

AD-A258 250



2

SEEING THE AIRLAND BATTLEFIELD:  
CAN THE HEAVY DIVISION MILITARY INTELLIGENCE  
BATTALION DO ITS JOB?

A Monograph  
by  
Major Brian A. Keller

S DTIC ELECTE D  
A DEC 21 1992



School of Advanced Military Studies  
United States Army Command and General Staff College  
Fort Leavenworth, Kansas

First Term AY 91-92

Approved for Public Release; Distribution is Unlimited

92-32400



92 12 18 000

# REPORT DOCUMENTATION PAGE

Form Approved  
OMB No. 0704-0188

The reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503

1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE 16/12/91	3. REPORT TYPE AND DATES COVERED MONOGRAPH	
4. TITLE AND SUBTITLE SEEING THE AIRLAND BATTLEFIELD: CAN THE HEAVY DIVISION MILITARY INTELLIGENCE BATTALION DO ITS JOB?			5. FUNDING NUMBERS	
6. AUTHOR(S) MAJ BRIAN A. KELLER, USA			8. PERFORMING ORGANIZATION REPORT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) SCHOOL OF ADVANCED MILITARY STUDIES ATTN: ATZL-SWV FORT LEAVENWORTH, KANSAS 66027-6900 COM (913) 684-3437 AUTOVON 552-3437			10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)			11. SUPPLEMENTARY NOTES	
12a. DISTRIBUTION/AVAILABILITY STATEMENT APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) <del>SEE ATTACHED</del>				
14. SUBJECT TERMS INTELLIGENCE IPB HEAVY DIVISION SIGINT DECISIONMAKING MI BATTALION UAV COLLECTION-CAPABILITIES			15. NUMBER OF PAGES 52	
17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED			16. PRICE CODE	
18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED		19. SECURITY CLASSIFICATION OF ABSTRACT UNCLASSIFIED		20. LIMITATION OF ABSTRACT UNLIMITED

SCHOOL OF ADVANCED MILITARY STUDIES  
MONOGRAPH APPROVAL

Major Brian A. Keller

Title of Monograph: Seeing the AirLand Battlefield: Can the  
Heavy Division Military Intelligence  
Battalion Do Its Job?

Approved By:

John D. Skelton Monograph Director  
LTC(P) John D. Skelton, MPA

James R. McDonough Director, School of  
COL James R. McDonough, MS Advanced Military  
Studies

Philip J. Brookes Director, Graduate  
Philip J. Brookes, Ph.D. Degree Program

Accepted this 31st day of December 1991

ABSTRACT

SEEING THE AIRLAND BATTLEFIELD: CAN THE HEAVY DIVISION MILITARY INTELLIGENCE BATTALION DO ITS JOB? by MAJ Brian A. Keller, USA, 52 pages.

This monograph examines the heavy division Military Intelligence (MI) battalion's capability to provide the division commander accurate and timely information for tactical decisionmaking.

The monograph begins by discussing why modern war and Army doctrine generate specific intelligence requirements for division commanders. Based on these requirements, the author offers a decisionmaking paradigm to describe the interaction between collecting information and orienting the commander to the enemy's intentions. Next, the monograph reviews the role intelligence doctrine--especially Intelligence Preparation of the Battlefield--plays in translating information into intelligence. Following this, the monograph outlines the heavy division MI battalion's capability to satisfy the commander's intelligence requirements. The analysis section examines how the MI battalion's current organization and equipment affects the commander's view of the modern battlefield.

The study concludes that the battalion's reliance on signals intelligence, not complemented by an organic imagery intelligence capability, limits the division commander's view of the battlefield. By discussing the battalion's collection limitations, the monograph addresses doctrinal problems when matching intelligence collection capabilities to intelligence requirements demanded by IPB.

To improve collection capabilities, the monograph recommends introducing both Close and Short Range Unmanned Aerial Vehicles into the MI battalion.

DAI

Accession For	
NTIS CRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	

TABLE OF CONTENTS

	Page
I. Introduction . . . . .	1
II. Intelligence Requirements . . . . .	4
III. Intelligence Support to Decisionmaking . . . . .	13
IV. IPB and Collection Requirements . . . . .	16
V. Heavy Division MI Battalion Organization and Capabilities . . . . .	20
VI. Analysis of the Heavy Division MI Battalion Collection Capabilities . . . . .	29
VII. Conclusions and Implications . . . . .	37
VIII. Recommendations . . . . .	39
Appendix 1: U.S. Army Heavy Division MI Battalion SIGINT Sensors . . . . .	41
Endnotes . . . . .	42
Bibliography . . . . .	47
<b>Figures</b>	
Figure One: Current Heavy Division MI Battalion Organization . . . . .	21
Figure Two: Heavy Division MI Battalion Collection Resources . . . . .	28

## I. INTRODUCTION

I have been passing my life in guessing  
what I might meet beyond the next hill,  
or round the next corner.

The Duke of Wellington: To J. W.  
Croker, 1845

A man trusts his ears less than his eyes.

Herodotus, 484-424 BC

Like the Duke of Wellington, present day commanders continue to contemplate the capabilities and intentions of their enemies. Yet, unlike last century's battle captains, today's commanders must fight on a battlefield significantly stretched in space and compressed in time. Within this changing physical domain, contemporary commanders face enemy forces whose speed, range, and lethality considerably complicate both decisionmaking and intelligence gathering.

Despite these changes, the commander's *coup d'oeil*--his ability to see the situation in "the twinkling of an eye"--retains great importance on the modern battlefield. Indeed, FM 71-100, *Division Operations*, suggests that "to win in battle, several fundamentals must be addressed by the commander."<sup>1</sup> Not surprisingly, the first fundamental presented by the manual's authors insists the commander "must know and understand how to see the battlefield."<sup>2</sup>

Until the nineteenth century, commanders often observed enemy movements from vantage points directly overlooking the battleground. Here, normally in daylight and surrounded by their staffs, commanders dispatched messengers or used

signals to transmit immediate instructions to their subordinates. For example, during the Battle of Rossbach in 1757, Frederick's cavalry expert, General Seydlitz, signaled the launching of four thousand horsemen against his French foes by flinging his tobacco-pipe into the air.<sup>3</sup> In short, commanders generally viewed their enemy in real-time, adjusting orders and plans to fit the situation on the ground facing them.

Today, increased operating distances and the swift tempo of operations seldom provide commanders the opportunity to see the entire battlefield. Yet, while often physically removed from the scene of action, commanders now have the ability--like their eighteenth century counterparts--to see these activities in real-time. Sophisticated sensors, linked to command posts by instantaneous communications, provide commanders timely information about enemy locations and dispositions. This information, combined with analysis such as Intelligence Preparation of the Battlefield (IPB), becomes intelligence. Taken together, sensors and analysis help commanders see enemy capabilities and intentions.

This monograph examines the heavy division Military Intelligence (MI) battalion's ability to "provide accurate information in sufficient time to allow the commander to reach a decision, prepare orders, and execute his plan."<sup>4</sup> To assess this ability, I will focus on this question: Does the heavy division's MI battalion have the necessary organization and equipment to enable the division commander

to see the battlefield? For the purposes of this monograph, the heavy division's battlefield is set in a mid-to high-intensity conflict. Here, I envision a fast tempo, nonlinear battle fought against a modern combined arms threat.

My criteria for the commander's ability to "see the battlefield" center on two factors. First, can the division's MI battalion provide surveillance of the Area of Operations (AO) and reconnaissance of the Area of Interest (AI) in near-real-time? Second, do these dedicated intelligence collection capabilities--combined with IPB doctrine--allow analysts to translate information into intelligence concerning the enemy's capabilities and intentions?

The monograph begins by discussing why modern war and Army doctrine generate specific intelligence requirements for division commanders. Based on these requirements, I offer a decisionmaking paradigm to describe the interaction between collecting information and orienting the commander to the enemy's intentions. Next, I will review the role intelligence doctrine--especially IPB--plays in translating information into intelligence about enemy capabilities and intentions. Following this, I outline the heavy division's MI battalion capability to satisfy the commander's intelligence requirements. The analysis section examines how the MI battalion's current organization and equipment affects the commander's view of the modern battlefield. Finally, I offer recommendations that might improve the battalion's current organization and equipment.

I have excluded non-MI divisional units and

intelligence resources at corps or echelon above corps (EAC) for two reasons. First, I want to analyze the role division-level military intelligence organizations play in assisting the commander to see the battlefield. Second, while higher, lower, and adjacent units form a "system of systems" that supplement the commander's intelligence requirements, we may be overstating their availability at the expense of organic capabilities.

## II. INTELLIGENCE REQUIREMENTS

Before evaluating the heavy division's current collection capabilities, it is necessary to identify what the commander needs from his G2 to see the AirLand Battlefield. Only then can we determine whether the division's collection capabilities match the commander's intelligence requirements.

At the tactical level, the commander's intelligence requirements flow from two interrelated aspects. One aspect centers on the nature of the modern battlefield. Another involves AirLand Battle Doctrine--the way in which our Army expects to fight. Both the nature of modern war and our doctrine, discussed below, influence the MI battalion's tasks, conditions, and standards for collection and analysis.

How, then, do we envision the modern battlefield? Here, analyzing the physical, cybernetic, and moral domains of war provide useful insights into the conditions of modern battle. Professor James J. Schneider, resident theorist at the School of Advanced Military Studies (SAMS) uses these

three domains to explain the changing nature of war.<sup>5</sup>

Schneider describes the physical domain as "the effects of weapons and munitions, the effects of terrain, the effects of weather, logistics and other physical factors that effect the battle."<sup>6</sup> The cybernetic domain deals with command, control, and communications. Finally, the moral domain "is concerned with the disintegration and breakdown of will."<sup>7</sup> As I describe below, the changing domains of war generate specific requirements for intelligence collection.

Greatly increased space and distance factors combined with compressed time constraints characterize the physical domain of modern combat. Today, the mechanization of armies and weapons' lethality "extend the battle across a wider space of air, land, and sea than previously experienced."<sup>8</sup> For example, M1A1 battle tanks can now traverse the battlefield at unprecedented speeds to a range of 289 miles before requiring refueling. Likewise, air assault units and attack helicopter battalions routinely plan missions at distances exceeding 50 kilometers beyond the forward line of troops (FLOT).

