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6. AUTHOR(S)
Major Harry Vann Phillips

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

US Army Command and General Staff College
1 Reynolds Avenue
Fort Leavenworth, KS 66027-1352

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DOES THE JOINT SURVEILLANCE TARGET ATTACK RADAR SYSTEM SUPPORT MILITARY PEACE OPERATIONS? A CASE STUDY OF JOINT SURVEILLANCE TARGET ATTACK SYSTEM SUPPORT TO OPERATION JOINT ENDEAVOR

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

HARRY V. PHILLIPS, MAJ, USA
B.A., Shippensburg University, Shippensburg, Pennsylvania, 1983

Fort Leavenworth, Kansas
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Name of Candidate: MAJ Harry V. Phillips

Thesis Title: Does the Joint Surveillance Attack Radar System Support Military Peace Operations? A Case Study of Joint Surveillance Target Aattack Radar System Support to Operation Joint Endeavor

Approved by:

_____, Thesis Committee Chairman
Robert F. Baumann, Ph.D.

_____, Member
LTC Walter E. Kretchik, M.A., M.M.A.S.

_____, Member
MAJ Dustin A. Tyson, M.A.

Accepted this 5th day of June 1998 by:

_____, Director, Graduate Degree Programs
Philip J. Brookes, Ph.D.

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

DOES THE JOINT SURVEILLANCE TARGET ATTACK RADAR SYSTEM SUPPORT MILITARY PEACE OPERATIONS? A Case Study of Joint Surveillance Target Attack Radar System Support to Operation Joint Endeavor, by MAJ Harry V. Phillips, USA, 133 pages.

America's 1997 "National Security Strategy" contends, "the future is uncertain." "Uncertainty" includes applying technology to military peace operations. Learning from peace operations today supports planning the peace operations of tomorrow. This thesis strives to capture the application of JSTARS' technology in support of Operation JOINT ENDEAVOR (OJE). OJE is the North Atlantic Treaty Organization's (NATO) *peace enforcement* mission in Bosnia-Herzegovina. The NATO led Implementation Force (IFOR), reinforced with non-NATO allies, deployed into a dangerous Bosnian security environment in December 1995. After four years of combat, the former warring factions (FWF), of three "ethnic nations," posed a significant threat to IFOR. Force protection requirements justified deploying JSTARS. The thesis therefore addresses the application of JSTARS technology to IFOR's mission requirements. Researching available data discovered mission degradation caused by uncoordinated mission planning, international airspace constraints, and lack of formal coordination at the international level. Deploying in contravention to stated doctrine likewise impeded mission execution. Additionally, thesis research discovered executive level interest influencing the deployment decision. The primary mission remained however to support IFOR. OJE is an excellent template for future peace operations. Studying JSTARS' OJE performance conveys the complexities associated with intelligence, surveillance, and reconnaissance (ISR) in joint and combined military operations.

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"Praise God from whom all blessings flow, Praise him all creatures here below, Praise him above the heavenly hosts, Praise father, son, and holy ghost," amen. I thank God for his strength, charity, and the miracles he performs everyday. Believing in his Son Jesus Christ has made my character stronger than I ever imagined possible. I thank Dr. George Kuykendall and Chaplain (LTC) Steve Paschall for introducing him to me.

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LIST OF ABBREVIATIONS

AEG	Air Expeditionary Group
AGS	Alliance Ground Surveillance
ARRC	ACE (Allied Command Europe) Rapid Reaction Corps
CAOC	Combined Air Operations Center
EUCOM	European Command
FTI	Fixed Target Indicator
FWF	Former Warring Factions
GRCA	Ground Reference Coverage Area
GSM	Ground Station Module
IFOR	Implementation Force
ISARC	Intelligence Surveillance and Reconnaissance Center
ISR	Intelligence Surveillance Reconnaissance
JCS	Joint Chiefs of Staff
JSTARS	Joint Surveillance Target Attack Radar System
LANDCENT	Allied Land Forces Central Europe
LGSM	Light Ground Station Module
MGSM	Medium Ground Station Module
MTI	Moving Target Indicator
NATO	North Atlantic Treaty Organization
OJE	Operation Joint Endeavor

PEO	Peace Enforcement Operation
RRCA	Radar Reference Coverage Area
SAR	Synthetic Aperture Radar
SCDL	Surveillance Control Data Link
SLAR	Side Looking Airborne Radar
SS	Sector Search
UNPROFOR	United Nations Protection Force
USAFE	United States Air Forces Europe
USAREUR	United States Army Europe
WAS	Wide Area Surveillance

CHAPTER 1

AND THE ARMY GOES MARCHING ALONG

Introduction

The United States Army is engaged in a dedicated effort to determine how it will fight in the twenty-first century. Doctrine, manning, tactics, and training are being subjected to the unconstrained influence of a revolution in military affairs (RMA). Every aspect of the Army's mission is enduring the turmoil of one era coming to a close and another era just beginning.[1] The transition began in 1989 when the collapse of the Soviet Union and tearing down of the Berlin Wall made the United States the world's only superpower. The U.S. Congress began perceiving reduced threats to America's security during this time period. A reduction in the perceived threat inspired congressional leaders to think in terms of reducing expenditures associated with the military. The term "peace dividend" became associated with anticipated cost savings resulting from a downsized military. As a result, congressional budget cuts targeted the military's size and acquisition expenditures. Military manpower, installation infrastructure, civilian personnel, and hardware acquisition became a billpayer associated with the term peace dividend.

Congressionally ordained manpower ceilings and budget cuts mandated reductions in the size of the Army and limited its ability to acquire new equipment.[2] Tradeoffs were made between research and development, the acquisition of new hardware, and improving existing inventories. Joint initiatives were substituted for single service projects associated with improving the respective service's ability to fight the

nation's wars. Voluntary separation from the Army was encouraged to help meet reduced personnel authorizations. The entire VII Corps in Germany was inactivated. Subordinate divisions furled their colors and reassigned personnel. In the U.S., divisions restructured, inactivated, or renamed themselves to support congressional mandates. (See Table 1.)

Table 1. The Army Transition

	(Fiscal Years)			FY89-03 Cumulative
	FY 1989	FY 1999	FY 2003	Reductions
Components:				
Active:	770,000	480,000	480,000	-290,000 (-38%)
Reserve:	776,000	565,000	530,000	-246,000 (-32%)
(National Gaurd)	(457,000)	(357,000)	(350,000)	(-107,000)(-23%)
(Reserves)	(319,000)	(208,000)	(205,000)	(-114,000)(-36%)
Corps	5	4	4	-1 Corps (VII)
Divisions:				
(Active)	18	10	10	-8 Active Divisions
(Reserve)	10	8	8	-2 Reserve Divs
Civilian Personnel	403,000	237,000	218,000	-185,000 (-46%)

Source: Col Charles F. Feldmeyer (U.S. Army Retired), "The Army Budget," (Arlington, Virginia: Association of the United States Army), *Army Magazine*, May 1998), 24.

The congressionally mandated Base Realignment and Closing Commission (BRAC) closed or reduced operations at military facilities worldwide. By 1994, economic prosperity in the private sector began luring large numbers of soldiers away from Army career aspirations. Recognizing the utility of emerging technologies, the Army began a program to leverage technical capabilities to increase the lethality of its downsized force. The Army's civilian and military leadership understood the changing

threats combined with emerging technology would change the way the Army supports national interests.

The changing global situation significantly modified the Cold War method of doing business. The term military operations other than war (MOOTW) came into vogue. Seeing an idle military (resulting from lack of a threat) as nonproductive, congressional and administration decision-makers tasked the Army to perform a myriad of modern peace operations. As the size of America's overseas Army decreased, the number of operations in foreign lands increased. Historically, it is argued the Army has conducted MOOTW since its inception. However, never before in the history of America has the Army engaged in the number of MOOTW as it has in the late twentieth century. Not all of the missions have been peaceful.[3] A number of deadly lessons learned have given the Army good reason to focus on force protection and warfighting skills. Understanding the potential for threat, decision makers have opted for increased levels of force protection with each subsequent mission.

The challenge facing today's Army is how to balance warfighting skills with MOOTW requirements. Integrating the emerging technologies associated with the RMA compounds the challenge. Whereas RMA concepts and principles apply to warfighting, do they likewise apply to MOOTW. The current state of technology allows the commander at each echelon of every military service to have more information available to him (or her) than at any point in the past. Increasing the amount of information theoretically improves understanding of situational awareness thereby reducing the number of soldiers, airmen, sailors, and marines to accomplish the same mission of their

military predecessors. It is argued that advanced computing capabilities and streamlined communications combine to reduce decision making cycles and increase lethality of combat forces. (See table 2.)[4]

Table 2. Historical Data Rates and Number of Soldiers Needed to Cover 10 Square Kilometers

	US Civil War	WWI	WWII	Gulf War	Future War
Data Rate (wpm)	30 *telegraph*	30 *telegraph*	66 *t eletype*	192,000 *computer*	1.5 trillion *computer*
# Soldiers	38,830	4,040	360	23.4	2.4

Source: Richard J. Newman, "Warfare 2020," *U.S. News And World Report*, 5 August 1995), 35-36.

Threats to America's security are changing. The changing global situation has altered the nature of the threat facing America in the next century. Perceived threats are not as physically imposing as in the past. However, the capabilities of the threat are potentially more malicious than at any point in America's history. America's *National Security Strategy for a New Century* addresses three challenges for the military: "responding to transnational threats, smaller-scale contingencies, and major theater war (MTW)."[5] The associated national military objectives include: "promoting stability through regional cooperation and constructive interaction and thwarting aggression through credible deterrence and robust warfighting capabilities."[6] No longer is America threatened by a super power nemesis standing just to the east of her European allies.[7] Linear battlefields of the past are being relegated to the history books. Future military

operations are being categorized as nonlinear without clear lines of demarcation between opposing forces. These realizations are combining to shape the Army of the twenty-first century.[8] The outcome will determine the Army's ability to respond to the full spectrum of future crisis.

