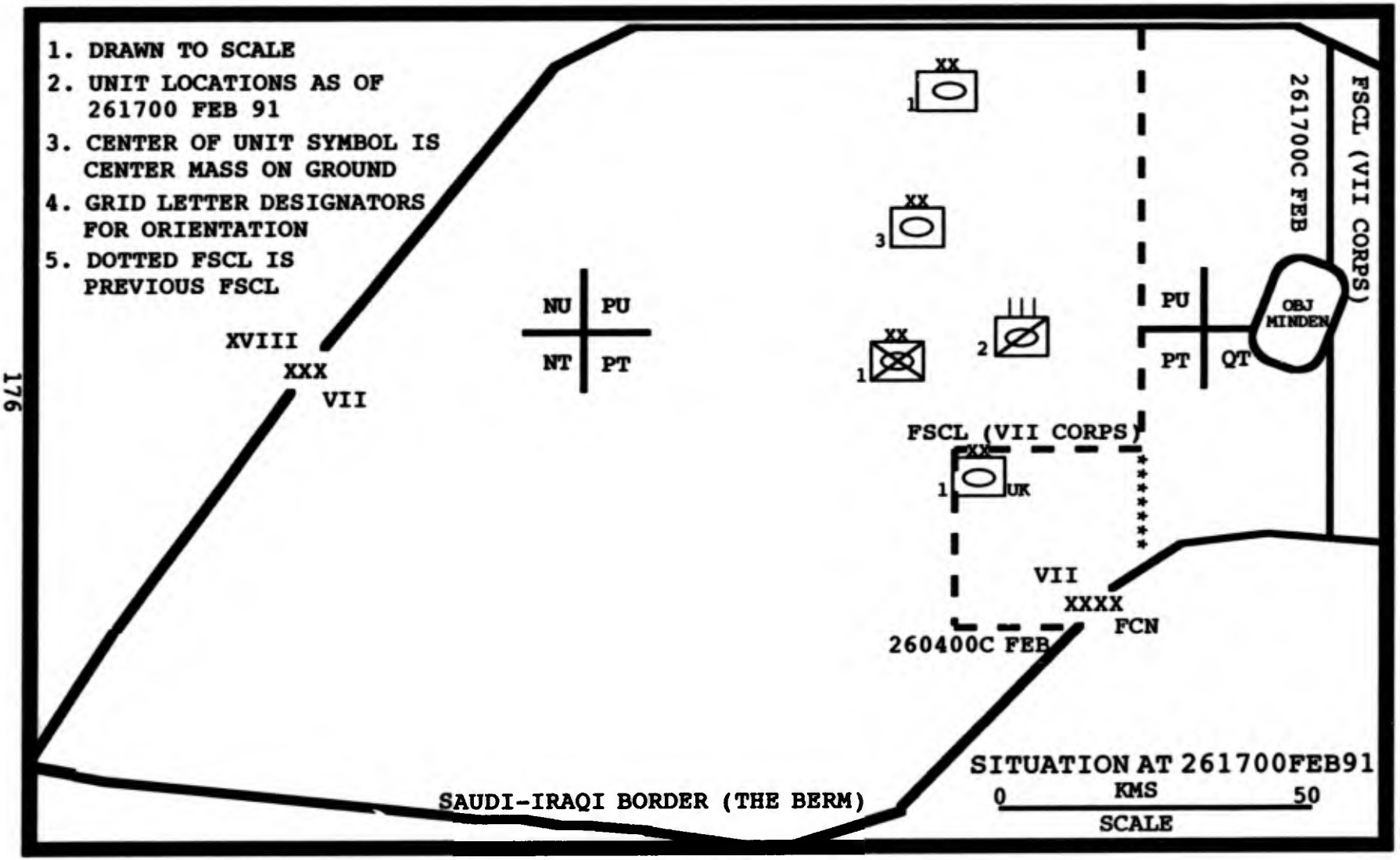
Map A-7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