Increasingly lethal long range fires, linked with sophisticated sensor and surveillance capabilities, affect the division's ability to survive while concentrating combat power at the battlefield's decisive point. To reduce vulnerability, the division must remain dispersed, relying on rapid, synchronized movements to offset the effects of modern weapons. Thus, while discussing the phenomenon of the "empty battlefield," author Paddy Griffith argues that

during the twentieth century "formations have become looser still, and the battlefield has become even emptier."<sup>9</sup>

Paradoxically, as sensor capabilities improve, intelligence collection sometimes becomes more difficult. As Griffith again argues, since "large formations can easily be noticed and monitored, the use of smaller ones may well be unavoidable, and all the more so since small units today can pack a much bigger punch than they could in the past."<sup>10</sup>

During the recent Gulf War, for example, the Iraqis

had to avoid moving in normal battalion and brigade-sized convoys, and go instead to infiltrating/exfiltrating vehicles in twos and threes--or at most platoon-sized convoys. . . . Otherwise, J-STARS [Joint Surveillance Target Attack Radar System] picked up the movements and was able to provide data for attacks.<sup>11</sup>

In short, smaller yet more lethal units infiltrating across the battlefield create fluid, intermingled battles. Thus, reduced signatures offered by smaller units make detection and targeting more difficult.

Today, the physical domain of war fosters a fluid, non-linear battlefield compressed in time, yet extended in space. The mobility of modern mechanized forces enhances their ability to converge from greater ranges in shorter times. These conditions create three significant requirements for the division's MI battalion. First, sensors must detect enemy activity at deeper ranges to help the commander focus combat power at the decisive time and place. Next, intelligence collection, analysis, and dissemination must occur at a faster rate than ever before. Finally, to be effective, intelligence and electronic warfare equipment and

organizations must keep pace with combat operations on the modern battlefield.

Unprecedented changes in the physical domain also alter the cybernetic domain of war. Martin van Creveld addresses these changes in his work *Command in War*. "The increase in the demands on command systems[.]" van Creveld contends, "is due to the greatly enhanced complexity, mobility, and dispersion of modern armed forces."<sup>12</sup> Field Manual 100-5, *Operations*, also addresses the complexity of command and control. "The more fluid the battlefield," the authors write, "the more important and difficult it will be to identify decisive points and to focus combat power there."<sup>13</sup>

Today, orchestrating decentralized and dispersed forces moving swiftly across the battlefield demands timely and accurate information. As one officer observes, the Army Command and Control System (ACCS)

has to provide commanders and their staffs at every level with accurate, near-real-time information, so that all will have a common picture of the battlefield. It must support the rapid collection, analysis and presentation of information for decision making.<sup>14</sup>

Lieutenant General (Retired) Leonard P. Wishart, former commander of the U. S. Army Combined Arms Center, reinforces Anderson's views suggesting

[t]he analysis and decision-making process must be accelerated so leaders at all echelons can make decisions in a timely manner. Commanders must be able to project and anticipate in order to seize the initiative, and their staffs must have decision aids and situation assessment systems that will enable them to accurately "see the battlefield" in real or near-real time.<sup>15</sup>

The cybernetic domain of modern war, then, demands the

swift analysis and transfer of information to commanders for effective decisionmaking. Equally important is the ability to detect, report, analyze, and disseminate intelligence concerning enemy centers of gravity and weak points. Hence, the MI battalion's requirement to feed intelligence quickly into the decision making process readily becomes apparent.

Like the physical and cybernetic domains, war's moral domain also influences intelligence requirements. Here, reducing ambiguity from the fog of war often strengthens the commander's resolve. David Kahn explains this view in his excellent essay "Clausewitz and Intelligence." "In the psychological [moral] domain," Kahn writes, "intelligence improves command. Knowing that a town ahead is empty of the enemy eases a commander's mind, freeing him to resolve other problems."<sup>16</sup> Conversely, "poor intelligence harms command most commonly by leading a general to exaggerate the enemy's strength and consequently to lose confidence."<sup>17</sup>

Some classical military theorists discount the importance of intelligence within the moral domain of combat. Clausewitz's writings provide one example. Before discussing the subject of intelligence in *On War*, Clausewitz sets the stage by addressing the climate of war. This climate, he concludes, contains four key elements: "danger, exertion, uncertainty, and chance."<sup>18</sup> Given this view, accurate intelligence was unlikely. In fact, Clausewitz writes, "many intelligence reports in war are contradictory; even more are false, and most are uncertain. . . . In short, most

intelligence is false. and the effect of fear is to multiply lies and inaccuracies."<sup>19</sup>

This view, combined with the limitations of his collection capabilities, convinced Clausewitz to distrust the role of intelligence in decisionmaking. Instead, he relied on the commander's genius and strength of will to carry him through the fight. Thus Clausewitz writes, "if we consider [the four elements] together, it becomes evident how much fortitude of mind and character are needed to make progress in these impending elements with safety and success."<sup>20</sup> Later, Clausewitz concludes, "a sensitive and discriminating judgment is called for; a skilled intelligence to scent out the truth."<sup>21</sup>

Clausewitz's concept of the fog of war remains as relevant today as in the nineteenth century. Yet, changes in the physical and cybernetic domains of war, as well as intelligence collection capabilities of modern armies, rearrange the risk equations confronting contemporary commanders. Commanders, whose formations now converge on decisive points quicker and from greater depths--and with more lethal weapons--require clear distinctions between risks and gambles. Indeed, as one intelligence officer recently observed, "taking independent action . . . in the absence of accurate information could be considered a gamble, which could jeopardize the unit and the intent of the higher commander."<sup>22</sup>

*Auftragstaktik* and mission type orders embodying "trust tactics" help offset the "fog of war." However,

commanders expect timely and accurate intelligence before making decisions to launch attack helicopter battalions or maneuver brigades deep against enemy second echelon formations. As Richard Simpkin states in *Race to the Swift*, "the degree of operational tactical risk is mainly dependent *not* on posture, but on the quantity and quality of information available to the commander. . . ."23 (Original emphasis) Lacking this information, commanders may hesitate when risking their soldiers to accomplish the mission. Unable to distinguish between risk and gamble, paralysis not only of command and control, but more importantly moral will, may soon set in.

Besides the changing nature of modern war, U.S. Army warfighting doctrine also places demands on the division's MI battalion. As one author argues, "our doctrine presupposes that we are able to control the battle by seeing it in near real time and by maneuvering forces and fires to take advantage of opportunities as they occur."24 How, then, does AirLand Battle doctrine underscore the importance of seeing the battlefield?

Offensively oriented, AirLand Battle doctrine relies on seizing the initiative from the enemy. As such, our doctrine stresses simultaneous attacks against enemy forces throughout the depth of the battlefield. More clearly, AirLand Battle doctrine envisions synchronized close, deep, and rear operations as one continuous battle. Division close operations concentrate on defeating committed enemy

forces and their *readily available* reserves. Deep operations, on the other hand, delay, divert, or destroy enemy follow-on forces before they can influence the close operation.

During both close and deep operations, intelligence analysts focus on identifying the enemy's objectives, capabilities, and most probable course of action. Here, an important intelligence-related planning consideration specified in FM 100-5--anticipating enemy actions--affects the close, deep, and rear battle.

Besides the distinction between close, deep and rear battles, AirLand Battle *tenets* also characterize our current fighting doctrine. Indeed, these tenets--including initiative, agility, depth, and synchronization--require timely and trustworthy intelligence to see the battlefield.

Each AirLand Battle tenet places similar demands on the MI battalion's collection requirements. For example, agility, defined in FM 100-5 as "the ability of friendly forces to act faster than the enemy," implies getting into the enemy's decision cycle to anticipate his actions.<sup>25</sup> Again, two critical components--accurate and timely assessments of enemy capabilities and intentions--become prerequisites for success.

Linked to the expanding physical domain of war, AirLand Battle doctrine also envisages division battles conducted throughout an enlarged area of operations and interest. In fact, commanders often view the AO and AI as two distinct battlefield areas. While corps designates the division's

AO, the division commander determines his AI. Current field manuals no longer prescribe distances for areas of operations or interest. Instead, time considerations and the commander's intent determine the AO and AI size and shape.

FM 71-100, *Division Operations*, supports this view adding:

[d]ivision areas of interest and operations extend forward of the FLOT far enough to give the division commander time to identify approaching enemy forces, assess his options, and execute operations accordingly.<sup>26</sup>

Yet, the AI also includes "areas occupied by enemy forces who could jeopardize the accomplishment of the mission."<sup>27</sup>

Recent changes in the geopolitical environment notwithstanding, U.S. divisions targeted for contingency operations must remain capable of defeating potential Third World adversaries armed with modern Soviet equipment and influenced by Soviet doctrine. Therefore, the division's AI should encompass areas where second-echelon divisions or reinforcements might assemble or move. Division commanders typically designate these enemy units for deep attack.

Returning again to FM 71-100, a defending U.S. division's

deep operations are focused against interdicting or fighting second-echelon regiments of the first-echelon divisions. *It then interdicts or fights regimental-sized elements of the enemy second-echelon divisions.*<sup>28</sup> (emphasis added).

Hence, like the AO and AI, "division deep operations are not a function of depth, but a function of what forces are being attacked and the intent of the operation."<sup>29</sup>

Taken together, AirLand Battle doctrine and tenets--implemented across an enlarged AO and AI--place a premium on

accurate and timely intelligence. For this to occur, collection assets must detect enemy dispositions and movements throughout the area of operations and interest. Additionally, intelligence analysis must penetrate the enemy's decision cycle to predict his intentions and objectives. Failing either endeavor, the commander faces uncertainty when implementing our fighting doctrine.

In summary, the nature of modern war and AirLand Battle doctrine generate specific division-level intelligence requirements to see the battlefield. Based on the above analysis, four key requirements emerge. First, intelligence sensors must collect and report information instantaneously or in near-real-time. Second, sensors must provide surveillance of the division Area of Operations and reconnaissance of the Area of Interest to support the close, deep, and rear battles. Third, the MI battalion must be able to maintain the operational tempo set by combat formations fighting on the modern battlefield. Finally, collection and analysis must be focused towards accurately predicting enemy intentions. In the following section, I discuss these requirements in relation to decisionmaking by the division commander.