The Army recognizes its primary mission is to fight and win America's wars. In peacetime, training soldiers to fight is preeminent over every other consideration. Defeating the nation's enemies is the ultimate purpose of America's Army. However, the Army must also consider its role in crisis which fall short of war. Because the National Military Strategy (NMS) stresses the need for global engagement, the Army must be prepared to support important national interests. Supporting friendly nations around the world is key to accomplishing global security. Fulfilling requirements established by the President and Congress include using military forces to conduct peace operations. Given the National Security Strategy's (NSS) consideration of an uncertain future, it seems plausible the Army will find itself conducting peace operations in the future. RMA concepts, however, focus on future warfighting. Should RMA concepts support the execution of operations other than war?

The Army's Force XXI[9] initiative is exploring information age technology in an effort to retain the advantage over potential future adversaries. Force XXI integrates advanced technology to support anticipated Army requirements. Maneuver, fire support, communications, logistics, and intelligence are key areas undergoing evaluation. Individual warfighting disciplines are being honed in preparation to defend America in the next century.[10] Force XXI is maximizing the output of individual battlefield operating

systems (BOS) through collectively applying their force multiplying efforts.[11] Each BOS is engaged in a transition from Cold War era doctrine and tactics, which were defensive in nature, to a highly mobile and increasingly lethal force capable of responding quickly to crisis situations as they arise.[12]

As the Army advances its body of knowledge, information operations (IO) remain central to shaping the Army of the future.[13] Improved tactical communications combined with militarized display technologies provide combat commanders from platoon through corps with increased knowledge of their battlefield environment. Enhancing battlefield situational awareness (SA) through dissemination of a common relevant picture (CRP) is a key component of ongoing Force XXI experimentation.[14] CRP development involves information collection, processing, analysis, dissemination, and displaying. The intent of Force XXI is to make the entire process as near real time (NRT) as possible. Reducing the time span between collecting information and making operational or tactical decisions is one goal of Force XXI.[15]

A limitation imposed on emerging IO is the amount of information collected. Intelligence, Surveillance, and Reconnaissance (ISR) systems capture different types of information through various means.[16] Digital surveillance and imaging systems combined with enhanced communications systems provide information in near real-time (NRT). The drawback to most of these systems is the relatively small area they can observe. For example, an unmanned aerial vehicle (UAV), with an electro-optical imaging system, may only see a relatively short distance to the port or starboard side of its established flight path. Other factors include the amount of time it takes to fly to a

suspected target area and the degree of difficulty in finding the target the UAV is searching for. Environmental factors including weather and terrain impact the utility of UAV as well. The UAV is additionally susceptible to enemy concealment and deception measures.

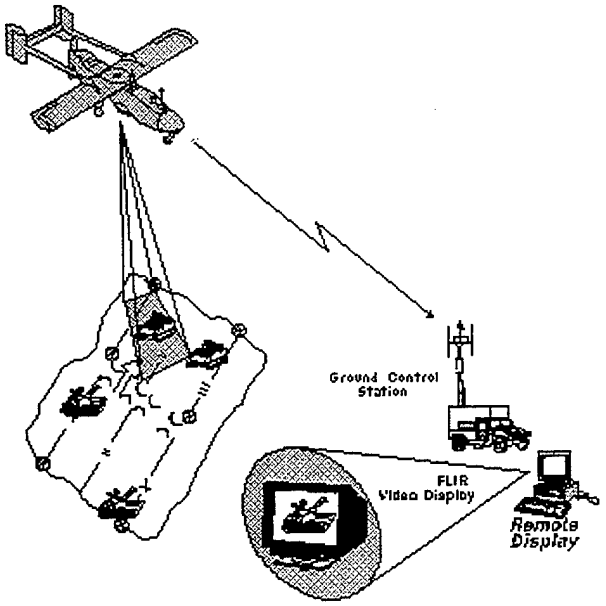

Figure 1. UAV Imaging Provides a detailed view of the Battlefield. *Source:* Director Combat Developments United States Army Intelligence Center and School, Fort Huachuca, Arizona, internet in February 1998. URL, http:// huachuca-usaic.army.mil/homepage-basic.html.

A relatively large amount of time supports planning a UAV mission. Flying the UAV, in accordance with its established profile, takes time as well. Searching for the intended target (or in the case of a change of mission a new target) is difficult and not an exact science. Processing and analyzing the information obtained by the UAV is

accomplished manually. UAV data input into a CRP requires manually typing a report into a processor for merging with other sources of information. Another consideration is getting the perishable information to the appropriate consumer in a timely manner. If the consumer is an intelligence analyst conducting battle damage assessment (BDA), time may not be critical. However, if the consumer is an artillery battery targeting ATACMS against an enemy high value target (HVT), time is of the essence. The use of UAV to monitor the battlefield is likened to looking through a soda straw.[17] Many other sensors providing high-resolution imagery information are subjected to the same limitation. The larger the area the sensors monitor, the more time it takes to process the information. In general, the larger the picture, the smaller the amount of resolution. Greater resolution is provided by covering a smaller area. (See figure 1.)

To achieve the amount of SA necessary to conduct Force XXI operations, the Army must exploit the largest amount of information in the shortest period of time. In terms of monitoring the battlefield, any systems which detect enemy activity, over a wide expanse of terrain, and make decision makers aware of the activity is invaluable. The army of tomorrow must have the ability to monitor large areas and detect enemy activity long before the enemy realized he is being monitored. The ability to provide tactical ground commanders with surveillance of the majority of their assigned are of operations (AO) is essential to successfully prosecuting combat operations in the future.

The Joint Surveillance Target Attack Radar System (JSTARS)[18] is the only sensor currently capable of providing wide area surveillance (WAS) supporting Army Corps and Division sized AOs. JSTARS is a Joint Army and Air Force system with two distinct

components. The airborne component is a militarized Boeing 707 aircraft (designated E-8C) outfitted with an AN/APY-3 multimode phased-array side-looking airborne radar (SLAR). The radar is operated in different modes depending on mission requirements.[19] (see figure 2.)

1. Radar Reference Coverage Area (RRCA): Refers to the entire FOV the radar is capable of monitoring. This area is "seen" by the radar but is not usually monitored by radar analysts.

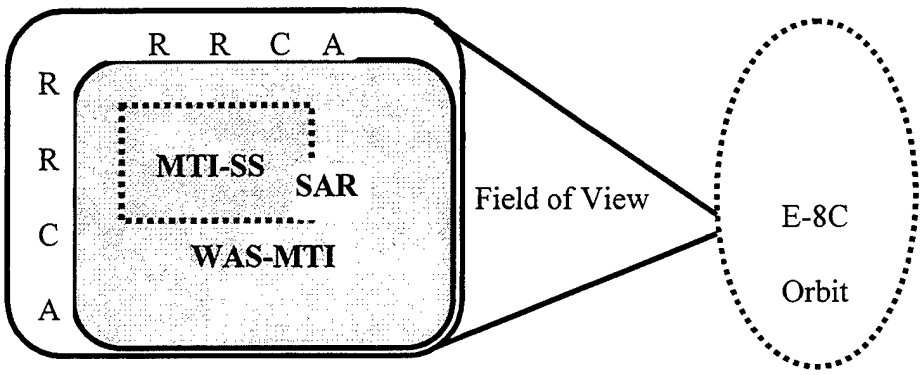

Figure 2. Relationship of JSTARS' Multimode Radar Functions. *Source*: LTC Jack Kem, 319th Military Intelligence Battalion, "Common Ground Station," (Briefing Slide: Fort Bragg, North Carolina, 1995).

2. Ground Reference Coverage Area (GRCA): An area of terrain the JSTARS radar is targeted against. A GRCA is established within the boundaries of the RRCA. This area is doctrinally conceived as being 180 kilometers by 180 kilometers or roughly the size of one conventional corps area of operations. Radar operators onboard the E-8C

are capable of operating the radar without a GRCA by significantly reducing the area of coverage.

3. Wide Area Surveillance-Moving Target Indicator (WAS-MTI): WAS-MTI is the basic operating mode of the AN/APY-3 radar within the boundaries of a GRCA. This mode is designed to detect, locate and classify moving vehicles within the radar's field of view (FOV). WAS-MTI supports moving vehicle pattern analysis over large areas. GRCA associated WAS-MTI provides the greatest area of coverage for ground surveillance operations.

4. Moving Target Indicator-Sector Search (MTI-SS): The MTI-SS focuses on selected areas of the radar's FOV to support enhanced resolution and attack guidance. Radar operators can focus the radar on a smaller sized area to increase radar resolution. MTI-SS provides the highest resolution MTI radar imagery supporting air to ground battle management operations. It reduces the overall area of coverage.

5. Synthetic Aperture Radar-Fixed Target Indication (SAR-FTI): A black and white radar imaging capability used against fixed point targets within the radar's FOV. The FTI highlights the largest fixed targets visible in the selected area under surveillance. SAR-FTI supports change detection within a highly defined small area.

The E-8C aircraft is flown by an Air Force crew. Army and Air Force personnel facilitate the radar surveillance and targeting functions. The ground component consists of Army ground station modules (GSM). GSMs are configured as light or medium.[20] Army GSM teams co-locate with the intelligence staffs of the supported commands. The GSM acts as the interface between the unit conducting operations on the ground and the

E-8C aircraft. Interaction between the GSM and the E-8C is conducted by line of sight (LOS) radio communications. The surveillance control data link, (SCDL) is established between the E-8C and the Army GSM designated as the master system for the specific mission. Radar service requests (RSR) are passed from the GSM to the aircraft to convey the ground commander's intended area of coverage. Army crewmembers onboard the E-8C coordinate with Air Force radar operators for establishment of a Ground Radar Coverage Area (GRCA). In conventional situations, a GRCA can be established covering an area 180Km X 180Km. The SLAR radar is then targeted against enemy activity and provides a picture showing moving target indicators (MTI). The SAR radar can target fixed facilities, assembly areas, border crossings, and key named areas of interest to provide fixed target indications (FTI). The E-8C passes the collected information back to the master GSM for processing, analysis and dissemination to other GSM locations. Master GSM dissemination to other locations is conducted via satellite communications (SATCOM). In this manner, only one GSM conducts interface with the E-8C to reduce overloading the radar operators with RSRs. Based on LOS considerations, an alternate GSM may designated the master for subsequent missions.