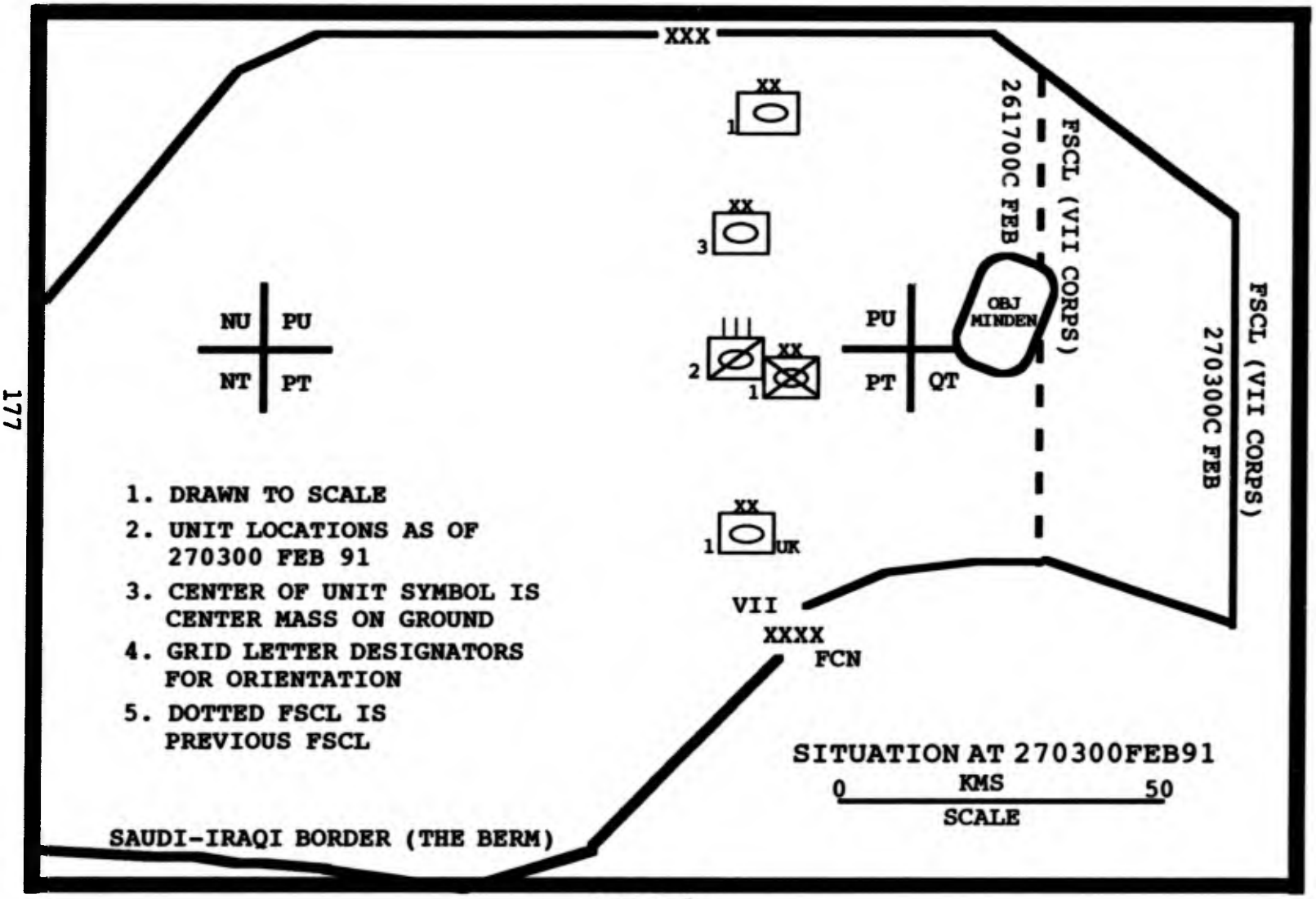
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