### III. INTELLIGENCE SUPPORT TO DECISIONMAKING

The MI battalion's support to tactical decisionmaking centers on providing timely and accurate intelligence to commanders. Indeed, as FM 71-100 reminds us, "intelligence requirements must be collected, collated, and provided to

the commander as a matter of priority."<sup>30</sup> In today's parlance, "getting into the enemy's decision cycle" equates to the friendly commander's ability to make decisions and execute operations faster than the enemy. As such, the goal "is to deny the enemy time to complete one tactical response before another is required, [forcing] him to deal with more than one tactical decision at a time."<sup>31</sup>

To assist the commander's decision cycle, the intelligence system must respond rapidly to enemy actions. This requires the MI battalion to detect enemy locations, dispositions, and movements in near-real-time. Just as important, the G2 must orient the division commander to enemy capabilities and probable courses of action through analysis and IPB. In short, by continuously observing and orienting, the G2 improves the commander's view of the battlefield. I offer below one decisionmaking theory to suggest why quickly observing and orienting information is crucial for tactical-level decisionmaking.

The Boyd Theory provides a practical paradigm for explaining the MI battalion's intelligence collection role in tactical decisionmaking. Developed by Air Force Colonel (Retired) John Boyd, the theory underscores the roles of observing and orienting for timely decisionmaking.<sup>32</sup>

Often referred to as the "OODA Loop," (Observe, Orient, Decide, Act), Boyd's decisionmaking theory originates from his examination of air-to-air combat during the Korean War.<sup>33</sup> Here, American fighter pilots sustained stunning

kill ratios against their North Korean and Communist Chinese contenders. Armed with these facts, Colonel Boyd set out to explain why this occurred.

Initially, Boyd found that Communist pilots using MIG-15's could out climb and accelerate faster than their American foes flying the F-86 Sabre. Yet, the F-86 provided American aviators two important advantages. First, the Sabre's bubble canopy gave pilots a much better view of the situation. Second, the F-86's advanced hydraulic controls responded faster than the MIG's manual maneuver controls.

Taken together, these advantages allowed American aviators to outfight enemy pilots. More clearly, during dogfights, "the F-86 gained a time advantage, because the F-86 pilot could see more quickly how the situation had changed and he could also make his aircraft shift more quickly to a new action."<sup>34</sup> Thus, quickly observing and orienting towards the enemy provided the decisive edge.

In summary, Boyd's "OODA Loop" stresses two important intelligence-related functions. First, Boyd's theory highlights the importance of the commander's ability to see the battlefield. Indeed, as Bill Lind suggests in the *Maneuver Warfare Handbook*:

conflict can be seen as time-competitive observation-orientation-decision-action cycles. Each party to a conflict begins by observing. On the basis of his observation, he orients, that is to say, he makes a mental image or "snapshot" of his situation. On the basis of this orientation, he makes a decision.<sup>35</sup>

Second, the theory reinforces the need for timely decision-making inside that of the enemy's. For clarity, the

following formula expresses these ideas:

$$\text{Time (Friendly } (F_1 + F_2 + F_3 + F_4) (N) < \text{Time (Enemy } (E_1 + E_2 + E_3 + E_4) (N)$$

where 1 is time to observe, 2 is time to orient, 3 is time to decide, 4 is time to act, and N represents "noise" (ambiguous, unobserved, or misleading indications of enemy capabilities or intentions). Again, we see the importance of observing enemy actions through multiple sources to reduce uncertainty.

With Boyd's theory as a model, the next section summarizes the role Intelligence Preparation of the Battlefield (IPB) plays in orienting the division commander to the enemy's most probable course of action. Here, the linkage between IPB collection requirements and "predictive intelligence" becomes readily apparent. Later, I outline the heavy division MI battalion's ability to meet not only IPB-driven requirements, but those demanded by the nature of modern war and our warfighting and intelligence doctrine as well.

#### IV. IPB AND COLLECTION REQUIREMENTS

Predictive in nature, IPB "is an analytical methodology employed to reduce uncertainties concerning the enemy, weather and terrain for all types of operations."<sup>36</sup> Relying heavily on multilayered overlays, IPB seeks to graphically display both enemy capabilities and probable courses of action (COA). Continuously updated, IPB "is used to predict enemy activity and to produce event-related forecasts of battlefield operations."<sup>37</sup> Most important, during tactical

decisionmaking. IPB helps the commander develop a concept of operation to allocate combat power at the decisive time and place.

Initially, IPB concentrates on battlefield area evaluation to determine how weather and terrain effect operations. Next, enemy capabilities and current order of battle, matched with the combined obstacles overlay, evolve into situational templates. Known as the "intelligence estimate in graphic form," situational templates help analysts unveil the enemy's most probable COA.

The G2 uses situational templates to produce the event template. Event templates further assist analysts project likely enemy courses of action by identifying and analyzing significant battlefield events and activities. As FM 34-130, *Intelligence Preparation of the Battlefield* states, analyzing these events and activities provides

a projection of what will occur if the enemy adopts a particular course of action. By recognizing what the enemy can do, and by comparing it with what the enemy is doing, we can predict what the enemy will do next.<sup>38</sup>

To track *what the enemy is doing*, analysts and commanders rely on Named Areas of Interest (NAIs) designated during event templating. Here, analysts watch for indicators to confirm or deny their predictions concerning a particular enemy COA. NAIs perform two other important functions. Initially, they help the G2 or collection manager focus collection planning. Along with the event template, NAIs enable the G2 "to develop precise collection requirements, maximizing the effectiveness of limited resources over

extended areas against a vast array of enemy targets."<sup>39</sup> Later, by monitoring NAIs, the G2 provides the G3 a snapshot of where the enemy is and what his next move might be. This helps the commander decide where, when, and what to shoot, jam, and maneuver against.

During the final phases of IPB, the G2 and G3 work together to produce the Decision Support Template (DST). Essentially a combined intelligence and operations estimate in graphic form, the DST

relates the detail of the event template to decision points that are significant to the commander, and identifies critical battlefield areas, events, and activities which require tactical decisions by time and location.<sup>40</sup>

The division commander's targeting triad--normally consisting of the G2, G3, and Fire Support Coordinator--develop the DST. (I should stress here that the DST is not a G2 product. In fact, to be complete and effective, DST refinement requires a complete staff effort orchestrated by the commander or G3). The targeting triad begins DST development by identifying TAIs. Usually associated with bridges, road junctions, or chokepoints, TAIs reveal areas where the commander can delay, disrupt, destroy, or manipulate enemy forces. Further, TAIs furnish focal points for attacking enemy high value targets as they appear on the battlefield.

After selecting TAIs, the G3 determines decision points (DPs). As their name implies, DPs are events, areas, or points on the battlefield where the commander must make decisions to have a desired effect on the enemy. Locations

of DPs depend on the time required to implement a decision. Therefore.

the placement of DPs must be far enough in advance of the expected location of the event or activity to ensure sufficient time to effectively implement the required decision, and close enough to allow confirmation that the expected event will occur.<sup>41</sup>

As I argue below, the location of DPs--as well as NAIs and TAIs--*close enough* for detection by divisional assets often shrouds the commander's ability to clearly see the battlefield.

In summary, IPB plays an important role in tactical decisionmaking. IPB helps the commander concentrate combat power at the decisive time and place by identifying enemy capabilities and intentions. Here, two key points follow. First, to confidently confirm enemy capabilities, intelligence analysts must determine what, when, where, and in what strength the enemy can conduct a course of action. Second, ascertaining enemy intentions involves thorough analysis--devoid of preconceptions and biases--carefully matched to indicators of the enemy's probable COA.

As the discussions above suggest, discerning enemy COAs depends heavily on the MI battalion's ability to monitor and observe indicators near NAIs. Likewise, TAIs and DPs require continuous surveillance for targeting and decisionmaking. Yet, detecting indicators--vital to the IPB process--presupposes aggressive and accurate collection from the division's intelligence teams. Indeed, as one division intelligence officer observed, "successful

intelligence production is a result of the application of analytical methods to a body of information."<sup>42</sup> Without this "body of information," analysts and commanders may interject their own biases and predilections in place of facts. With this in mind, the next section evaluates current MI battalion collection capabilities.

#### V. MI BATTALION ORGANIZATION AND CAPABILITIES

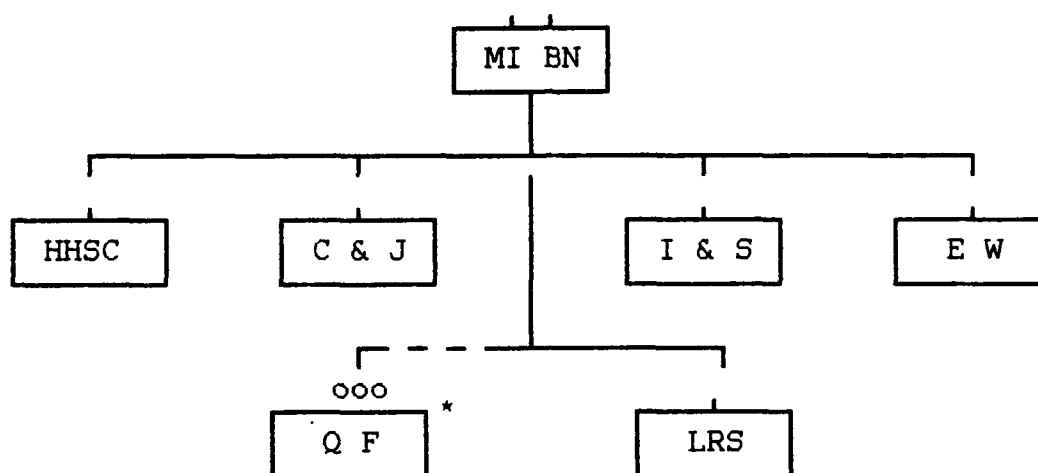
Lessons learned during the 1973 Yom Kippur War prompted consideration of MI battalions at division level. In late 1974, the Army Chief of Staff ordered the Intelligence Organization and Station Study (IOSS) "to plan the integration of intelligence and EW assets within corps and division."<sup>43</sup> In 1977, as a result of the IOSS, the Army first formed military intelligence battalions at corps and division. The same year, a major electronic warfare exercise conducted at Fort Hood Texas validated the IOSS's recommendations.<sup>44</sup> Known as "CEWI" (Combat Electronic Warfare Intelligence) battalions, the new intelligence organizations soon became integral members of the heavy division.