Given the central importance of JSTARS technology to SA, it is relevant to discuss its application to peace operations. Northrop Grumman, the primary contractor for JSTARS, envisions the system being used to monitor civilian evacuation operations. Their point is that during a large movement of civilian vehicles, as in evacuation of coastal areas prior to a hurricane, JSTARS can provide useful information to civilian authorities. Whereas this type of situation is outside the scope of military peace

operations, the scenario may have application to some future peace endeavor. A suitable example, which may have significant impact for the future, is the American military involvement in Bosnia. For the purposes of this thesis, we will explore the usefulness of JSTARS imbedded radar technology to the Army's operation in Bosnia.

Purpose of the Thesis

The intent of this thesis is to increase the understanding of JSTARS operations within the context of PEO. This thesis uses two JSTARS deployments supporting OJE as a case study. The thesis addresses multiple aspects of JSTARS employment. The following serves to highlight the complexity of planning, coordinating, and executing JSTARS operations. In this regard, the following areas will be presented throughout the course of thesis development.

1. Historical considerations: The background leading up to U.S. involvement in ending the wars in the Balkans provides the basis for JSTARS' deployments. Evaluation of the Former Warring Factions (FWF) provides insight into the difficulty surveillance platforms encountered monitoring the FWF during the war. Analysis of peace making attempts prior to the Dayton Peace Accords reviews the failure of the international community to quickly intervene and end the war. The role of the U.S. administration was important to establishing the accords. Therefore, the United States government placed high priority in having then enacted. This discussion evaluates the rationale for committing U.S. troops as peace keepers into Bosnia. It was a matter of national prestige and military necessity.

With respects to JSTARS, this thesis contends the system is in a state of evolution. History provides rationale for the development of JSTARS. In the course of this thesis, JSTARS technology is considered at an intermediate stage of development pertaining to evolving situational awareness technologies.

2. Technical aspects of JSTARS: Capabilities and limitations of JSTARS provides an understanding of the system's operations. The system is explained in terms of its two primary components (the Air Force E-8C aircraft and the Army Ground Station Module). Technical aspects of managing the system are addressed with respect to preparing for and conducting mission execution. Additionally, addressing JSTARS integration into the Theater Architecture in Bosnia explains shortfalls associated with information dissemination.

3. Command and Control: The complexity of JSTARS operations requires a degree of sophistication in terms of integrating the system into theater operations. The question of C2 is important with respects to the relationship of the Army GSM teams and the command relationship they have with their supported unit, their organic headquarters, and the Wing operating the E-8C aircraft. It is important to evaluate the targeting of the JSTARS against targets established by the Ground Component Commander (GCC). Supporting the senior commander on the ground appears as the logical choice for JSTARS targeting. However, cultural differences between the Army and the Air Force almost beg the system to be employed in a less than effective manner. Additionally, having the Combined Air Operations Center (CAOC) control E-8C mission profiles detracted from coverage of targets established by the GCC. The origin of CAOC

disaffiliation with GCC requirements is not well documented. However, there are indications the situation was personality based

4. Doctrine: The predominant issue surrounding doctrine is the unsynchronized focus between Army and Air Force basic doctrine. Air Force thinking is predominantly in terms of strategic targeting. Support to ground forces requires a greater degree of tactical targeting during the conduct of PEO. On the other hand, the Army was not effective in conveying the urgency of need for specific targets. As will be alluded to later in this thesis, senior Air Force officers complained they were not consistently in receipt of Army targeting priorities. This situation added to the confusion over the appropriate role of the E-8C platform itself. Whereas, the Army views JSTARS in terms of its surveillance capabilities enhancing situational awareness; the Air Force prefers to prioritize the aircraft in its battle management role. The battle management aspect focuses on Air Force intent to use JSTARS more as an operational platform supporting ground attack operations. It is important to understand basic differences between the Air Force and the Army.

5. Political: The political environment surrounding the JSTARS deployment to Bosnia is especially interesting. The NATO effort to determine a core system for its Air Ground Surveillance Test Bed (AGS) mandated JSTARS fly in an operational capacity for purposes of demonstrating the system to NATO. Candidate systems for AGS include JSTARS, The British ASTOR, and the French CRESO. Determining the source of that decision is the purpose of a later section of the thesis. Additionally, being in a combined environment, the thesis discusses allied reactions to the deployment. By examining the

issue of political impact, the thesis will address NCA decision making on a small but highly visible portion of the OJE effort.

At the end of the thesis, an attempt will be made to provide a recommendation for improving JSTARS in support of PEO in the future. The recommendation will be formatted in terms of tactics, techniques, and procedures (TTP) based on lessons learned from the JSTARS Bosnia experience. At the heart of the recommendations is the writer's hope that the future will bring effective use of the system to save lives.

The heart of this thesis is addressing JSTARS role in support of PEO. As such, the primary question asked in the thesis is: What purpose does JSTARS serve in support of peace enforcement operations? In order to determine why JSTARS was deployed in support of Bosnia operations, the above stated areas of Historical Considerations, Technological Aspects, Command and Control, Doctrine, and Political Considerations will be used to quantify and qualify the analysis. Numerous supporting questions will provide insight to answering the primary question. The principal secondary questions are stated as follows:

1. What were the political, economic, and military factors which influenced the NCA's decision to deploy JSTARS in support of Joint Endeavor?

2. Why was JSTARS deployed in support of Operation Joint Endeavor?

3. What coordination took place during planning, deployment, mission execution, and redeployment to maximize the effectiveness of JSTARS during Joint Endeavor?

4. What tactical, operational, and strategic goals were established for JSTARS during the deployment to Joint Endeavor?

5. What doctrinal innovations were made to maximize JSTARS effectiveness during Joint Endeavor?

6. What is JSTARS in terms of design, functionality, and purpose?

7. How can JSTARS support peace operations?

8. How was JSTARS used to support Joint Endeavor?

9. What does U.S. Joint, Army, and Air Force doctrine provide in terms of using JSTARS in peace operations?

10. What are the differences and consistencies between doctrine and actual employment procedures?

11. What are the measurable criteria necessary to evaluate JSTARS suitability for peace operations?

12. What are the JSTARS lessons learned which can be used in support of future JSTARS operations?

Background

A peace agreement, ending four years of conflict in the Former Republic of Yugoslavia (FRY), was initialed on 21 November 1995.[21] The formal signing of the agreement took place in Paris, France, on 14 December 1995. In order to insure the peace, the international community, led by the North Atlantic Treaty Organization (NATO), agreed to deploy ground forces to separate the former warring factions (FWF). As a result of this diplomatic action, the President of the United States ordered military personnel deployed to Bosnia-Herzegovina, and Croatia. With this decision, the President announced the commitment of United States ground forces to the NATO-led

Implementation Force (IFOR).[22] The United States' decision to deploy forces into FRY appears to be based on European security concerns and American intolerance of continued bloodshed. It is also an indication of the commitment the U.S. had to full implementation of the Dayton Accords. Previous attempts to end the fighting failed. American and European Union (EU) initiatives were beset with political agendas, lack of resolve on the part of the international community, and bad timing.[23] (See figure 3.)

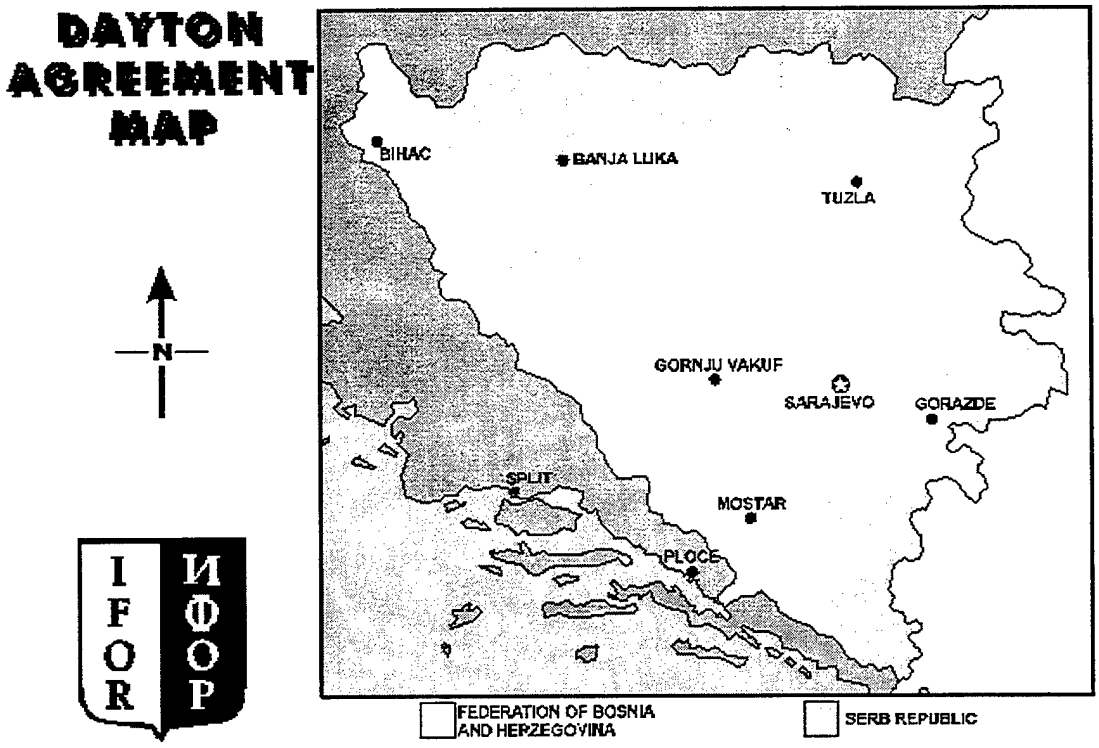

Figure 3. Partition of Bosnia-Herzegovina as stated in the Dayton Peace Accord. *Source:* NATO Briefing Slide. Slide accessed via the internet in March 1998. URL: http:\www.NATO.int.html

Assumptions

This thesis is a case study of events which have already taken place. Assumptions are derived from known facts, insight, and deductions. The relation of Army intelligence and targeting doctrine to the assumptions is central to the thesis itself. Given the above, the following assumptions have been made.