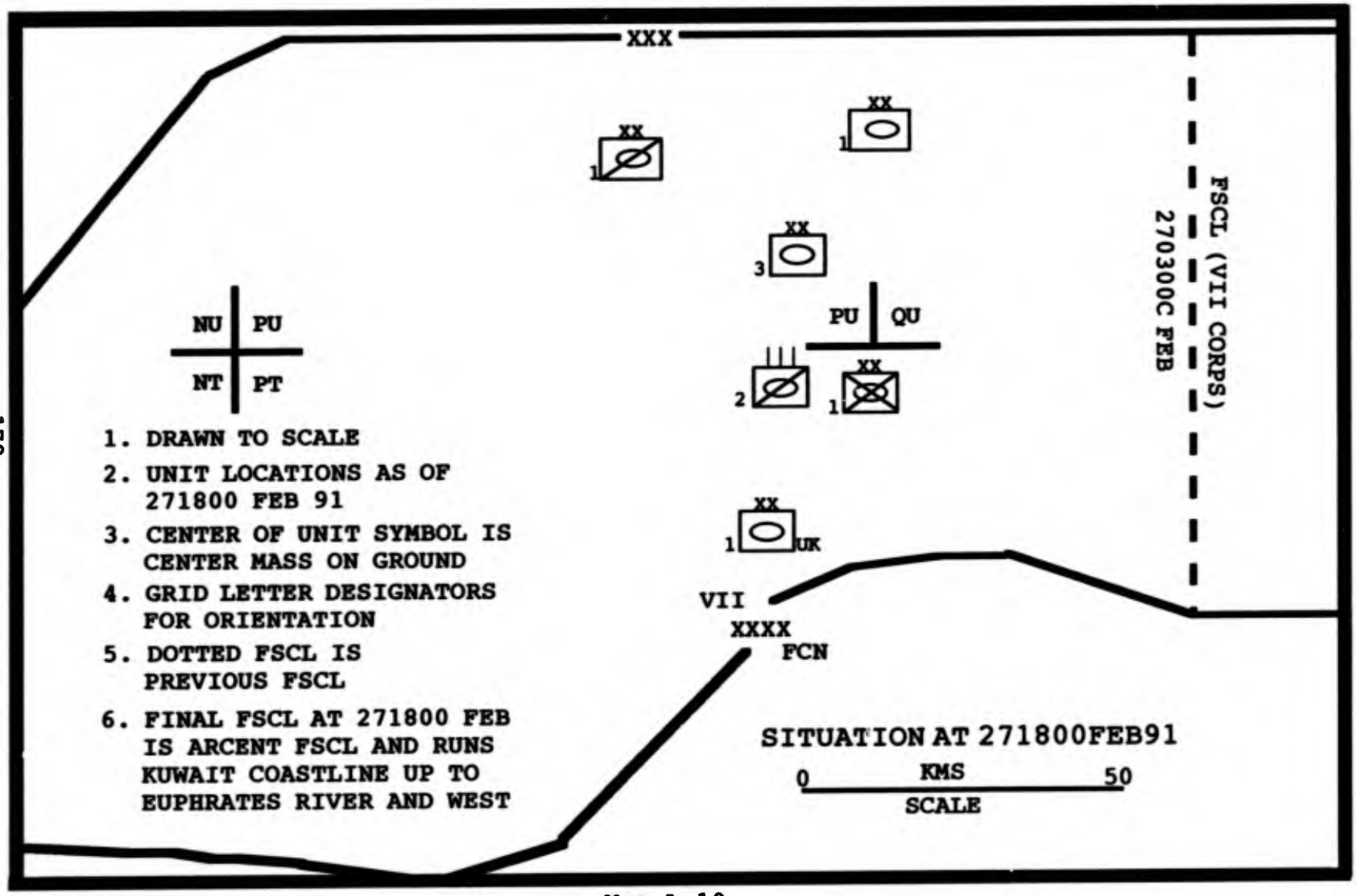
Map A-9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Map A-10