Today, the MI battalion provides dedicated intelligence and electronic warfare (IEW) support to the commander. The battalion's mission is to

provide the heavy division combat electronic warfare and intelligence support through the accomplishment of four tasks: situation development, target development, electronic warfare, and counterintelligence.<sup>45</sup>

To accomplish this mission, the current Table of Organization and Equipment (TOE) assigns the battalion five

companies.<sup>46</sup> The organization includes Headquarters and Service, Collection and Jamming (C & J), Intelligence and Surveillance (I & S), Electronic Warfare (EW) and Long Range Surveillance (LRS) companies. Additionally, the battalion operationally controls a Quickfix flight platoon consisting of three EH-60 helicopters. Figure One shows the current heavy division MI battalion organization.



\* Assigned to Combat Aviation Brigade, OPCON to MI Bn.

FIGURE ONE

Field Manual 34-10, *Division Intelligence and Electronic Warfare Operations*, provides detailed discussions on the organization, missions, and collection and jamming capabilities of each MI company. In the section below, I outline only the MI battalion's capability to observe and collect combat information for division commander decisionmaking.

Headquarters and Headquarters Service Company provides command and control to headquarters elements and elements OPCON to the battalion. HHSC also furnishes food services and communications-electronic and mechanical maintenance

support for battalion units. As such, HHSC has no capability to actually observe information. Yet, one section within HHSC helps focus the lenses of battalion intelligence collectors. This is the Technical Control and Analysis Element (TCAE).

The TCAE is the focal point for all electronic warfare operations conducted in the division area. It normally operates from nine to eleven vehicles collocated with the MI battalion tactical operations center. Here, "the TCAE performs technical tasking of all SIGINT [signals intelligence] and EW assets in the division, regardless of the standard type missions given IEW company teams."<sup>47</sup>

The TCAE receives mission taskings from the G2's Collection Management and Dissemination (CM & D) section. The TCAE translates these tasks into missions for the battalion's three C & J platoons, the EW Company's SIGINT processing platoon, and the Quickfix flight platoon. Depending on standard operating procedures, platoon and company headquarters--and sometimes individual sensors--transmit technical data and reports directly to the TCAE. Here, analysts synthesize information into intelligence, reporting their findings to CM & D. The following scenario clarifies the TCAE's collection and analysis roles.

While planning a deliberate attack, the division commander intends to air assault one battalion to seize a key river crossing site. Before the operation, CM & D tasks the TCAE to locate enemy air defense radars. Next, responding

to TCAE taskings, the SIGINT processing platoon alerts its three AN/MSQ 103 TEAMPACK noncommunications intercept systems to begin searching for air defense radars. Each TEAMPACK reports intercepted radar locations to the SIGINT platoon headquarters, which retransmits information to the TCAE for analysis. Finally, after analysis, the TCAE forwards reports to CM & D. In short, the TCAE helps the division commander see the battlefield's electronic signature.

While the TCAE orchestrates the technical control of SIGINT assets, the C & J and EW companies supply the bulk of the MI battalion's SIGINT collection capabilities. I briefly describe below the collection capabilities and equipment of both companies.

The C & J company's mission is to provide SIGINT and EW support to the division. Three identical C & J platoons, normally deployed well-forward in the brigade AO, furnish the C<sup>2</sup> for assigned collection systems. Each platoon operates one AN/TRQ-32 (V2) TEAMMATE communications intercept and direction finding system. Mounted in a HMMWV, TEAMMATE's six team members man two intercept positions, collecting High Frequency (HF), Very High Frequency (VHF), and Ultra high Frequency (UHF) signals out to thirty kilometers. When netted with other AN/TRQ-32's, the system provides a direction finding (DF) capability. Additionally, each team can deploy one manpacked AN/TRQ-30, capable of intercepting HF and VHF signals at the same range as the AN/TRQ-32 (V2).

The EW company also plays an important SIGINT

collection role. The company's current organization includes a SIGINT processing platoon and a noncommunications intercept platoon.

The SIGINT processing platoon, equipped with one radio intercept and direction finding AN/TSQ-138 TRAILBLAZER system, normally deploys in general support to the division. Recently upgraded, the system provides a significant SIGINT capability for the heavy division. Indeed, TRAILBLAZER is the division's "primary organic means for identifying, locating, tracking, and monitoring the movement of enemy first- and second-echelon regiments, division and Army C<sup>2</sup> facilitates, fire support units, and CSS [combat service support] facilities."<sup>48</sup>

The system includes two master control stations (MCS) and three outstations each mounted in a M1015 tracked vehicle. Outstations typically operate 3-5 kilometers behind the forward line of troops (FLOT), with the MCS deployed another 5 kilometers to the rear. From these forward deployed positions, each station can intercept and provide lines of bearing (LOB) on HF, VHF and UHF frequencies up to thirty kilometers. Most important, the MCS's--when netted to at least two outstations--can automatically determine the approximate location of enemy tactical radio emitters operating in the VHF spectrum. The EW Company headquarters, collocated with one MCS designated as the net control station, forwards reports to the TCAE.

The EW Company's noncommunication intercept platoon

collects signals emitted by enemy radars. The platoon's three AN/MSQ-103A TEAMPACKs--mounted in M1015 tracked vehicles--utilize quick-erect antennas and on-board power generators to facilitate rapid set-up and relocation.<sup>49</sup> With a thirty kilometer intercept range, the TEAMPACK primarily targets high pay-off radars, such as air defense or division artillery group counter-battery radars, within the division's close battle area. To facilitate reporting to the TCAE, one TEAMPACK acts as a net control station and collocates with the SIGINT processing platoon.

The Quickfix Flight Platoon provides the final organic source of SIGINT collection for the heavy division. Assigned to the Combat Aviation Brigade, the platoon's three EH-60A Quickfix IIB helicopters respond to tasking from the MI battalion TCAE. Presently fielded in heavy divisions, Quickfix IIB intercepts VHF signals out to 50 kilometers while its HF collection range is unlimited. Crucial to the division's overall SIGINT collection effort, Quickfix is especially useful when directed at Named Areas of Interest (NAIs) and Target Areas of Interest (TAIs) in defilade to ground based collection assets.<sup>50</sup> Appendix 1 summarizes the SIGINT collection systems currently available in the heavy division.

The MI battalion's I & S Company supports the division with ground surveillance radar, interrogation, and counter-intelligence (CI) teams. The Ground Surveillance platoon normally attaches 1 squad with 4 AN/PPS-5B radars to each infantry and armor brigade. Transported in M113 Armored

Personnel Carriers, the AN/PPS-5B detects moving vehicles and personnel out to 10 and 6 kilometers respectively. Teams report to Brigade or battalion S2s on AN/VRC-46 radios. When integrated into the division's overall surveillance plan, radars provide line of sight coverage of high speed avenues of approach and flanks during periods of low visibility.

The I & S Company also provides the division with enemy prisoner of war (EPW) interrogation and CI support. Like other collection assets, EPW teams focus their effort on the division commander's priority intelligence requirements (PIR). Interrogators help furnish the commander with information concerning enemy dispositions, compositions, and past, present, and future missions. Further, interrogation reports help cue sensors for additional collection and corroboration. Most important, interrogators provide a unique capability to help the commander determine the enemy's morale, training status, and combat readiness. Here, the interrogator's time and skill, combined with the prisoner's knowledge and reliability, offer the only limits to the potential collection "range."

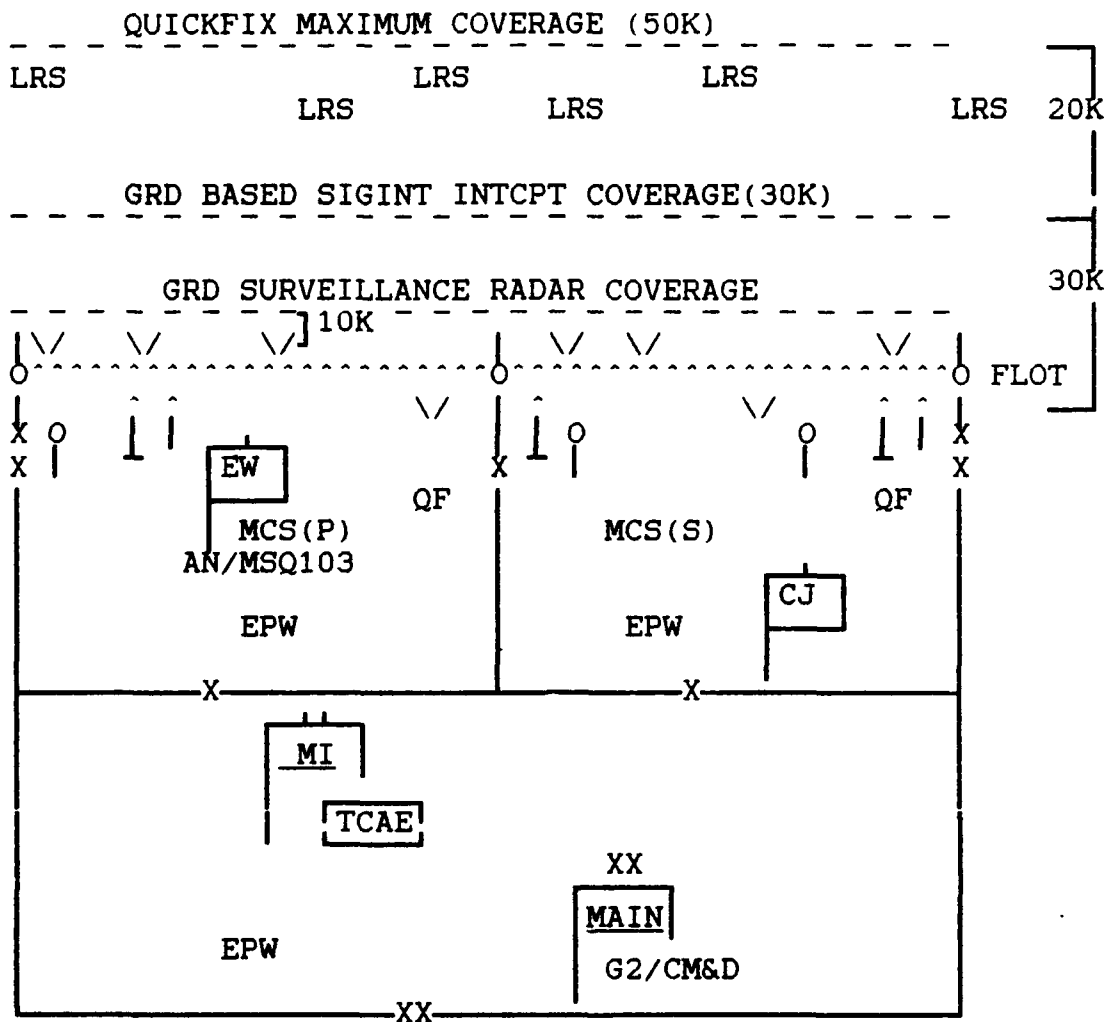
To conduct interrogations, current heavy division resources include two interrogator teams, each consisting of four enlisted interrogators led by a warrant officer. The teams, with military police support, establish G2-directed EPW collection points. While based on METT-T, G2s normally position EPW collection points in each forward-deployed

brigade support area for rapid screening of EPWs and captured documents. Additionally, one element operates the division collection point. When augmented with corps interrogators, the G2 can provide EPW teams in direct support of forward-deployed brigades or battalions.<sup>51</sup>

The Long Range Surveillance Company (LRSC) provides the final source of intelligence collection capability organic to the MI battalion. For planning purposes, the LRSC's six six-man teams conduct surveillance and reconnaissance operations to a depth of 50 kilometers beyond the FLOT. Normally focused towards key NAIs, TAIs and decision points, the teams observe and report enemy dispositions, activities, movements, and terrain and weather conditions within their assigned surveillance areas. Teams report information to the detachment's communications base stations or the Division's Tactical Operations Center Support Element (DTCSE) within the G2. Often able to cue other division sensors, the LRSC provides the division commander his primary organic human intelligence means to monitor the deep battle.