1. Military Culture: The U.S. Army relies on USAF assets for intelligence and targeting support. The Air Force supports GCC requirements during Joint and Combined operations. As a supporting organizations, it is inherent for the Air Force to understand Army requirements and develop appropriate doctrine. Assuming differences in basic doctrine between the two Departments, it is assumed that requirements may not be understood in the same way by both organizations. An example of this is the basic difference in viewing the role of JSTARS. The Army perceives JSTARS primarily as a surveillance platform providing information to the decision making cycle. The Air Force views JSTARS primarily as a battle management tool used to guide attack aircraft against ground targets. This thesis assumes Army intelligence and targeting requirements establish the priorities for JSTARS surveillance operations. The presumption is that surveillance, being key to situational awareness, requires the Air Force to fly JSTARS in a manner conducive to satisfying Army information requirements.[24] Furthermore, the thesis assumes the tasking of JSTARS is planned in accordance with stated GCC requirements.

2. Technology: The surveillance and information systems resident in JSTARS are evolving technologies. The Air Force continually improves the capability of the

system through software upgrades and enhanced communications capabilities. The Army focuses on the evolution of the GSM to provide enhanced resolution supporting situational awareness. The impact of the parallel technology paths must be compatible to ensure the E-8C does not outpace the ability of the GSM to process information. Likewise, GSM evolution should not result in unintentionally overwhelming E-8C radar system operators with information requirements. The infusion of improved JSTARS technologies into both the airborne and ground components requires increased knowledge levels on the part of operators. As an example of this, the GSM has recently demonstrated an ability to receive data from the Predator UAV platform. Initial capabilities provide the GSM with only the UAV video picture. Army desire for technical data associated with the UAV, (i.e., UAV location, target location, distance from target, etc.) helps in understanding what the UAV is looking at. GSM operators previously concerned with JSTARS only data must now understand the utility of the UAV data to the supported commander. The operators must also understand how the new data stream affects receipt and dissemination of the JSTARS information. The increasingly complex technical environment associated with JSTARS operations necessitates having highly intelligent and knowledgeable personnel capable of trouble shooting system failures. The assumption here is that as capabilities improve, the need for dedicated maintenance support and aggressive systems training increases as well. It is fundamental for GSM operators to understand capabilities and limitations of the E-8C. This suggests a need for sustained familiarization training of E-8C and GSM operators with each other's systems.

3. Threat Environment: Conventional warfighting is conducted with the intent of having the enemy submit to the will of combat power generated to fulfill national political objectives. In PEO, the situation differs dramatically by reducing the need for destroying enemy forces. In fact, the word enemy is not relative to the conduct of peace operations. Instead, threats to U.S. forces are perceived as resulting from the flare-up of hostilities between FWF. However, the possibility of direct hostile action against friendly forces is a potential. Therefore, this thesis assumes losses could occur from hostile action. It also maintains friendly use of lethal force is modified to support national objectives. With respect to OJE, the IFOR engaged in restricted ROE designed to prevent FWF from conducting offensive actions. However, IFOR retained the right to defend itself. Improving situational awareness enhances IFOR's ability to respond to hostile action in a timely manner. Therefore, an assumption is PEO require a dedicated intelligence/information and targeting architecture which takes advantage of multiple collection sensors and their associated data processors. It seems logical for JSTARS to perform dedicated surveillance operations which support GCC situational awareness.

Limitations

Limitations to the development of this thesis originate by virtue of the exclusion of classified data. The thesis endeavors to objectively evaluate the JSTARS in support of NATO in Bosnia. The lack of information from British and French participants precludes the incorporation of Allied perspective. Conduct of the research made extensive use of information found on the he World Wide Web. The author necessarily attempted to use primarily official U.S., NATO, or Allied web-sites during the gathering of unclassified

open source material. The study assumes official government web-sites contain accurate information. For purposes of the study, attempts were made to gather information from U.S. Air Force sources. The majority of the material is generated by Army organizations and provides a predominantly ground oriented perspective. Not all of the information will be agreeable to all parties associated with JSTARS. This in itself is not so much a limitation to the development of the thesis, but rather a statement that objectivity is the primary goal. Overall there appears to be sufficient data supporting thesis development. The fact that most available information was generated from Army sources is considered a strength. The author makes no apologies for his findings and theses conclusion. The primary objective of the thesis is to contribute to the body of knowledge pertaining to using JSTARS in support of PEO.

Definition of Terms

The following key terms are defined to enhance understanding the thesis' primary objective to analyze JSTARS' role in peace operations.

Battlefield Visualization as defined by TRADOC PAM 525-5.[25] The process whereby the commander develops a clear understanding of his current state with relation to the enemy and the environment, envisions a desired end state, ant then subsequently visualizes the sequence of activity that will move his force from the current state to the end state.

Combined Operations as defined by FM-100-5. [26] An operation conducted by forces of two or more allied nations acting together for the accomplishment of single mission.

Intelligence Requirement as defined by FM 34-2.[27] A requirement for intelligence to fill a gap in the command's knowledge and understanding of the battlefield or threat forces. Intelligence requirements are designed to reduce the uncertainties associated with successful completion of a specific friendly course of action.

Interoperability as defined by C4I for the Warrior.[28] Interoperability is the ability of systems, units, or forces to provide services to and to accept services from other systems, units, or forces, and to use the exchanged services to operate effectively together

Peace Enforcement as defined by FM 100-23.[29] The application of military force, or the threat of its use, normally pursuant to international authorization, to compel compliance with resolutions or sanctions designed to maintain or restore peace and order.

Situational Awareness.[30] The ability to maintain cognizance of events occurring throughout the entire area of operations and area of interest.

Significance of the Study

This document is designed as an analysis of an historical event. Operation Joint Endeavor is the first operational deployment of U.S. and European forces since the inceptions of NATO. Studying a relatively obscure aspect of the deployment serves to assist in better understanding that portion of the deployment. In this case, the subject of the study is the Joint Surveillance Target Attack Radar System. By choosing to explain the reasons behind the U.S. decision to deploy JSTARS in support to OJE one develops and appreciation for the magnitude of the fighting which occurred in the Former Republic of Yugoslavia. Explaining the origins of the war, and the failure of the international

community to prevent or stop the conflict in its early stages, facilitates understanding why the United States ultimately had to intervene.

Another area of consideration is the current Revolution in Military Affairs being experienced by the United States Military. Facing significant force reductions in the late part of the twenty first century, U.S. military planners realized the need to harness technology as a means of compensating for the overall reduction in military combat power. Additionally, the reduction in military budgets precluded the continuation of certain modernization programs designed to create a more mobile and lethal force. The incorporation of state-of-the-art digitization technology focuses the available budget dollars into a combat force multiplier. Through enhancing situational awareness, the Army intends to offset reduced available combat power. Improving situational awareness is considered a means to improving force survivability. In an era of reduced budget and manpower, the Army cannot afford to go into battle and suffer significant losses due to weapons of mass destruction or operational level defeat. Only the future will tell if the Army is successful in its attempt to use information technology as a means to increasing lethality and survivability.

Current Army thinking is that the battlefield of the future will be nonlinear in terms of geometry. Clear lines of demarcation between opposing forces will not be readily discernible. The tactical situation in Bosnia today approximates the view of the future battlefield. As an example of the information challenges of the future, OJE provides a foundation from which to build future capabilities and operating procedures. As a flagship system in the military's inventory today, JSTARS support to OJE should

provide an invaluable set of lessons learned. Through the study of JSTARS lessons learned, future surveillance and targeting capabilities and limitations can be evaluated. For example, it is clear in the author's mind that JSTARS survivability is reduced in a nonlinear environment. This has relevance to other airbreathing platforms used to provide information to commanders conducting ground operations.

The complexity of peace operations is compounded by the inclusion of Allied Forces. Integrating a system, such as JSTARS, into OJE facilities understanding the detailed level of coordination necessary to providing a CRP to a combined force. This is especially critical where allied units speak different languages and have different means of conducting operations. It is essential for all subordinate commands to receive, process, and act on information in as timely a manner as possible. The near real-time capability of JSTARS supports conducting proactive operations.

This thesis endeavors to enhance understanding the operational capabilities and limitations of JSTARS in a peace environment. Future military planners considering JSTARS as an asset should be able to make an informed decision based on the information provided in this his thesis. Through an explanation of the airborne and ground components of the JSTARS, an understanding of what JSTARS can and cannot do will be conveyed. Additionally, discussion of how to best utilize the system for PEO may very well carry over to the conventional arena. As an example, using the GSM to conduct pattern analysis affords greater resolution in the area of change detection. By establishing regular patterns of movement through key areas, GSM operators should be able to readily detect anomalies associated with high interest activities.

Lastly, this discussion on the use of JSTARS operations in support of OJE will help to quell unrealistic expectations of the system. Many of today's subject matter experts in the RMA arena highlight JSTARS as a cornerstone of United States military surveillance capabilities. This thesis serves to illustrate JSTARS premier role in providing wide area surveillance (WAS), but it also dispels the notion that JSTARS is a one in all package. Through better understanding what the system can and cannot do, ground commanders will have a greater appreciation for the application of JSTARS technology in support of their operation.

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[1] Gordon R. Sullivan, General (retired) USA, "Let the Debate Flourish," *Army Magazine,* Association of the United States Army, April 1998, 10. Former Army Chief of Staff, General (Retired) Gordon R. Sullivan writes, "We are entering a new strategic era, but too much thinking-in the Army...remains firmly rooted in the previous era. Who knows what the future holds or what the best equipment, organizations or training systems will be? We don't know what we don't know, and change is taking place so quickly that we are hardly aware of what we know." This profound statement accurately portrays the current state of affairs regarding the Army's modernization efforts.

[2] bid. Gordon writes, "Today (1998) the Army is doing 60 percent of the work with about 24 percent of the budget." Congressionally mandated budget cuts have significantly reduced Army endstrength. Ironically, since 1991, the Army has experienced an increase in the number of operations conducted annually. Exercise and contingency deployments place an increasing amount of pressure on a force being whittled away by fiscal attrition.