GLOSSARY OF ACRONYMS

ABCCC	Airborne Battlefield Command and Control Center
ACC	Air Component Commander
AI	Air Interdiction
ALB	AirLand Battle
ARCENT	Army Component Central Command
ASOC	Air Support Operations Center
ATACMS	Army Tactical Missile System
ATO	Air Tasking Order
A^2C^2	Army Airspace Command and Control
BAI	Battlefield Air Interdiction
BCE	Battlefield Coordination Element
BCTP	Battle Command Training Program
CALL	Center for Army Lessons Learned
CAS	Close Air Support
CENTAF	Central Air Force Component Command
CENTCOM	US Central Command
CFL	Coordinated Fire Line
CP	Command Post
CTACC	Combined Tactical Air Control Center
CTOC	Corps Tactical Operations Center
C^3CM	Command, Control & Communications Countermeasures
DOD	Department of Defense
EAC	Echelons Above Corps
EW	Electronic Warfare
FFA	Free Fire Area
FLOT	Forward Line of Own Troops
FM	Field Manual
FSCL	Fire Support Coordination Line
FSCM	Fire Support Coordinating Measure
FSCOORD	Fire Support Coordinator
FSE	Fire Support Element
HPT	High-Payoff Target
HQ	Headquarters
IPB	Intelligence Preparation of the Battlefield

JCS	Joint Chiefs of Staff
JFACC	Joint Forces Air Component Commander
JFC	Joint Force Commander
Joint STARS	Joint Surveillance Target Attack Radar System
KTO	Kuwait Theater of Operation
METT-T	Mission, Enemy, Terrain, Troops, Time Available
MI	Military Intelligence
MLRS	Multiple Launch Rocket System
NATO	North Atlantic Traty Organization
NFA	No Fire Area
NFL	No Fire Line
REFORGER	Return of Forces to Germany
RFA	Restrictive Fire Area
RFL	Restrictive Fire Line
RIPL	Reconnaissance and Interdiction Planning Line
RPV	Remotely Piloted Vehicle
SIGINT	Signals Intelligence
SLAR	Side Looking Airborne Radar
STANAG	Standardization Agreement
TACAIR	Tactical Air Support
TACC	Tactical Air Control Center
TACS	Tactical Air Control System
UAV	Unmanned Aerial Vehicle
VHF	Very High Frequency

BIBLIOGRAPHY

BOOKS

Association of the United States Army Special Report, The US Army in Operation Desert Storm. Arlington: Association of the United States Army, 1991.

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

House, Jonathan M. Toward Combined Arms Warfare: A Survey of Twentieth Century Tactics, Doctrine and Organization. Combat Studies Institute, Research Survey Number 2. Fort Leavenworth: US Army Command and General Staff College, 1984.

Ott, David E. Vietnam Studies, Field Artillery, 1954-1973. Washington DC: US Government Printing Office, 1975.

Shrader, Charles R. Amicide: The Problem of Friendly Fire in Modern War. Combat Studies Institute, Research Survey Number 1. Fort Leavenworth: US Army Command and General Staff College, 1982.

US News and World Report. Triumph Without Victory. New York: Random House, 1992.

GOVERNMENT PUBLICATIONS

US Department of Defense. Conduct of the Persian Gulf Conflict, An Interim Report to Congress. Washington DC: US Government Printing Office, 1991.

_____. Joint Chiefs of Staff Publication 0-1, Basic National Defense Doctrine. (Proposed Final Pub) Washington DC: Office of Joint Chiefs of Staff, 1991.

_____. Joint Chiefs of Staff Publication 1-01, Joint Publication System Joint Doctrine and Joint Tactics, Techniques, and Procedures Development Program. Washington DC: Office of Joint Chiefs of Staff, 1988.

_____. Joint Chiefs of Staff Publication 1-02, Department of Defense Dictionary of Military and Associated Terms. Washington DC: Office of the Joint Chiefs of Staff, 1989.

_____. Joint Chiefs of Staff Publication 3-03, Doctrine for Joint Interdiction Operations. (Test Pub) Washington DC: Office of the Joint Chiefs of Staff, 1990.

_____. Joint Chiefs of Staff Publication 3-03.1, Doctrine for Joint Precision Interdiction (JPI). (Proposed Final Pub) Washington DC: Office of the Joint Chiefs of Staff, no date.