In summary, the MI battalion provides the commander dedicated SIGINT and HUMINT assets to collect intelligence. Figure Two (on the following page) shows where these assets locate in the division AO and the ranges of each sensor. More important, the figure illustrates three key points regarding the battalion's collection capabilities.

First, the MI battalion's current TOE emphasizes SIGINT collection roles. Indeed, the C & J and EW Companies, along with the TCAE and Quickfix flight platoon, dominate mission



LEGEND

<u>SIGINT</u>		<u>OTHER</u>	
Communications Intercept Systems	Noncommunications Intercept Systems	∩	AN/PPS-5B

∪	AN/TRQ-32	∧	AN/MSQ-103
---	-----------	---	------------

∪ AN/TSQ-138  
Outstation  
(P) Primary MCS  
(S) Secondary MCS  
QF Quickfix

HUMINT

LRS Long Range Surveillance Team  
EPW Enemy Prisoner of War Collection Point

Heavy Division MI Bn Collection Resources

FIGURE TWO<sup>52</sup>

requirements for the MI battalion. Second, only two battalion collection assets--Quickfix and LRS teams--provide surveillance farther than thirty kilometers beyond the FLOT. Finally, besides ground surveillance radars, the battalion has no organic imagery intelligence (IMINT) collection systems. With these observations in mind, does the MI battalion have the necessary equipment and organization to see the battlefield?

#### VI. ANALYSIS OF MI BATTALION COLLECTION CAPABILITIES

Like the original 1970's "CEWI" battalions, present MI battalions emphasize ground-based SIGINT collection. Today, SIGINT remains an indispensable source of tactical intelligence, especially for the division commander's close battle. Here, wide area surveillance and rapid responsiveness make SIGINT especially useful for target acquisition and situation development. However, given the intelligence requirements generated by modern war and our doctrine, both outlined earlier, several factors limit the divisional MI battalion's SIGINT capabilities as a deep reconnaissance or surveillance asset.

The most serious divisional MI battalion ground based SIGINT limitation stems from inadequate range. As Figure Two shows, the maximum range for the division's ground based SIGINT systems is thirty kilometers. Even when augmented with the division's three aerial Quickfix systems, the SIGINT collection range only extends to fifty kilometers beyond the FLOT. Unfortunately, as the discussions in Part

II show, the division commander's intelligence requirements often transcend this distance.

The short range of ground based SIGINT systems also adversely effects their survivability. To reach their maximum thirty kilometer range, ground based systems must deploy dangerously close to the FLOT. Here, the SIGINT teams forward deployment, combined with their unique radio signatures and fragile carriers, increases their vulnerability to enemy direct and indirect fire weapons.

Besides limited range and survivability, the MI battalion's SIGINT equipment provides inadequate coverage of the division's frontage. For example, the division's TRAILBLAZER system can only cover a one- or two-brigade front.<sup>53</sup> However, this coverage "requires that all five [stations] of the system are operating, on line, and within communications line of sight of each other."<sup>54</sup> Additionally, for direction finding operations, TRAILBLAZER must be within line of sight to the target. Finally, even when fully operational, the TRAILBLAZER's

UHF data link communications system, which is the primary means for C<sup>3</sup> and automatic DF operations, presents a unique signature on the battlefield. Data link signals are emitted 360 degrees from the omnidirectional whip antennas. Thus, the system itself is not only vulnerable to enemy SIGINT, DF, and indirect fire systems, its employment against high priority target areas or on major avenues of approach used by friendly forces provide the enemy commander a significant indicator of brigade and division objectives.<sup>55</sup>

Similarly, TEAMPACK--the division's only organic source of enemy noncommunications emitters--cannot cover the entire

division front.<sup>56</sup> Indeed.

the fields of view and forward deployment of each TEAMPACK to achieve triangulation, maximum range, and LOS to the HPT emitters, restricts the target coverage area, front-wise, to that of one and possibly two brigades in best case situations, flat and level terrain notwithstanding.<sup>57</sup>

Moreover, TEAMPACK lacks an automated DF capability, relying instead on manually plotted lines of bearing from at least three systems. Thus, to DF enemy radar emitters, all three division TEAMPACK's must be operational and have communications line of site.

Additionally, current ground-based SIGINT intercept systems lack on-the-move collection capabilities. This limitation seriously degrades the MI battalion's collection contributions--especially during offensive operations. One example from Operation DESERT STORM illustrates the point.

During the 1st Armored Division's movement to contact with Iraqi forces, the division's 501st MI Battalion found SIGINT seldom suitable as a source of intelligence. Struggling to keep pace with maneuver brigades, SIGINT systems were unable to halt long enough to set up and operate. As the former battalion executive officer explains, "the equipment physically kept pace [with the division's attack], but the IEW system was not providing support during the movement."<sup>58</sup> We should recall that the division's movement continued at a steady pace for four days. Similar situations occurred with 1st Infantry Division (Mechanized).<sup>59</sup> In short, with SIGINT collection temporarily shut down during movement, the battalion loses its primary means to

acquire intelligence.

Operation DESERT STORM also reveals dilemmas facing commanders as they consider SIGINT capabilities. Paradoxically, initial SIGINT collection against Iraqi ground forces hindered subsequent tactical SIGINT collection. More clearly, before the coalition ground offensive, corps-controlled SIGINT platforms--primarily RV-21 Guardrail communications intercept aircraft--frequently located Iraqi command posts (CPs).<sup>60</sup> Armed with this intelligence, commanders often directed air and artillery strikes against these CPs with devastating results. The systematic attacks convinced Iraqi soldiers that merely turning on their radio equipment meant instant death.<sup>61</sup> However, the Iraqi hesitancy to use radios--while significantly degrading their C<sup>3</sup> capabilities--later hindered SIGINT collection by MI battalions during the ground war.<sup>62</sup>

The division uses its aerial SIGINT capability, Quickfix, to complement ground based SIGINT operations. However, like its ground-based counterparts, Quickfix also suffers from range limitations. Quickfix helicopters must operate about 10-20 kilometers from the FLOT to survive in a mid- to high-intensity environment. This limits their collection planning range to fifty kilometers beyond the FLOT.<sup>63</sup>

Human intelligence, primarily provided by the LRSC, can compensate for ground based SIGINT's deep surveillance and reconnaissance deficiencies. For example, the 124th MI Battalion's LRSC teams provided the 24th Infantry Division (Mech) commander with invaluable intelligence during DESERT

STORM. Inserted at night by the division's Blackhawk helicopters, the teams operated from 50 to 200 kilometers behind enemy lines.<sup>64</sup> Later, from carefully selected observation posts, the highly trained scouts radioed back important intelligence reports of Iraqi armor and troop movements.<sup>65</sup>

Despite their deep surveillance potential, division LRS operations have several limitations. First, deep infiltration normally occurs by parachute or helicopter insertion. This type of insertion requires detailed planning, complex coordination, and external support such as suppression of enemy air defenses. Second, once inserted, LRS teams are difficult to move, extract, and resupply. Finally, LRS operations run considerable risks of compromise, endangering not only the lives of the team members, but the higher headquarter's mission as well. As the 124 MI battalion LRS detachment commander recalls:

[w]e had one Bedouin stumble over a team's antenna wire and decide to pull it up and take it with him . . . . Suddenly three people erupted from the desert pointing guns at him. Must have been the worst day of his life.<sup>66</sup>

Fortunately, the team extracted without further difficulties.<sup>67</sup> Such is not always the case with LRS missions.

In sum, division-based signal and human intelligence systems have definite capabilities and limitations for collecting information. The division G2 considers these factors when matching sensors to intelligence requirements. However, notably missing from the division's collection capabilities is an imagery collection system. To truly

balance its collection capabilities and provide multi-source intelligence, the MI battalion needs an organic imagery collection capability.

Imagery intelligence, provided by sensors such as side looking airborne radar (SLAR), low light televisions, infrared cameras, or aerial photography, could add an important dimension to the division's deep collection plan. An imagery platform--such as an Unmanned Aerial Vehicle (UAV)--could complement the existing battalion SIGINT and HUMINT collection capabilities. Specifically, what advantages would UAV imagery collection platforms provide to the division commander?

To begin with, UAVs can provide surveillance of NAIs, TAIs, and DPs beyond the range of existing battalion collection systems. Moreover, able to revisit these areas or follow enemy forces, UAVs can track enemy movements along avenues of approach. This helps the G2 confirm or deny a previously predicted enemy course of action. In short, UAVs provide analysts near-real-time intelligence critical for situational development.

In addition to situational development, UAVs equipped with an imagery digital data link offer immediate targeting data for the division's deep strike attack systems. Focused at critical TAIs, UAVs can locate and confirm stationary or non-emitting high value targets. Further, during the division's close battle, UAVs--cued by wide-area SIGINT surveillance systems--can pinpoint targets for more effective indirect fire.