[3] America's military has conducted MOOTW since revolutionary times. In the twentieth century, MOOTW operations around the world have exposed military personnel to the dangers associated with war. In 1968, the USS Liberty was strafed by Israeli warplanes in the Mediterranean Sea. Two-hundred-forty-eight Marine peacekeepers were killed by a terrorist truck bomb at Beirut International Airport in 1982. Thirty-four crew members onboard the USS Stark were killed by an Iraquie Exocet missile during routine operations in the Persian Gulf in 1987. In 1988 the USS O'Brian was damaged by an Iranian laid MYAM type mine during operations in the Persian Gulf. Eighteen Army Rangers were killed during fighting in Mogadishu, Somalia in 1993. In 1996, Air Force

personnel were killed and injured during a truck bomb explosion outside there living area at Khobar Towers in Saudi Arabia.

[4] Richard J. Newman, Article: "Warfare 2020," *US News & World Report*, 5 August , 1996), 34-35.

[5] Clinton Administration, (NSS), "A National Security Strategy for a new Century," "*1997 National Security Strategy*," (Washington DC: The White House, Government Printing Office, May 1997), 10-12

[5] Chairman, Joint Chiefs of Staff (CJCS), "National Military Strategy (NMS): Shape, Respond, Prepare Now: A Military Strategy for a New Era," (CJCS, Government Printing Office (GPO), Washington DC 1997), 1-3.

[6] Chairman, Joint Chiefs of Staff (CJCS), "National Military Strategy (NMS): Shape, Respond, Prepare Now: A Military Strategy for a New Era," (CJCS, Government Printing Office (GPO), Washington DC 1997), 1-3.

[7] Congress, Senate, Congressional Airpower Caucaus, Hearing before the Senate Armed Services Committee, Washington DC, 11 September 1997. Remarks made by General Dennis J Reimer, Chief of Staff, United States Army. General Reimer maintains the Army entered preparation for the 21st century in 1989. When the Berlin Wall came down, the primary threat to American security subsided. Reimer stated, "That's when our world was really turned upside down. We recognized there would have to be a change." Additionally, Reimer asserted, "We've also gone through a significant cultural change. We've changed from a forward deployed, threat-based Army to a capabilities-based, power projection force...(during the Cold War) We lived in a very dangerous, but very predictable world. Everything we did depended on the Soviet threat...We trained...and...modernized against that threat. We wrote doctrine to deal with that threat. In these last eight years, there has been no single threat. We find ourselves having to take on new missions, missions in places like Haiti, Somalia, Bosnia."

[8] CJCS, 19-21. Transforming America's Armed Forces to meet future requirements is included in the CJCS strategy. Conducting a "balanced evolution" based on objective assessments undertaken by each Department, CJCS envisions incorporating "technological innovation" to achieve "information superiority." Guiding the process of evolution are the concepts of "strategic agility, overseas presence, power projection, and decisive force."

[9] Briefing slide, "Force XXI," *Joint Venture,* (Fort Monroe, Virginia: U.S. Army Training and Doctrine Command, October 1997); available from http://www. monroe

.army.mil/pao.tradoc/sld006.htm. The web-site explains the Army's Force XXI hypothesis and objectives.

[10] Clinton Administration, 13.

[11] Reimer, "We're focusing on what we call The Army's six imperatives- quality people, quality training, the proper force mix, the right doctrine, modernization and leader development programs and making sure they're all synchronized so that we really maximize the improvements we're leveraging from technology."

[12] CJCS, 1. CJCS identifies four principal threats to America's national security "Regional dangers, asymmetric challenges, transnational threats, and wild cards."

[13] TRADOC. The first objective listed on the TRADOC Force XXI web-site reads, "Develop an easily tailorable modular force designed around information."

[14] Jim Caldwell, Article: "TRADOC Commander Reveals Some Results of Force XXI AWE," (Fort Monroe, Virginia, TRADOC News Service, April 22, 1997). Accessed from http://www.tradoc.army.mil/pao.results.htm. General William W. Hartzog is quoted as saying, "The most important thing learned from the Task Force XXI advanced warfighting experiment held at the National Training Center, For Irwin, Calif., last month is that situational awareness is so powerful."

[15] Reimer. "Another important advantage we saw in the experiment was the value of situation awareness." Reimer paraphrases a discussion between the Force XXI AWE Brigade S3 and Secretary of Defense Cohen. "Mr. Secretary, before I had situational awareness I spent 70% of my time trying to gather information-where are we and where is the enemy-and about 30% of my time analyzing that information and making recommendations to my commander. With situational awareness that's just reversed, 30% getting the information, 70% devoted to making analysis and recommendations."

[16] Stuart Johnson and Martin Libecki, "Dominant Battlespace Knowledge," (National Defense University: Institute for National Strategic Studies, October 1995), 3. "...ISR involves sensor and reporting technologies associated with intelligence collection, surveillance, and reconnaissance, as well as the new means by which we are able to keep track of what our own forces are doing. Because of advances in this area, we are expanding quite dramatically our capacity to maintain real-time, all weather awareness of what is occurring in and above a wide geographical area."

[17] For the purposes of this thesis, information provided by the UAV is referred to as the "micro-view of intelligence." This concept will be explained further in the thesis. The idea is that when ground forces are operating in an area of operations, sensors

providing information on a small portion of that area are performing functions associated with the micro-view of intelligence.

[18] Caldwell. Hartzog states, "Among the great winners were JSTARS....JSTARS really is important to...getting the big picture."

[19] The descriptions of the various radar modes are taken from an undated article in an unidentified publication. I think the article was published in a Jane's Defense magazine focusing on combat aircraft of the world. The section the article is taken from appears to address primarily surveillance systems.

[20] A follow on to the GSM the Common Ground Station (CGS) is undergoing operational testing at the Army's Intelligence Center and School, Fort Huachuca, Arizona, at the time of this writing.

[21] William Jefferson Clinton. Comments made on December 5, 1995 during a briefing on the Bosnia situation in the Old Executive Office Building in Washington DC. President Clinton gave an impassioned talk during a briefing on the Bosnia Peace Accord. The accords were agreed to on 21 November 1995 in Dayton, Ohio. The actual formal peace agreement was not signed until 14 December 1995 in Paris, France. Remarks by Clinton included, "We cannot bring back the war's victim....We cannot erase its horrors...because the parities have said they will turn from war to peace, we can now prevent further suffering.... Each side in Bosnia has asked NATO to help secure their peace agreement, to make sure the armies withdraw behind the separation lines and stay there, to maintain the cease-fire so that the war does not start again, to give all the parities the mutual confidence they need so that all will keep their work. ...Creating a climate of security is the necessary first step toward rebuilding and reconciliation. That is NATO's mission and it must be America's mission. ...I am absolutely convinced that our goals are clear, they are limited and they are achievable in about a year's time. I'm also satisfied that we have taken every possible precaution to minimize the risks to our troops. They will take their orders from the American general who commands NATO; there will be no confusing chain of command. Our troops are very well-trained, and they will be heavily armed. They will have very clear rules of engagement that will allow them to respond immediately and decisively to any threat to their security." The source for these comments is the White House Homepage on the World Wide Web. The document was released by the Office of the Press Secretary on December 5, 1995. [21] William Jefferson Clinton. Comments made on December 5, 1995 during a briefing on the Bosnia situation in the Old Executive Office Building in Washington DC. President Clinton gave an impassioned talk during a briefing on the Bosnia Peace Accord. The accords were agreed to on 21 November 1995 in Dayton, Ohio. The actual formal peace agreement was not signed until 14 December 1995 in Paris, France. Remarks by Clinton included, "We cannot bring back the war's victim....We cannot erase its horrors...because the parities

have said they will turn from war to peace, we can now prevent further suffering.... Each side in Bosnia has asked NATO to help secure their peace agreement, to make sure the armies withdraw behind the separation lines and stay there, to maintain the cease-fire so that the war does not start again, to give all the parities the mutual confidence they need so that all will keep their work. ...Creating a climate of security is the necessary first step toward rebuilding and reconciliation. That is NATO's mission and it must be America's mission. ...I am absolutely convinced that our goals are clear, they are limited and they are achievable in about a year's time. I'm also satisfied that we have taken every possible precaution to minimize the risks to our troops. They will take their orders from the American general who commands NATO; there will be no confusing chain of command. Our troops are very well-trained, and they will be heavily armed. They will have very clear rules of engagement that will allow them to respond immediately and decisively to any threat to their security." The source for these comments is the White House Homepage on the World Wide Web. The document was released by the Office of the Press Secretary on December 5, 1995

[22] William Jefferson Clinton, "Letter from the President to the Speaker of the House of Representatives and the President Pro Tempore of the Senate." (Washington DC: The White House, December 6, 1995). The source for this document is the White House Homepage, Washington D.C., found on the World Wide Web. Released by the Office of the Press Secretary, December 7, 1995. The text of the letter describes President Clinton's intent to deploy an "enabling force" as part of the preparation to deploy the Implementation Force. Clinton addresses the issue of security for the enabling force by indicating "national forces currently part of the United Nations Protection Force...." Later in the letter Clinton describes the right of U.S. to defend themselves in the event they come under attack. He also indicates U.S. air assets supporting Operation Deny Flight are available to provide close air support if necessary.

[23] James Gow, "Triumph of the Lack of Will," (New York: Columbia University Press, 1997),. 299-300. Gow's analysis of international failure to resolve the conflict in FRY provides an interesting perspective of the complexities associated with the war. He relates how movement of Serbian mechanized forces were monitored in August 1991. EU efforts to diffuse hostilities in 1992 are described as being reactive rather than proactive in nature. The United States position was influenced by the hesitation of the newly installed Clinton Administration to support the United Nations sponsored Vance-Owen peace plan of 1993. By failing to ratify Vance-Owen, the U.S. failed to perform its leadership role within the international community. Gow's argument is that Clinton had the influence to enable an end to the fighting more than two years earlier.