_____. Joint Chiefs of Staff Publication 3-09, Doctrine for Joint Fire Support. (Final Draft) Washington DC: Office of the Joint Chiefs of Staff, 1991.

_____. Joint Chiefs of Staff Publication 3-52, Doctrine Washington DC: Office of the Joint Chiefs of Staff, 1991.

US Air Force. Basic Aerospace Doctrine of the United States Air Force. Air Force Manual 1-1. Washington DC: US Government Printing Office, 1984.

_____. Mission Employment Tactics, Tactical Employment, Forward Air Controller (FAC). Multi Command Manual 3-1, Volume VIII. Washington DC: Department of the Air Force, 1988.

US Army. Fire Support in the AirLand Battle. Field Manual 6-20. Washington DC: US Government Printing Office, 1988.

_____. Fire Support in Combined Arms Operations. Field Manual 6-20. Washington DC: US Government Printing Office, 1984.

_____. Fire Support in Combined Arms Operations. Field Manual 6-20. Washington DC: US Government Printing Office, 1983.

_____. Fire Support in Combined Arms Operations. Field Manual 6-20. Washington DC: US Government Printing Office, 1977.

_____. Field Artillery Tactics and Operations. Field Manual 6-20. Washington DC: US Government Printing Office, 1973.

_____. Field Artillery Tactics and Technique. Field Manual 6-20. Washington DC: US Government Printing Office, 1958.

_____. Field Artillery Tactics and Technique. Field Manual 6-20. Washington DC: US Government Printing Office, 1953.

_____. Field Artillery Tactics and Technique. Field Manual 6-20. Washington DC: US Government Printing Office, 1948.

_____. Field Artillery Tactics. Field Manual 6-20-1. Washington DC: US Government Printing Office, 1965.

_____. Field Artillery Tactics. Field Manual 6-20-1. Washington DC: US Government Printing Office, 1961.

_____. Field Artillery Techniques. Field Manual 6-20-2. Washington DC: US Government Printing Office, 1970.

_____. Field Artillery Techniques. Field Manual 6-20-2. Washington DC: US Government Printing Office, 1962.

_____. Tactics, Techniques and Procedures for the Targeting Process. Field Manual 6-20-10. Washington DC: US Government Printing Office, 1990.

_____. Tactics, Techniques and Procedures for Fire Support for Corps and Division Operations. Field Manual 6-20-30. Washington DC: US Government Printing Office, 1989.

_____. Tactics, Techniques and Procedures for Fire Support for Brigade Operations (Heavy). Field Manual 6-20-40. Washington DC: US Government Printing Office, 1990.

_____. Intelligence and Electronic Warfare Operations. Field Manual 34-1. Washington DC: US Government Printing Office, 1987.

_____. Corps Operations. Field Manual 100-15. Washington DC: US Government Printing Office, 1989.

_____. Corps Operations Tactics and Techniques. Field Manual 100-15-1. (Unedited Coordinating Draft). Ft. Leavenworth: Combined Arms Center, 1991.

_____. Army Airspace Command and Control in a Combat Zone. Field Manual 100-103. Washington DC: US Government Printing Office, 1987.

_____. Operational Terms and Symbols. Field Manual 101-5-1. Washington DC: US Government Printing Office, 1985.

US Marine Corps. Fire Support Coordination. Fleet Marine Force Manual 7-1. Washington DC: Department of the Navy, 1981.

US Navy. Supporting Arms in Amphibious Operations. NWP 22-2, (Revision B). Washington DC: Depatment of the Navy, 1990.

War Department. Field Artillery Field Manual. Washington DC: US Government Printing Office, 1931.

_____. Field Artillery Field Manual, Tactics and Technique. Field Manual 6-20. Washington DC: US Government Printing Office, 1940.

_____. Field Artillery Tactical Employment. Field Manual 6-20. Washington DC: US Government Printing Office, 1944.

US Air Force. Tactical Air Force Headquarters and the Tactical Air Control Center. Tactical Air Command Regulation 55-45. Langley AFB: Headquarters Tactical Air Command, 1988.