Besides improving surveillance and target acquisition, UAVs enhance the commander's reconnaissance capabilities throughout his AO and AI. Launched before a division deliberate attack or movement to contact, UAVs could conduct route reconnaissance ahead of attacking maneuver forces. During DESERT STORM, for example,

the Army developed an innovative use for [UAVs], employing them for route reconnaissance for AH-64 pilots. Apache pilots would watch the imagery coming back from a Pioneer [UAV] over a particular area, familiarize themselves with the terrain and pick out potential targets, then hop in their aircraft and fly their mission.<sup>68</sup>

Finally, UAVs would provide the commander an important battle damage assessment (BDA) capability. Follow up BDA missions flown by UAVs could confirm the destruction of previously engaged targets. This reduces expenditure of precious resources, allowing the commander to concentrate combat power for commitment at other decisive points on the battlefield.

Without an organic imagery collection platform, division commanders must rely on IMINT provided by corps or echelons above corps (EAC) intelligence systems to meet their intelligence requirements. Current EAC and corps-controlled imagery systems--including Joint Surveillance Target Attack Radar System (JSTARS) and SLAR-equipped OV-1D Mohawk's--often provide divisions and separate brigades important imagery support. Both systems, linked to ground terminals by digital data communications, can transmit IMINT reports directly to division intelligence officers.

However, recent DESERT STORM experiences reveal shortcomings in the dissemination of imagery products and reports to divisions. Indeed, as BG John F. Stewart, 3rd U.S. Army G2 during DESERT STORM writes:

dissemination, as it turned out, was the Achilles heel of MI. . . . We encountered every problem; delivery at the wrong unit, arrival at the wrong airport, inadequate numbers of copies at one spot and too many at another."<sup>69</sup>

Three other factors tend to limit the responsiveness of corps imagery systems. First, strategic or national priorities--as well as the corps deep battle mission--may focus the corps' limited imagery assets against targets outside the division commander's AO or AI. The "SCUD-busting" operations during DESERT STORM provides one example. Here, strategic priorities diverted many corps assets away from supporting division intelligence requirements.

Second, like other battlefield operating systems, corps generally focus their collection assets to support the main effort. However, there can be only one main effort. Thus, divisions conducting supporting attacks may receive little benefit from corps' intelligence support.

Finally, while direct dissemination of intelligence from the corps and echelon above corps promises great potential, such collection systems are often unresponsive to the division commander's priority intelligence requirements (PIR).<sup>70</sup> As the 1st Infantry Division G2 recently revealed, corps collection systems "tended to be responsive to the commander who owned them."<sup>71</sup> Thus, the G2 added, "if you own the assets it focuses on what you want it to focus on."<sup>72</sup>

## VII. CONCLUSIONS AND IMPLICATIONS

As the discussion above shows, the current MI battalion organization and equipment provide limited coverage of the heavy division's AO and AI. Indeed, as one senior intelligence officer stated:

if the contentions of AirLand Battle doctrine are correct and we find ourselves on a fluid battlefield, mounting dynamic offensive actions where courses of action on both sides continue to evolve. . . , our current [MI] assets will contribute more to traffic control problems than to the outcome of battles far to the front.<sup>73</sup>

Moreover, as a former School of Advanced Military Studies student succinctly observed, "the current tactical IEW system can provide usable intelligence to the commander, but not in the depth that AirLand Battle doctrine demands."<sup>74</sup>

The MI battalion's reliance on SIGINT, not complemented by an organic IMINT capability, restricts the division commander's view of the battlefield. Limited range, LOS requirements, inadequate coverage of the division front, and no on the move capability combine to curb the battalion's SIGINT collection operations. Use of helicopter platforms--while an important improv. it--is not enough to offset these limitations. Moreover, with no imagery capability to corroborate SIGINT or HUMINT findings, the MI battalion presents the commander an incomplete view of the battlefield. This hinders the commander's ability to make decisions regarding the synchronization of maneuver forces for the deep battle. Simply put, unable to look deep or effectively operate during mobile warfare, the MI battalion's

SIGINT systems offer the division commander limited intelligence to see the battlefield farther than fifty kilometers beyond the FLOT.

Finally, the battalion's collection deficiencies impact on current intelligence doctrine. Commanders today expect accurate predictions of enemy intentions. Their predictive tools--most importantly IPB--require multi-source collection to confirm enemy intentions. This is especially true during division deep operations. Indeed,

the intelligence system's capability to see deep is necessary to understand the effect of deep attack on the enemy decision cycle, tempo, and momentum. Both commanders and intelligence officers must realize the importance of seeing deep and deep attack in the interactive mental contrast with the opposing commander for control of initiative, tempo, and momentum.<sup>75</sup>

However, the battalion's ability to conduct reconnaissance or surveillance against NAIs, TAIs, or DPs deep in the division's area of interest falls far short of these expectations. Again returning to DESERT STORM, operational security considerations and political restrictions prevented forward deployment of the 1st Armored Division's MI battalion before 22 February 1991. Yet, even after crossing the line of departure, the division still "had virtually no ability to see its NAIs or TAIs except by sending aircraft out to go put eyes on. They were virtually all outside of division collection capability."<sup>76</sup> Before the next battle, we must provide division commander's the eyes they need to see the battlefield.

## VIII. RECOMMENDATIONS

A recently released "Military Intelligence 2000 White Paper" signed by the Deputy Chief of Staff, Intelligence, describes the modernization of intelligence forces out to the year 2006.<sup>77</sup> Planned additions for the heavy division's collection capability include an Advanced Quickfix system, a new ground based common sensor (GBCS) mounted in an electronic fighting vehicle system (EFVS), and an Unmanned Aerial Vehicle (UAV) platoon equipped with Close Range UAVs. I offer below two recommendations to fill the division commander's collection gap before the fielding of these systems.

First, heavy divisions need an organic IMINT capability to supplement SIGINT and HUMINT sources. Here, introducing both Close Range (CR) and Short Range (SR) Unmanned Aerial Vehicles (UAVs) into the division's MI battalion offers the most important improvement for intelligence collection. Unfortunately, current fielding plans include introducing only CR UAVs into the division's organization.<sup>78</sup>

The Joint UAV Program Office, established by Congress in 1988 to overwatch UAV development, differentiates CR and SR UAVs primarily based on range. The CR UAV has a maximum range of thirty kilometers while the SR UAV can fly forward of the FLOT more than 150 kilometers.<sup>79</sup> Both provide the commander a day or night imaging capability with a minimum of six hours loiter time. Most important, CR and SR UAVs can downlink instant imagery to the Mission Planning and

Control Station (MPCS) and remote video terminals best positioned to support the commander's requirements. In short, the addition of a UAV Company with a combination of SR and CR UAVs would provide the commander near-real-time imagery of the division's areas of operations and interest out to ranges up to 150 kilometers.

Recent DESERT STORM experiences clearly demonstrate the UAV's importance for imagery collection. During the war, UAV's logged more than 1000 hours in support of coalition forces. Despite intense ground fire from enemy defenders, only two UAVs were lost while three others were damaged.<sup>80</sup> Developmental shortcoming notwithstanding, UAVs provided division commanders some of their most significant intelligence during the ground war.<sup>81</sup>

Second, with the addition of UAVs, divisions would also require an organic imagery interpretation capability. Assigning an eleven man imagery section headed by a warrant officer to the heavy division All Source Production Section (ASPS) appears the best solution.<sup>82</sup> This number would allow two four-man shifts to continuously monitor and interpret UAV imagery down-linked to the MPCS. Moreover, besides interpreting UAV- or corps-furnished imagery products, the imagery section could provide valuable help to collection managers when planning IMINT missions. Finally, a Department of the Army Directive removing AN/MSQ103s from the heavy division MI battalion by fiscal year 1993 would yield personnel spaces to establish the division imagery section.

Appendix 1: U.S. Army Heavy Division SIGINT Sensors

<u>Collection System/ Nickname</u>	<u>Quantity/ Platform</u>	<u>Intercept/ DF or LOB</u>	<u>Normal Range</u>
AN/TRQ 30* (NONE)	3 Manpack	HF,VHF/ VHF LOB	30 KM LOS
AN/TRQ 32 (V)2 TEAMMATE	3 HMMWV	HF,VHF,UHF/ VHF DF	30 KM LOS
AN/PRD 10 (NONE)	3 Manpack	HF,VHF,UHF/ VHF DF	30 KM LOS
AN/TSQ 138 TRAILBLAZER	1 5 M1015s	HF,VHF,UHF/ VHF DF	30 KM LOS
AN/ALQ 151 (V)2 QUICKFIX IIB	3 EH60A	HF,VHF/ VHF DF	50 KM
AN/MSQ 103 C** TEAMPACK	3 M1015	NONCOMS/ NONCOMS LOB	30 KM

\* Will eventually be replaced by AN/PRD 10.

\*\* Removed from Heavy Division MI Battalion in FY 93 by DA Directive.

The following two Electronic Counter Measures (ECM) Warfare systems have a secondary role as SIGINT collectors.

AN/TLQ-17A(V)3 TRAFFICJAM	3 HMMWV	HF/VHF	30 KM LOS
AN/MLQ-34 TACJAM	3 M1015	HF/VHF	30 KM LOS

## ENDNOTES

- 1 US Army Field Manual 71-100, *Division Operations* (Washington D.C.: US Government Printing Office, 16 June 1990), p. 1-22.
- 2 *Ibid.*
- 3 J. F. C. Fuller, *Military History of the Western World, vol II, From the Defeat of the Spanish Armada, 1588 to the Battle of Waterloo, 1815* (New York: Funk and Wagnall, 1955), p. 206.
- 4 US Army Field Manual 34-10, *Division Intelligence and Electronic Warfare Operations* (Washington D.C.: US Government Printing Office, 25 November 1986), p. 1-1.
- 5 James L. Schneider, "Theoretical Paper No. 3: 'The Theory of Operational Art.'" Comprehensive Exam Special. School of Advanced Military Studies. (Ft Leavenworth, Ks.: US Army Command and General Staff College), 1 March 1988.
- 6 *Ibid.* p. 6.
- 7 *Ibid.* p. 7.
- 8 US Army Field Manual 100-5, *Operations* (Washington D.C.: US Government Printing Office, 5 May 1986), p. 2.
- 9 Paddy Griffith, *Forward Into Battle: Fighting Tactics From Waterloo to the Near Future* (Novato, CA: Presido Press, 1991), p. 180.
- 10 *Ibid.*, p. 183.
- 11 "'Filtering' Helped Top Military Leaders Get Proper Intelligence Information." *Aviation Week and Space Technology*, 22 April 1991, p. 84.
- 12 Martin van Creveld, *Command in War* (Cambridge, MA: Harvard University Press, 1985), p. 2.
- 13 FM 100-5, *Operations*, p. 4.
- 14 Dean R. Anderson, "Modernizing Army Command and Control," *Military Review* 70 (July 1990): 6.
- 15 LTG Leonard P. Wishart, "Leader Development and Command and Control," *Military Review* 70 (July 1990): 12.
- 16 David Kahn, "Clausewitz and Intelligence," in *Clausewitz and Modern Strategy*, ed. Michael A. Handel (London: Frank Cass & Company, 1986), p. 121.
- 17 *Ibid.*, p. 117.