[24] Northrop Grumman (NG), the primary contractor for the E-8C aircraft, publicly states the potential for the E-8C in peace. The NG Homepage on the World Wide Web allocates an entire section to JSTARS. The system developers stress the potential for

JSTARS to support civilian evacuation operations in anticipation of a hurricane. Noting this, it is interesting to explore the debate between the Army and the Air Force on the use of JSTARS. As one senior Air Force officer stated to the author "JSTARS is not an intelligence system. We are not just going to drill holes in the sky." (This statement was made to the author during the 93rd Air Expeditionary Group's mission outbrief after the JSTARS mission conducted the night of 16-17 December 1996. The author participated in the mission onboard the E-8C as an observer. The outbrief took place at the 93rd's mission planning area at Rhine Main Air Base, Germany).

[25] U.S Army, 525th Military Intelligence Brigade, briefing: "Battlefield Visualization," (Fort Bragg, North Carolina: XVIII Airborne Corps, udated).

[26] U.S. Army, FM 100-5, "Operations," (Washington DC: Headquarters, Department of the Army, 14 June 1993), Glossary-2

[27] U.S. Army, FM 34-2, Collection Management and Synchronization Planning, (Washington, DC: Headquarters, Department of the Army, 8 March 1994), Glossary-6. In Combined operations with Allied forces, the term intelligence has generally been changed to information. Within this thesis, the term information requirement(s) is synonomous with the term intelligence requirement as defined in FM-34-2.

[28] Joint Chief of Staff Pamphlet, "C4I for the Warrior," (Washington, DC: U.S. GPO, 1992), 2.

[29] U.S. Army, FM 100-23, Peace Operations, (Washington DC: Headquarters, Department of the Army, 30 December 1994), 111.

CHAPTER 2

INFORMATION RESOURCES USED IN THESIS DEVELOPMENT

A Variety of Sources

Comprehensive research for this thesis relied on a diverse set of information sources. The body of knowledge associated with JSTARS' performance in Bosnia is fragmented. There is not one definite set of information addressing the many aspects of JSTARS support to OJE. Many different sources were used to address the primary thesis question. A few led down false trails and others enhanced the author's understanding beyond the original intent of the thesis. The Army's Field Manual (FM) 34-25-1, *Joint Surveillance Target Attack Radar System*, addresses Army GSM employment during a conventional war. The tactics, techniques, and procedures addressed in FM 34-25-1 focus on support of the JSTARS system to Army ground forces. FM 34-25-1 was the only doctrinal publication used in development of the thesis which specifically pertained to JSTARS employment. Air Force Technical Order (TO) 1E-8C-43-1-2, *Preliminary Technical Manual USAF Series E-8C Aircraft Mission Console Operations,* provides a comprehensive overview of the air component. The TO, written under contract number F19628-90-C-0197 by Grumman Melbourne Systems, is considered incomplete without three other E-8C TO documents. The TO provides sufficient information on its own about E-8C subsystem characteristics.

The use of the World Wide Web provided an enormous amount of information. Subjects explored included governmental, military, commercial, and historical issues. Information on the Dayton Peace Accords and other historical documents were reviewed

in detail. The United States Department of State provides a comprehensive overview of the Dayton Accords. The United Nations gives detailed information on the United Nations Protection Force (UNPROFOR) efforts in Bosnia. The United States Department of Defense (DOD), Defense Technical Information Center (DTIC), provides unique perspectives on IFOR and SFOR through "BOSNIALINK." NATO sources on the internet are invaluable in researching the war in Bosnia. Subordinate NATO commands post daily press briefings, composition of deployed forces, and issues faced in the conduct of peace enforcement. The NATO homepage provides detailed information about NATO's Alliance Ground Surveillance (AGS) testbed program. JSTARS was a primary candidate for the core operational system supporting a future NATO AGS capability. This information led to an understanding of the economic and political rationale for the JSTARS deployment. Access to both the Army's War College homepage and the Air Force's Air University homepage provided numerous articles for research. As an example, the Air University maintained an article summarizing the airpower issues associated with Operation DELIBERATE FORCE, the NATO air campaign against the Bosnian Serbs between 30 August and 14 September 1995. The War College homepage provided many articles addressing peace operations.

Information extracted from the internet enhanced understanding of Army and Air Force views about JSTARS. Commercial publications, such as *Jane's Defense Review* and *Journal of Electronic Defense*, provided excellent material on the technical aspects of JSTARS. Janes published an article in anticipation of JSTARS deployment in 1995. Numerous industry and government sites providing information on JSTARS development

and history. The Federation of American Scientists (FAS) describes JSTARS in detail. FAS also provides information on other electronic sensors. FAS is an excellent site to begin technical research. The Northrop Grumman and Motorola internet sites provided understanding of the commercial economic power of the JSTARS program. These commercial companies are the primary contractors for the E-8C and GSM respectively. They advertise the capabilities of JSTARS and provide a limited amount of information on forecasted system improvements. Lastly, many of the illustrations in this document were taken directly or derived from sources on the Web.

Defining the components of peace operations became a fundamental part of thesis development. Sources were developed to explain the differences between warfighting and peace operations. FM 100-5, *Operations* describes the various aspects of peace operations in good detail. Fm 100-23, *Peace Operations* provides the best overview of Army doctrine related to the conduct of peace enforcement. However, for a comprehensive understanding of peace operations in JOINT or COMBINED environments, the Joint Warfighting Center's *Joint Task Force Commander's Handbook for Peace Operations* is exceptional. The combination of these three publications provides an excellent understanding of the challenges associated with peace operations. A key idea obtained from these sources is that political decisions will directly impact military requirements. The thesis acknowledges this concept and contends JSTARS deployed to Bosnia as a result of national level political considerations.

Many periodicals were used during the course of thesis research. *Military Intelligence Professional Bulletin*, (MIPB), the U.S. Army's professional Intelligence

journal, provides a series of articles on JSTARS in Bosnia. These articles are an excellent source of material for exploring JSTARS performance from an Army perspective. MIPB is by far the best periodical addressing the Army's contemporary Intelligence issues. The Air Force's *Air Power Journal* (AEJ) provides a number of excellent articles on the role of airpower in the Balkans. AEJ is an excellent source regarding multiple topics about the role of today's Air Force. The Winter 1996 edition of AEJ contains an article addressing the role of airpower in peace enforcement operations. The Army's Field Artillery branch publication *FA Journal* provides articles on U.S. lessons learned in Bosnia. Interviews of the 1st Armored Division's (Task Force Eagle) Commander, Major General William L. Nash, and the 1st Brigade Combat Team (BCT), 1st Armored Division (TF Eagle) Commander, Colonel Gregory Fontenot provide interesting perspectives of the Army's role in Bosnia. *Military Review* and *Army* magazine are outstanding sources for contemporary issues impacting the Army. Both publication are tenacious in their efforts to put Army requirements at the forefront of the RMA. The Army's Center for Army Lessons Learned (CALL) produces periodic publications specifically addressing the Army's experience in Bosnia. Three CALL documents *News From the Front*, *Newsletter*, and *Initial Impressions Report* capture a variety of Army related peace enforcement issues. One article addresses the JSTARS verification of the FWF's adherence to restrictions of the Bosnian zone of separation (ZOS). The Armed Forces Communications Electronics Association's *SIGNAL* magazine is a good reference for technical information associated with JSTARS. These publications are excellent sources for research on technical and doctrinal subjects.

With respect to information operations (IO) a number of different sources were researched. The Army's Training and Doctrine Command pamphlet 525-5 *Force XXI*, addresses the Army's preparation to enter the twenty-first century. It provides the Army roadmap for leveraging information age technologies against future adversaries. The heart of Force XXI is the Army's intent to improve battlefield situational awareness. The Air Force vision for the next century is titled *Global Engagement: A Vision for the 21st Century Air Force.* Air Force core compentencies include information superiority. This complements providing enhanced situational technologies to battlefield commanders. JSTARS ability to provide wide area surveillance is key to evolving situational awareness technology.

Exploring the historical reasons for the war in Bosnia underscores the devastation the war brought to the people of the region. Numerous books, articles, web-pages, songs, art, and poetry decry the suffering and destruction which took place. One point becomes clear throughout each accounting of the war. International efforts to stop the fighting were halfhearted until the signing of the Dayton Peace Accords. UNPROFOR efforts were futile due to the FWF's rejection of the UN intervention. One author suggests the war could have ended two and one-half years earlier had the U.S. gone forward with the Vance-Owen peace plan. A constant theme, throughout the entire literary body, is that NATO intervention would not have occurred without U.S. leadership. It is essential to the construct of this thesis to review the background for the war, the nature of the fighting which took place, the composition of the FWF, and the environment which emerged after the initialing of the 21 November 1995 Dayton Accord. Only then can we understand the

relative merit of not only JSTARS but the entire NATO effort to force the FWF to adhere to the peace agreement.

Personal experience inspired the main idea for the thesis. Discovering fundamental differences between Army and Air Force doctrine, regarding the employment of JSTARS, was the catalyst for thesis development. Considering the Army is planning to harness JSTARS technology to fight in the next century, it raised the level of importance in addressing the differences. Given the context of this thesis is evaluating JSTARS in a peace enforcement operation (PEO), the findings should assist in assessing JSTARS utility in future peace missions.

The number of varying viewpoints about JSTARS supporting OJE led the author to explore the system's commitment to the NATO led peace operation. The system has both proponents and opponents for use in peace. The Air Force appears to be predisposed to using JSTARS whereever and whenever a crisis arises. Army consumers of JSTARS data are more pragmatic and voice caution with respects to the system's utility. Both sides suffer from a lack of understanding of the other's viewpoint. One is based on flying a modified Boeing 707 at 30,000 feet. The other is based on the ground level integration of soldiers and equipment while staring the horrors of war in the face. In short, the Air Force views JSTARS as a battle management tool. The Air Force wants to find targets and direct high performance aircraft against them. In a conventional war the Air Force position gets little argument from the Army. However, in peace operations the Army is more disposed to take advantage of the system's wide area radar coverage. The Army viewpoint is JSTARS is a sensor and falls within the realm of intelligence, surveillance,

and reconnaissance (ISR) systems. Depending on the circumstance, JSTARS was perceived as both effective or not warranted in association with Army operations in Bosnia. Personal observations and discussions reflect the differing viewpoints throughout the course of the thesis.