US Army Training and Doctrine Command. AirLand Operations. Pamphlet 525-5. Ft. Monroe: US Army Training and Doctrine Command, 1991.

_____. The Airland Battle and Corps 86. Pamphlet 525-5. Ft. Monroe: US Army Training and Doctrine Command, 1981.

US Army Combined Arms Center. Corps Deep Operations Tactics, Techniques and Procedures Handbook-1990. Ft. Leavenworth: Combined Arms Combat Developments Activity, 1990.

Allied Air Forces Central Europe. AAFCE Manual 80-2, Offensive Air Support. Ramstein, Germany: Headquarters, Allied Air Forces Central Europe, 1986.

ARTICLES

Bornick, Bruce K. "Unmanned Aerial Vehicle Support," Military Review LXIX (August 1989): 44-49.

Cosby, William N. "BCTP Lessons Learned-Battlefield Air Interdiction," Field Artillery (April 1990): 40-42.

Crighton, Gordon C. and Baker, Timothy J. "A NATO Primer on Battlefield Air Interdiction," Field Artillery (February 1988): 30-33.

Dikkers, Gary L. "Battlefield Air Support (BAS), A Doctrinal Definition," Air Land Bulletin 90-4 (December 1990): 3-7.

Duitsman, Leighton L. "Army TACMS," Field Artillery (February 1991): 38-41.

Foss, John W. "The Challenges of Our Changing Times," Field Artillery (August 1990): 6-11.

Franks, Frederick M. Jr. "After the OPFOR, the Medina Ain't Nothin'!" Army (October, 1991): 72-77.

Franks, Tommy R. "1st Cav in Desert Storm; Deception, Firepower and Movement," Field Artillery (June 1991): 31-34.

Goldwater, Barry. "DOD Organization: An Historical Perspective," Armed Forces Journal International (October 1985): 12-13.

Grandin, Jay F. "Fire Support Coordination-It's Time for a Relook," Field Artillery (February 1992): 19-23.

Graves, Kenneth P. "Steel Rain-XVII Airborne Corps Artillery in Desert Storm," Field Artillery (October 1991): 49-56.

Hales, Grant M. "The Tactical Air Command and Operation Desert Storm: A Case Study of Tactical Aircraft Employment," Air Power History (Winter 1991): 43-47.

Horner, Charles A. "Desert Shield/Desert Storm: An Overview," Air Power History (Fall 1991): 5-9.

Hughes, David. "Electronic Systems Division Accelerates New Systems Deployments, Upgrades," Aviation Week and Space Technology (February 4, 1991): 58.

Jensen, Mark S. "MLRS in Operation Desert Storm," Field Artillery (August 1991): 30-34.

Kahan, James P. "Air Support in CENTAG Deep Operations," Military Review LXIX (August 1989): 64-73.

Kindsvatter, Peter S. "VII Corps in the Gulf War: Deployment and Preparation for Desert Storm," Military Review LXXII (January 1992): 2-16.

_____. "VII Corps in the Gulf War: Ground Offensive," Military Review LXXII (February 1992): 16-37.

Kleiner, Martin S. "Joint STARS Goes to War," Field Artillery (February, 1992); 25-29.

Kolcum, Edward H.. "Joint-STARS E-8s Return to US; 20-Aircraft Fleet Believed Assured," Aviation Week and Space Technology (March 11, 1991): 20.

Mauborgne, Joseph O. "Radio Communications for the Field Artillery," The Field Artillery Journal XI (May 1921): 273-280.

Morgan, Thomas D. "BCTP Trains Artillery Leaders in Command and Control," Field Artillery (February 1991): 42-46.

Painter, Keith. "A Case for a General," Field Artillery Journal (May 1974): 62-63.

Rittenhouse, C. William. "Operation FireStrike," Field Artillery (February 1991): 33-37.

Sanderson, Kent S. "Joint STARS Looks Deep to Win," Field Artillery (February 1988): 25-27.

Schreyach, Jon C. "Fire Support for Deep Operations," Military Review LXIX (August 1989): 29-36.