18 Carl von Clausewitz, *On War*, translated and edited by Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1989), p. 104.

19 *Ibid.*, p. 117.

20 *Ibid.*, p. 104.

21 *Ibid.*, p. 101.

22 Wayne M. Hall, "AirLand Battle Doctrine and IEW Operations," *Military Intelligence* 12 (July-September 1986): 11.

23 Richard E. Simpkin, *Race to the Swift: Thought on Twenty-First Century Warfare* (London: Brassey's Defence Publishers, 1985), p. 201-202.

24 Anderson, "Modernizing Army Command and Control," p. 5.

25 FM 100-5, *Operations*, p. 16.

26 FM 71-100, *Division Operations*, p. 5-3.

27 US Army Field Manual 101-5-1, *Operational Terms and Symbols*, (Washington, D.C.: US Government Printing Office, 21 October 1985), p. 1-5.

28 FM 71-100, *Division Operations*, p. 1-5.

29 *Ibid.*

30 *Ibid.*, p. 3-2.

31 US Army Field Manual 17-95, *Cavalry Operations* (Washington, D. C.: US Government Printing Office, 14 February 1986), p. 2-3.

32 Telephone interview with COL (Ret) John Boyd, U. S. Air Force, 25 July 1991: While involved with flight tests for the YF-16/17, Boyd initially used his "OODA loop" theory to explain fighter pilot actions in air-to-air combat. Today, he has expanded the decisionmaking model to include combat operations between larger formations; See also William S. Lind, *Maneuver Warfare Handbook* (Boulder, CO: Westview Press, 1985), p. 4; US Army Field Manual 34-1, *Intelligence and Electronic Warfare Operations* (Washington, D.C.: US Government Printing Office, 2 July 1987), uses a diagram including "Observation, Orientation, Decision, and Action" to describe the decisionmaking process on page 4-16.

33 William S. Lind, *Maneuver Warfare Handbook* (Boulder, CO: Westview Press, 1985), p. 4.

34 *Ibid.*, p. 5.

- 35 *Ibid.*
- 36 US Army Field Manual 34-130, *Intelligence Preparation of the Battlefield* (Washington, D.C.: US Government Printing Office, 23 May 1989), p. 1-1.
- 37 *Ibid.*, p. 4-1.
- 38 *Ibid.*, p. 4-59.
- 39 US Army Field Manual 34-3, *Intelligence Analysis* (Washington, D.C.: US Government Printing Office, 15 March 1990), p. 4-29.
- 40 FM 34-130, *Intelligence Preparation of the Battlefield*, p. 4-66.
- 41 *Ibid.*, p. 4-70.
- 42 Linda Linden, "To Predict or Not Predict: Crossroads for Tactical Intelligence?" Monograph, School of Advanced Military Studies. (Ft. Leavenworth, Ks.: US Army Command and General Staff College, 26 March 1990), p. 37.
- 43 Chris Bellamy, *The Future of Land Warfare* (New York: St. Martin's Press, 1987), p. 230.
- 44 *Ibid.*
- 45 Table of Organization and Equipment 34285L000, Heavy Division, Military Intelligence Battalion, 1 October 1989.
- 46 *Ibid.*
- 47 FM 34-10, *Division Intelligence and Electronic Warfare Operations*, p. 3-20.
- 48 US Army Field Manual 34-80, *Brigade and Battalion Intelligence and Electronic Warfare Operations* (Washington, D. C.: US Government Printing Office, 15 April 1986), p. 2-44.
- 49 *Ibid.*, p. 2-46.
- 50 *Ibid.*, p. 2-54.
- 51 *Ibid.*, pp. 2-25--2-26.
- 52 Figure Two reflects data extrapolated from FM 34-10, *Division Intelligence and Electronic Warfare Operations*, ps. 2-1 and 5-20 -- 5-21.
- 53 FM 34-80, *Brigade and Battalion IEW Operations*, p. 2-44.

54 James E. Elder, "The Tactical IEW System and Intelligence on the AirLand Battlefield." Monograph, School of Advanced Military Studies. (Ft. Leavenworth, Ks.: US Army Command and General Staff College, 16 December 1988), p. 23.

55 FM 34-80. *Brigade and Battalion IEW Operations*, p. 2-44.

56 *Ibid.*, p. 2-47.

57 *Ibid.*

58 Letter received from LTC Russell Thayden, US Army, G2, 5th Infantry Division (Mech), formerly Executive Officer, 501st Military Intelligence Battalion, 1st Armored Division during Operation DESERT STORM, 25 October 1991.

59 Personal interview with CPT Michael Donovan, US Army, G2 Assistant Plans Officer, 1st Infantry Division (Mech), conducted at Hoge Hall, Fort Leavenworth, KS, 10 October 1991.

60 *Ibid.*

61 *Ibid.*

62 *Ibid.*

63 FM 34-10, *Division Intelligence and Electronic Warfare Operations*, p. 2-1.

64 Telephone interview with Captain Franklin Moreno, Commander, Company D (LRS), 124th MI Battalion, 24th Infantry Division (Mech), 7 November 1991; see also Joseph L. Galloway, "The Spies in the Sand Far Behind the Enemy Lines," *US News & World Report*, 11 March 1991, p. 34; Galloway reports the 24th Inf Div (M) LRSU insertions taking place out to ranges of "500 kilometers." Telephone interviews with Captain Moreno confirm the maximum insertion ranges at 200 kilometers.

65 Telephone interview with Captain Moreno.

66 Galloway, "Spies in the Sand," p. 35.

67 Telephone interview with Captain Moreno.

68 "Gulf War Experience Sparks Review of RPV Priorities," *Aviation Week & Space Technology*, 22 April 1991, p. 86.

69 John F. Stewart, Brigadier General, US Army. "Operation Desert Storm, The Military Intelligence Story: View from the G-2, 3rd Army." Riyadh, Saudi Arabia: 3rd US Army, April, 1991., p. 10-11.

70 CPT Donovan interview: letter received from LTC Thayden, 25 October 1991.

71 1st Infantry Division (Mech) G2 and MI Battalion "Lessons Learned" briefing to Command and General Staff College students by LTC Terrance Ford (G2) and LTC Bill Moore, (MI Bn Cdr), Fort Leavenworth, Kansas, 7 November 1991.

72 *Ibid.*

73 Leonard G. Nowak, "Division Intelligence: Left in AirLand Battle's Dust?" *Military Review* 67 (November 1987): 56.

74 Elder, "The Tactical IEW System and Intelligence on the AirLand Battlefield," p. 27.

75 Hall, "Airland Battle Doctrine and IEW Operations," p. 13.

76 Letter received from LTC Thayden, 25 October 1991.

77 US Army White Paper "MI 2000: Identification of Military Intelligence Missions, Organizations and Functions Thru the Year 2006," 25 January 1991.

78 *Ibid.*, p. B-5.

79 Sheila Galatowitsch, "Unmanned Aerial Vehicles Take the Spotlight," *Defense Electronics* 9 (September 1991): 44.

80 "Gulf War Experience Sparks Review of RPV Priorities," p. 86.

81 1st Inf Div G2 and MI Bn "Lessons Learned" Briefing by LTC Ford and LTC Moore; personal interview with CPT Donovan.

82 Special Security Officer (SSO) Message (Unclassified) From 1st Armored Division SSO To SSO FT Huachuca, DTG 121135Z June 1991, Subject: Heavy Division Intelligence Support.

## BIBLIOGRAPHY

### US Government Documents, Manuals, and Reports

- Table of Organization and Equipment 34285L000, Heavy Division, Military Intelligence Battalion, 1 October 1989.
- U. S. Army Field Manual 17-95, *Cavalry Operations*. Washington, D.C., US Government Printing Office, 14 February 1986.
- U. S. Army Field Manual 34-1, *Intelligence and Electronic Warfare Operations*. Washington, D.C., US Government Printing Office, July 1987.
- U. S. Army Field Manual 34-3, *Intelligence Analysis*. Washington, D.C., US Government Printing Office, March 1990.
- U. S. Army Field Manual 34-10, *Division Intelligence and Electronic Warfare Operations*. Washington, D.C., US Government Printing Office, November 1986.
- U. S. Army Field Manual 34-25, *Corps Intelligence and Electronic Warfare Operations*. Washington, D.C., US Government Printing Office, September 1987.
- U. S. Army Field Manual 34-80, *Brigade and Battalion Intelligence and Electronic Warfare Operation*. Washington, D.C., US Government Printing Office, April 1986.
- U. S. Army Field Manual 34-130, *Intelligence Preparation of the Battlefield*. Washington, D.C., US Government Printing Office, May 1990.
- U. S. Army Field Manual 71-100, *Division Operations*. Washington, D.C.: US Government Printing Office, June 1990.
- U. S. Army Field Manual 100-5, *Operations*. Washington, D.C., US Government Printing Office, May 1986.
- U. S. Army Field Manual 101-5-1, *Operational Terms and Symbols*. Washington, D.C.: US Government Printing Office, 21 October 1985.

### Books and Monographs

- Argersinger, Steven J., Major, US Army. "An Operational Concept for the Defeat of the Soviets Based on an Analysis of the Soviet Decision Cycle." Thesis. Ft. Leavenworth, Ks.: US Army Command and General Staff College, 16 May 1984.