The bulk of personal experience came from the author's participation during the planning, deployment, execution, and redeployment phases associated with the JSTARS ground component in 1996. A previous deployment took place in 1995. Deploying into Bosnia through Tazar, Hungary in October 1996 provided insight to the magnitude of NATO's military presence in the region. Moving throughout the region between Tuzla, Sarajevo, and Mostar in November 1996 provided a clear understanding of the destructive power of war. These experiences laid the foundation for the need to address historical aspects of the war, efforts to stop the fighting, and NATO's deployment into the region. It addresses the complexity of the Balkan situation.

Flying onboard the E-8C on the 16 December 1996 mission over Bosnia provided insight to the complexity of JSTARS operations. A host of technical manuals and military jargon, associated with the airborne and ground components of JSTARS, indicated a need to translate the technical language into useable information.. Conveying the environment JSTARS was designed for and the environment found in Bosnia serves to enhance understanding the challenges of surveillance operations. Lastly, exploring the decision to deploy JSTARS illuminates the inter-relationships between tactical, political, and economic decision making. In this case, tactical requirements were part of a much broader JSTARS mission. Planning, coordination, and execution of the entire

deployment was shrouded in economic and political opportunity.

The inspiration for the thesis is the author's personal involvement with a JSTARS deployment supporting the turnover of IFOR to SFOR. The transition began in October 1996 and was complete on 20 December 1995. Most notable from the author's perspective was the difference in doctrine between the way the Army views JSTARS and how the Air Force views JSTARS. As the operations officer for an Army task force deploying into Bosnia, it was unnerving to discover such diverse attitudes about the system. Throughout the course of thesis development, the author referred to the notes he made and the material he obtained during the performance of his duties. The topic of the thesis, "JSTARS Support to Peace Operations," remains focused no matter how varied the source material.

CHAPTER 3

THESIS RESEARCH METHODOLOGY

A Case Study

The research methodology used in developing this thesis is a case study of two JSTARS deployments supporting NATO operations in Bosnia. The first deployment took place in 1995, the second in 1996. The conduct of the case study uses different research techniques. Personal perspective is tempered through historical analysis, technical research, and comparing Army to Air Force doctrine. The intent is to provide the reasons for deploying and employing JSTARS in a peace enforcement mission. The purpose for the research is to ensure objectivity of the thesis with respects to the decision to deploy JSTARS.

As stated in chapter 2, the origin of the primary thesis question evolved from personal experience. The concept of evaluating JSTARS' support to peace operations emerged from firsthand experiences on the ground and in the skies of Bosnia. Initially, an idea formed out of perceived disagreements between the Army and the Air Force. Participation in planning, coordinating, and executing the ground component's deployment in 1996 planted the seed for the thesis to take root. Personal interaction with senior NATO intelligence officers, both U.S. and European, indicated a wide chasm in the views on the need for JSTARS. The reactions varied from indifference, to positive reception, to outright refusal to use the system. In the end, a group of gutsy soldiers and airmen worked hard to ensure the system worked. Those efforts were hindered by relaxed planning and coordination at multiple echelons of command. The system was not

employed in a manner consistant with operational and tactical requirements. In contrast, the operators of the JSTARS airborne and ground components conducted their missions in a superb manner. Unfortunately however, political requirements overshadowed cohesive doctrinal employment of the system.

The research of Army and Air Force JSTARS doctrine became a critical task. Identifying the differences between the two provided insights to each service's employment requirements. In simplistic terms the Army views JSTARS as an intelligence platform. The Air Force considers the system an operational platform. This dichotomy is both divisive and complementary. It is divisive from the standpoint that Army requirements focus the power of the the AN/PY3 radar to enhance situational awareness. It is complementary in that the JSTARS targeting role is a combat multiplier. Both views are correct. The problem arises when synchronizing the system's surveillance and targeting power during a peace enforcement operation. Describing the basic differences between the Army and Air Force serves to identify areas requiring extensive coordination for the effective use of JSTARS.

A doctrinal analysis of the integration of JSTARS into a multi-national peace operation serves to provide lessons learned for future deployments. From an Army standpoint it is imperative to evaluate doctrinal considerations of training, maintaining, sustaining, and caring. These same considerations apply to the Air Force as well. Each phase of the deployment must undergo analysis to assess doctrine in terms of what actually took place. It is incumbent for decision makers at all levels to ensure the appropriate detail is addressed during coordination. Detailed planning and coordination

become increasingly challenging during integration into ongoing multi-national operations.

The historical context of the JSTARS deployment to Bosnia provides insights to the impact the RMA has on the U.S. military. Exploring issues associated with RMA provides a look at the U.S. military's intent to leverage information operations in support of warfighting. The Army's Force XXI and Air Force Global Engagement efforts serve as a starting point for thesis research. Research in both areas delves into each service's intent to transform itself in preparation for the next century. The transformation involves changing from a forward deployed, threat oriented military to a rapid reaction, capabilites based force. Emerging technologies are at the center of the transformation. JSTARS is a predominant technology supporting the transformation of both services.

Beyond warfighting, the U.S. military is responsible for responding to "...the full spectrum of crisis that may arise."[1] Peace operations fall within the scope of missions the the military is called upon to support "important national interests."[2] The NATO military operation in Bosnia provides a template for peace enforcement operations (PEO) in the future. Evaluating OJE as a peace enforcement mission differentiates it from other forms of peace operations. This is true especially with respect to the potential for hostilities to occur.[3] Addressing the challenges associated with a multi-national PEO provides a comparison to military operations in other environments. The attempt is then to delineate any similarities and differences in addressing the primary thesis question.

The historical overview of the war in Bosnia provides insight to the environment NATP peace enforcers deployed. Describing the events leading up to NATO's

involvement provide the rationale for deploying JSTARS. Exceptionally violent acts took place during the conduct of the UNPROFOR operation in Bosnia. Hostilities continued during the transition of the peace enforcement mission in 1995. By the fall of 1996 the situation was relatively calm. JSTARS impact on enforcing the peace is not an issue. Warriors on the ground and in the air of Bosnia secured the peace. What is being studied is the difference JSTARS made to the operation and the potential value JSTARS has to future peace enforcement missions.

1. Clinton Administration, "A National Security Strategy for a New Century." *1997 National Security Strategy* (NSS),(Washington DC: The White House, Government Printing Office, May 1997), 9.

2. Ibid. The U.S. Military's participation in the NATO Bosnia operation is specifically cited in the NSS as supporting important national interests.

3. Joint Warfighting Center, "Joint Task Force Commander's Handbook for Peace Operations" (Fort Monroe, Va: TRADOC, GPO, 16 June 1997), GL-8.

CHAPTER 4

DEFINING THE PROBLEM

"Audacity, Audacity, Always Audacity!"

Major George Patton, *Source:* "The Reasons Why"[1]

What Are The Issues?

General Patton was not one to mince words. The Army is on the threshold of a new era. Competition for defense budget dollars is fierce. Rivalry over which service controls JSTARS is boiling within the corridors of the Pentagon. The Army has a tool which will change the manner in which warfighting decisions are made.

> The JSTARS sensor has the potential to be the most important Intelligence and Targeting tool that the ground commander has available. Its primary mission is to support the ground commander with dedicated Moving Target Indicator (MTI) coverage. Anonymous Staff Officer, "JSTARS Fact Sheet," (ATSF-CBL: 7 January,1998).

JSTARS is a highly technical surveillance and targeting platform. The E-8C and GSM components are designed to support the requirements of fighting a major theater war (MTW). Doctrinal sources contend the system is useful in supporting peacetime requirements as well.[2] Beginning with the history of JSTARS development, this chapter explores the evolution of JSTARS into an information age warfighting centerpiece. The point being made recognizes the development of the system to support warfighting. The thesis question poses the challenges of integrating JSTARS into peace operations.

An overview of JSTARS is conducted to familiarize the reader with system components, capabilities and limitations. JSTARS is depicted as a truly Joint system. Air Force and Army personnel man and operate its various components. This

relationship of the two services, with respects to operating the system, implies collaborative and consensual employment of the system. It conveys a seemingly synchronized harmony of air Force and Army operations. The reality is JSTARS flies where the Air Force wants it to fly. system operators choose targets based on what they determine as important. Unless cohesive coordination is conducted the system will potentially monitor targets in contravention to stated ground component requirements.

Addressing peace operations conveys the myriad of challenges for the military force involved in the operation. The types of peace operations and their components differentiates their execution from conventional warfighting. The primary focus is to define the nature of the threat in a peace operation. Constraints imposed on the military force required skill, confidence and patience. The value added of JSTARS to peace operations comes into question when addressing the threat. Identifying the differences between peace enforcement and other types of peace missions substantiates the potential for hostile action to occur. Adapting military skills to peace is included in this discussion. The training associated with preparation for conducting a peace mission readies the force. The thesis suggests JSTARS operations must conform to the requirements of the mission to be effective.

Providing the background for the war in Bosnia is designed to ensure understanding of the environment JSTARS deployed into during 1995 and 1996. This aspect of the thesis may at first appear inconsistent with the problem statement. The irony is, the end of the war, supported by the NATO deployment, provided the impetus

for the first peacetime use of JSTARS. As such, it is instrumental to thesis development to explore the military and political factors surrounding the war and its cessation.

The History of JSTARS

"Wars may be fought by weapons, but they are won by men."[3] The JSTARS program evolved out of separate Army and Air Force research programs. Army research began in 1958 at the Willow Run Laboratories of the University of Michigan.[4] A team of researchers developed the Periodically Elevated Electronic Kibitzer (PEEK).[5] The group developed an MTI radar mounted on a telescoping mast. The idea was to elevate the mast head above the treeline, quickly looking at the surrounding terrain, and retract the mast. Hence the name "PEEK." Their assumption was enemy surface air missile capabilities would target the mast and destroy the sensor if elevated for a protracted period of time. The Army evaluated the system in terms of its elevation mechanism. Most efforts focused on the ability to extend and retract the mast. A mortar launched version was studied and deemed impractical. The project ended as quickly as it started.[6]

Sometime after Project PEEK, the University of Illinois' Control Systems Laboratory (CSL), developed a moving target indicator (MTI) Side-Looking Airborne Radar (SLAR). The concept of the SLAR is to generate an electrical image of the area being monitored to depict suspicious vehicle movement. The challenge was how to mount the radar to take advantage of its capabilities. The Army contracted the Grumman Corporation to outfit the OV-1 (Mohawk) aircraft with the Motorola-produced AN/APS-94 SLAR radar. Additional components installed on the Mohawk included a radar terminal and image processor to produce a graphic display.[7] The Mohawk was used in

Vietnam to monitor North Vietnamese movements along road networks. The system saw duty in Europe and Korea to monitor the movement of Warsaw Pact and North Korean forces respectively.[8] The system remained part of the Army's inventory from the mid-1960s until its retirement in the late 1990s.