_____. "Deep-Attack System of Systems," Field Artillery (December 1989): 48-54.

Sincere, Clyde J. "Target Acquisition for the Deep Battle," Military Review LXIX (August 1989): 23-28.

Vuono, Carl E. "Change, Continuity and the Future Field Artillery," Field Artillery (June 1991): 6-10.

West, Lowry A., Mooney, David J. and Pokorny, Anthony G. "Field Artillery in the 21st Century," Military Review LXIX (August 1989): 15-22.

West, Richard D. and Motson, Charles E. III. "Decide, Detect, Deliver; Tactics and Training in VII Corps Artillery," Field Artillery Journal (March-April 1987): 9-11.

THESES AND MONOGRAPHS

Bradley, Michael J. "Operational Fires: Do They Require a Theater FSCOORD?." Unpublished Monograph, School of Advanced Military Studies, Fort Leavenworth, KS, 1989.

Busico, Roger P. "Battlefield Air Interdiction: Airpower for the Future." Unpublished Thesis, Command and General Staff College, Fort Leavenworth, KS, 1980.

Cerami, Joseph R. "The Corps Artillery in the AirLand Battle: A Study of Synchronization, Change and Challenges." Unpublished Monograph, School of Advanced Military Studies, Fort Leavenworth, KS, 1988.

Gay, Mark P. "The Field Artillery in Support of Deep Offensive Missions." Unpublished Thesis, Command and General Staff College, Fort Leavenworth, KS, 1985.

Gisler, Frederick S. "Joint Force Fire Support: Who is the Coordinator?" Unpublished Thesis, Command and General Staff College, Fort Leavenworth, KS, 1991.

Ingle, David L. "The Role of Corps Artillery in the Airland Battle Concept." Unpublished Thesis, Command and General Staff College, Fort Leavenworth, KS, 1982.

OTHER SOURCES

Center for Army Lessons Learned. "Preliminary Analysis of CALL Surveys which were Distributed to Desert Storm Units." July 1991.

Central Command Operations Order 91-001.

Cherrie, Stanley F., VII Corps G-3. Interview by author, 4 November 1991, Fort Leavenworth.

_____. Interview by author, 9 March 1992, Fort Leavenworth.

_____. Interview by author, 13 April 1992, Fort Leavenworth.

Department of the Air Force, XOXWD, Trip Report from Joint Doctrine Center (JDC) visit to Desert Storm locations, memorandum by Terry L. New, 30 April 1991.

Desert Storm Special Study Project. "Final Report, Volume III, Operational." Fort Leavenworth:Combined Arms Center, 1991.

1st Armored Division, "1st Armored Division in Operation Desert Storm," 19 April 1991.

1st Cavalry Division, "Executive Summary of Operation Desert Storm," 10 April 1991.

Smith, T.R.(Chief of Fire Support Element, VII Corps) Letter to Colonel Mike Hawk (BCTP). 21 March 1991.

6-41 Field Artillery, Tactical Operations Center Duty Log.

VII Corps Artillery. "Corps Fires After Action Report (Executive Summary)." 15 March 1991.

_____. "VII Corps Fires After Action Review." Draft Letter. 4 March 1991.

_____. "Feedback on AFCENT Phase IIIB Conference." Memorandum by Creighton Abrams, 30 January 1991.

_____. "Operation Desert Storm, A Fire Support Perspective." Briefing. Undated.

_____. "Operation Desert Storm, The Artillery Fight." Briefing. Undated.

_____. "Air-Ground Operations, Operation Desert Storm." Briefing. Undated.

VII Corps, "The 100 Hour War." Briefing. Undated.

_____. "Part 1B -- Historical Narrative."

VII Corps Main Command Post G-3 Operations Duty Log.

VII Corps Tactical Command Post Duty Log.

2ACR Operations Log Summary.

3rd Armored Division Artillery Historical Summary.

3rd Armored Division Summary of Combat Operations.

JULLS Number 13264-60800 (00002), ARCENT G-3, Deep Operations, Major Combs. 1 March 1991.

JULLS Number 13359-99900 (00006), ARCENT G-3, Deep Operations, Major Combs. 1 March 1991.

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