- Bellamy, Chris. *The Future of Land Warfare*. New York: St. Martin's Press, 1987.
- Clausewitz, Carl von. *On War*. Edited and translated by Michael Howard and Peter Paret. Princeton: Princeton University Press, 1984.
- Cohen, Eliot A., and John Gooch. *Military Misfortunes: The Anatomy of Failure in War*. New York: The Free Press, 1990.
- Conover, Gregory B., Major, US Army. "Soviet Troop Control: The True Target on the AirLand Battlefield." Monograph, School of Advanced Military Studies. Ft. Leavenworth, Ks.: US Army Command and General Staff College, 16 December 1988.
- Creveld, Martin van. *Command in War*. Cambridge, Mass.: Harvard University Press, 1985.
- Edwards, Lennie O. Jr, Major, US Air Force. "A Role for Unmanned Aerial Vehicles on the Modern Tactical Battlefield." Monograph, School of Advanced Military Studies. Ft. Leavenworth, Ks.: US Army Command and General Staff College, 26 March 1990.
- Elder, James E., Major, US Army. "The Tactical IEW System and Intelligence on the AirLand Battlefield." Monograph, School of Advanced Military Studies. Ft. Leavenworth, Ks.: US Army Command and General Staff College, 16 December 1988.
- Fuller, J. F. C. *Military History of the Western World, vol II, From the Defeat of the Spanish Armada, 1588 to the Battle of Waterloo, 1815*. New York: Funk and Wagnall, 1955.
- Griffith, Paddy. *Forward Into Battle: Fighting Tactics From Waterloo to the Near Future*. Novato, CA: Presido Press, 1991.
- Halbleib, Richard C., Major, US Army. "Tactical Communications Intelligence (COMINT): Targeting A Soviet Motorized Rifle Division." Monograph, School of Advanced Military Studies. Ft Leavenworth, Ks.: US Army Command and General Staff College, 26 March 1990.
- Handel, Michael I., ed. *Clausewitz and Modern Strategy*. London: Frank Cass and Company, LTD., 1986.
- Hemsley, John. *Soviet Troop Control: The Role of Command Technology in the Soviet Military System*. New York: Brassey's Publishers Limited, 1982.

- Kennedy, William V. *Intelligence Warfare: Today's Advanced Technology Conflict*. New York: Crescent Books, 1983.
- Kirkpatrick, Lyman B. Jr., *Captains Without Eyes: Intelligence Failures During World War II*. Boulder, CO: Westview Press, 1987.
- Lind, William S., *Maneuver Warfare Handbook*. Boulder, CO: Westview Press, 1985.
- Linden, Linda L., Major, US Army. "To Predict or Not Predict: Crossroad for Tactical Intelligence?" Monograph, School of Advanced Military Studies. Ft. Leavenworth, Ks.: US Army Command and General Staff College, 26 March 1990.
- \_\_\_\_\_. "Operational Level Intelligence: An Alternate Approach." Monograph, School of Advanced Military Studies. Ft. Leavenworth, Ks.: US Army Command and General Staff College, 7 June 1990.
- Manki, David R., Major, US Army. "Collection Management and Dissemination: The Anchor in the Race Against Time." Monograph, School of Advanced Military Studies. Ft. Leavenworth, Ks.: US Army Command and General Staff College, 26 March 1990.
- Simpkin, Richard E. *Race to the Swift: Thoughts on Twenty-First Century Warfare*. London: Brassey's Defence Publishers, 1985.
- Sun Tzu, *The Art of War*. Translated by Samuel B. Griffith. New York: Oxford University Press, 1971.
- Thayden, Russell., Major, US Army. "Intelligence Preparation of the Battlefield and Predictive Intelligence." Monograph, School of Advanced Military Studies. Ft. Leavenworth, Ks.: US Army Command and General Staff College, 3 December 1986.
- Wilson, Terry B., Major, US Army. "Brigade Intelligence Operations: Implications for the Nonlinear Battlefield." Monograph, School of Advanced Military Studies. Ft. Leavenworth, Ks.: US Army Command and General Staff College, 6 March 1991.

#### Articles and Papers

- Anderson, Dean R. "Modernizing Army Command and Control," *Military Review* 70 (July 1990).
- "Army's Radar Research Capability Expands in 90s." *Signal* 45 (March 1991): 61-63.

- Bornick, Bruce K., Captain (P), US Army. "Unmanned Aerial Vehicle Support." *Military Review* 69 (August 1989): 44-49.
- Burkett, Jack., Lieutenant Colonel, US Army. "Command and Control: The Key to Winning." *Military Review* 70 (July 1990): 60-68.
- Burton, Ralph W. "Military Intelligence Support to Division and the Air/Land [sic] Battle." *Military Intelligence* 7 (July-September 1981): 9-12.
- Campi, Anthony V. and Samuel G. Livecchi. "Seamless System of Systems for the Future Battlefield." *Army* 40 (April 1990): 58-65.
- Chastain, Albert S., Captain, US Army. "Unmanned Aerial Vehicles." *Military Intelligence* 7 (July-September 1981): 32-36.
- Cook, Donald R., Major, US Army. "The Army Intelligence Master Plan: A Path to the 21th [sic] Century." *Military Intelligence* 15 (January-March 1989): 12-15.
- Curtis, Ian. "Venturing into No Man's Land: The New Wave of RPVs." *Defense and Foreign Affairs* (July 1990): 26-31.
- Davis, Malcom R. "The Weapons That Won the War." *Asia-Pacific Defense Reporter* 18 (August 1991): 8-13.
- Galatowitsch, Sheila. "Unmanned Aerial Vehicles Take the Spotlight." *Defense Electronics* 23 (September 1991): 43-48, 50-54.
- "Gulf War Experience Sparks Review of RPV Priorities." *Aviation Week and Space Technology* 134 (12 April 1991): 86-87.
- Hall, Wayne M., Major, US Army. "AirLand Battle Doctrine and IEW Operations." *Military Intelligence* 12 (July-September 1986): 10-15, 53.
- Hammond, John C., Lieutenant Colonel (P), US Army. "CEWI: Vision for the Future?" *Military Review* 70 (June 1990): 58-68.
- Keyworth, G. A. "Distributed Surveillance: A Space-Based Revolution." *Signal* 44 (August 1990): 49-51.
- Kind, Peter A., Major, US Army. "Army Tactical C<sup>2</sup> System." *Military Review* 70 (July 1990): 35-41.

- Lockwood, Johnathan S., Captain, US Army. "The Principles of Intelligence and Electronic Warfare." *Military Intelligence*. 9 (April-June 1983): 7-8.
- Lovece, Joseph A. "UAV Programs Experience Growth Pains." *Armed Forces Journal International* (July 1991): 30-33.
- "Metal Rain: 'Old Ironsides' and the Iraqis Who Wouldn't Back Down." *Army Times*, 16 September 1991, p. 8.
- Newell, Clayton R., Lieutenant Colonel, US Army. "The Technological Future of War." *Military Review* 69 (October 1989): 22-28.
- \_\_\_\_\_. "Fog and Friction: Challenges to Command and Control." *Military Review* 67 (August 1987): 18-26.
- Nowak, Leonard G., Colonel, US Army. "Division Intelligence: Left in AirLand Battle's Dust?" *Military Review* 67 (November 1987): 52-59.
- Otis, Glenn K., General, US Army, and Johnson, John F., Major, US Army. "A Commander's Perspective on the Tactical Intelligence System." *Military Intelligence* 12 (April-June 1986): 19-21.
- Ostott, Charles P., Lieutenant General, US Army, Hagan, Craig A., Brigadier General, US Army, and Richmond, Melvin E., Major, US Army. "Battle Rhythm: Division Command and Control." *Military Review* 70 (June 1990): 14-26.
- Patterson, Robert. "The Other Side of the Hill: Reconnaissance and Surveillance on the European Battlefield." *NATO's Sixteen Nations* 31 (July 1986): 62-64, 67.
- Ridlon, Roy, Captain, US Army. "Shots in the Dark: British Tactical Intelligence in the Falklands War." *Military Intelligence* 15 (July-September 1989): 40-42, 49.
- Roy, Robert J. "Combat Operations Garner Unmanned Aerial Support." *Signal* 45 (April 1991): 15-19.
- Saint, Crosbie E., Lieutenant General, US Army. "Intelligence Requirements at the Operational Level of War." *Military Intelligence* 13 (March 1987): 6, 48.
- Schneider, James L. "Theoretical Paper No. 3: 'The Theory of Operational Art.'" Comprehensive Exam Special. School of Advanced Military Studies. Ft Leavenworth, Ks.: US Army Command and General Staff College. 1 March 1988.
- "Signals Warfare Center Has Potent Desert Storm Role." *Signal* 45 (March 1991): 57-59.

- Sincere, Clyde J., Captain, US Army. "Target Acquisition for the Deep Battle." *Military Review* 69 (August 1989): 23-28.
- Skelton, John D., Major, US Army. "IEW Support of FTX Hardened Steel VIII." *Military Intelligence* 12 (July-September 1984): 32-33.
- Stech, Frank J., Captain, US Army Reserve. "Intelligence, Operations, and Intentions." *Military Intelligence* 6 (July-September 1980): 37-43.
- Stewart, John F., Brigadier General, US Army. "Operation Desert Storm, The Military Intelligence Story: View from the G-2, 3rd Army." Riyadh, Saudi Arabia: 3rd US Army, April, 1991.
- US Army White Paper "MI 2000: Identification of Military Intelligence Missions, Organizations and Functions Thru the Year 2006," 25 January 1991.
- Wickham, John A., General, RET, US Army. "The Intelligence Role in Desert Storm." *Signal* 45 (April 1991): 12.

Telephone Interviews, Personal Interviews, Letters,  
and Briefings

- 1st Infantry Division G2 and MI Battalion "Lessons Learned" briefing to Command and General Staff College students by LTC Terrence Ford and LTC Bill Moore, Fort Leavenworth, Kansas, 7 November 1991.
- Boyd, John., Lieutenant Colonel (Retired), US Air Force. Telephone interview, 25 July 1991.
- Donovan, Michael., Captain, US Army. G2 Assistant Plans Officer, 1st Infantry Division (Mechanized). Personal Interview with author conducted at Hoge Hall, Fort Leavenworth, KS, 10 October 1991.
- Moreno, Franklin., Captain, US Army. Commander, Company D (LRS), 124th MI Battalion, 24th Infantry Division (Mech). Telephone interview. 7 November 1991.
- Thayden, Russell., Lieutenant Colonel, US Army, G2 5th Infantry Division (Mech), formerly Executive Officer, 501st MI Battalion, 1st Armored Division. Letter to author. 21 October 1991.