In 1968, the Army in Vietnam was using building mounted radars' to monitor Vietcong and suspected North Vietnamese movements on the outskirts of Saigon. Charles Fowler developed the idea for a helicopter mounted AN/PS4 SLAR radar. The radar would rotate beneath the helicopter and provide continuous radar coverage of an area of suspected enemy activity.[9] The Army invested in an experimental model of the concept naming it the Airborne Long-range Alerting Radar for MTI (ALARM).[10] The system was based on mounting the AN/PS4 radar onboard a UH-1 helicopter. ALARM was demonstrated in 1972 with resounding success. Studies indicated ALARM would provide an advantage to NATO forces facing off against the WARSAW Pact in Europe. sometime after 1973, the system was renamed "Stand Off Target Acquisition System" (SOTAS). The system passed evaluations during a number of Joint exercises through 1975. In 1976 SOTAS participated in exercises on the Korean peninsula. Evaluation of the system's monitoring of the Korean demilitarized zone (DMZ) were positive. Its performance resulted in requests for the system to stay in Korea. The requests were denied.[11] Later in 1976, SOTAS participated in the Army's Return of Forces to Germany REFORGER) exercise. The system proved itself and again resulted in a request from local commanders to stay in Europe. The request was again denied with the exception being the Army agreed to build two Interim-SOFAS (I-SOTAS) for United States Army

Europe (USAREUR). The two systems were built and arrived in Europe in 1978 and 1979.[12]

The Army gained invaluable experience through its use of the SOTAS. Technical and operational minds collaborated on the utility of SOTAS to ground operations. Through the period of the system's development, the Army concluded SOTAS provided a "critically important capability...over any opposing force."[13] SOTAS remained fully funded by the Army through 1980. Challenges to the program's funding were successfully defeated on the ground it provided the Army distinct advantages over Cold War era adversaries. Field Commanders are reported as accepting reductions in endstrength to support the continued funding of the program. The Army had a tool which was a proven force multiplier on the battlefield. The system had proponents in both the technical and operational arenas. SOTAS survived intact as a program through the cost cutting years of the Carter Administration. Why is it then that the SOTAS program was canceled in 1981?[14]

The Air Force developed a number of systems between 1969 and 1978 to leverage MTI radar technology against engaging ground targets. In response to the Army's ALARM program, the Air Force developed a concept for a Multi-Lateration Radar Surveillance and Strike System, (MLRS).[15] The system used two airborne platforms to pinpoint and engage ground and airborne targets. The MLRS concept was demonstrated successfully with two SOTAS radars. However, the program suffered from its own success.[16] A new program emerged from MIT based on MLRS principals. The new program was called the Multiple Antenna Surveillance Radar, (MASR).[17] The MASR

program mounted a ground-MTI (GMTI) radar on board a fixed wing platform. The system eliminated a sufficient degree of ground clutter to provide clear radar resolution of the targeted ground area. There were also important advances made regarding the many technical aspects of the radar characteristics.[18]

In 1976, the Defense Science Board conducted a study named the Conventional Counterforce Against a Pact Attack.[19] The focus of the study was developing a way to counter the numerical superiority the Warsaw Pact held over NATO in Europe. SOTAS was incorporated as part of the study. The part of the study impacting the focus of this thesis was referred to as, "The Interdiction team...[which] had the assignment of countering the Pact's second and third echelon forces." An airborne GMTI capability linked to "smart" battlefield interdiction missiles (BIM) was proposed as the result of the study. The concept was for the GMTI to detect the second and third echelon targets, resulting in the launching of multiple BIMs. The BIMs following directional guidance from the airborne GMTI would interdict the advancing columns with smart sub-munitions.[20] The study eventually transitioned into a program called Assault Breaker.[21] Based on the earlier studies, including Assault Breaker, the Air Force initiated the *Pave* Mover Radar Program.[22] In addition to the GMTI radar, the Pave Mover program included a synthetic aperture radar (SAR) capability. In 1978, the Air Force awarded competitive development contracts to Hughes Aircraft and Grumman/Norden.[23]

With the cancellation of the SOTAS program the Army suffered a gap in its organic threat surveillance capabilities. The importance of GMTI to the Army's tactical operations gained recognition during the SOTAS era. The issue at hand was having a

GMTI capability to support brigade and division operations. The Air Force Pave Mover program focused on supporting theater operations. The Mohawk supported Army Corps requirements. It quickly become evident congress would not fund two separate systems. The Chiefs of the Army and Air Force agreed to a Joint venture to support the GMTI requirements of both services. The Joint Surveillance Target Attack Radar System (JSTARS) emerged as the compromise effort between the Army and the Air Force. JSTARS was planned as a theater asset, flown by the Air Force, and targeted against second and third echelon forces of invading Soviet hordes. The system's radar coverage would support the needs of tactical Army consumers as well. Conservative elements of the Army voiced their concerns.[24] They felt the Air Force could not adequately support Army requirements. The cultural differences between the two services lent itself to mistrust on the part of Army opposition to the program.

In 1984, the type of airframe became an issue.[25] The Strategic Air Command (SAC) wanted to reconfigure the B-52 to take advantage of its missile carrying capability. This in effect would have provided a "killing" capability as part of the platform. The B-52 suffered from a lack of internal space for personnel and equipment. The Tactical Air Command and ESD wanted the C-130 and Boeing 707 respectively. Officials from the Office of the Secretary of Defense (OSD) instructed the services to explore using the U-2/TR-1 and the Mohawk.[26] The issue was finally decided when a Joint Initiatives memorandum declared the Boeing 707 as the "most cost effective approach to meeting the needs of both services."[27]

In September 1985, the contract for JSTARS aircraft system configuration was awarded to Grumman Corporation. The contract selection took place 17 July 1995. The estimated cost of the contract is sixteen billion dollars. The Air Force side of the program was managed by the Electronic Systems Division (ESD) at Hanscom Air Force Base, Massachusetts. The Army's GSM program fell under the supervision of the Communications Electronics Command (CECOM) at Fort Monmouth, New Jersey. The Army GSM contract was awarded to Motorola. The cost for the Army's follow-on system to the GSM, the common ground station (CGS) is estimated at one billion dollars.[28] At the time of this writing, the number of JSTARS aircraft scheduled for production is thirteen. The last aircraft is scheduled for delivery in the year 2005.

In January 1991, two prototype E-8A JSTARS aircraft deployed to Saudi Arabia in support of Operation Desert Storm. Contractor personnel manned the consoles while and adhoc crew from ESD flew the airplane. The aircraft are reported to have flown forty-nine combat sorties encompassing over 535 hours of flight time between the two aircraft. During one January 1991 mission, JSTARS detected an Iraqi column moving south towards Saudi Arabia. Two A-10 aircraft and an AC-130 gunship were vectored to intercept the column. Reportedly, fifty-eight of seventy-one vehicles were destroyed.[29]

In 1996, the Honorable Paul G. Kaminski, Undersecretary of Defense for Acquisition and Technology had these comments about the first JSTARS deployment to Bosnia. "I was struck by just how indispensable the continuous surveillance coverage provided by the JSTARS' moving target indicator and synthetic aperture radars' were to the initial deployment of the NATO Implementation Force. During the early stages of

Operation Joint Endeavor, the JSTARS aircraft flew 51 missions in the Bosnian theater, covering a total area of 747 million square kilometers. To put this in perspective, that is about 75 times the land area of the United States."[30]

Mr. Kaminski's remarks eloquently describe the technical aspects of the JSTARS system. However, they are devoid of quantifiable information supporting the post mission analysis of how effective the system was. This does not mean JSTARS did not perform admirably during the first deployment to Bosnia in 1995. It only suggests there is no measurable criteria upon which to evaluate the system's support to Army forces on the ground. Additionally, Mr. Kaminski's comments lack describing the contributions of the human dimension. Omitting the efforts of dedicated airmen and soldiers to make JSTARS work over Bosnia casts a cloak of simplicity over what was a complex and extremely dangerous mission. Another factor which was not addressed is the impact of terrain.

In summation, the history of JSTARS began when 1950s airframe and radar technology combined to create the Mohawk SLAR and SOTAS systems. The Mohawk aptly proved itself during fighting in Vietnam. SOTAS performed well during operational exercises in Germany and Korea. The Air Force programs Assault Breaker and Pave Mover synergized radar research efforts into a precursor for JSTARS. With the cancellation of the SOTAS program, the Army recognized a gap in its organic surveillance capability. Focusing on a radar technology to counter the numerical superiority of the Warsaw Pact in Europe, the JSTARS Joint Program office was formed subordinate to ESD at Hanscom Air Force Base, Massachusetts. The awarding of a 16

Billion dollar contract to Grumman Corporation in 1985 signified the beginning of the JSTARS development effort. By 1990, JSTARS had passed most of its operation tests and had demonstrated its capabilities to commanders in Europe. Lieutenant General Frederick Franks, former commander of the now deactivated VII Corps, requested the system to support coalition forces during operation Desert Storm. Lieutenant General Franks' knowledge of the system was gained during operational demonstrations in Europe. JSTARS received numerous accolades for its performance in Desert Storm. In 1995, JSTARS was again called upon to support coalition forces. During the deployment of NATO's IFOR into Bosnia, JSTARS scanned Bosnia's rugged terrain for sign of enemy activity. The system received accolades from the most senior military officers involved with the operation.[31] The history of JSTARS spans over three decades. The system has proven itself in war. It appears the system has proven itself in peace. If so, the issue becomes how well and in what manner was JSTARS successful?

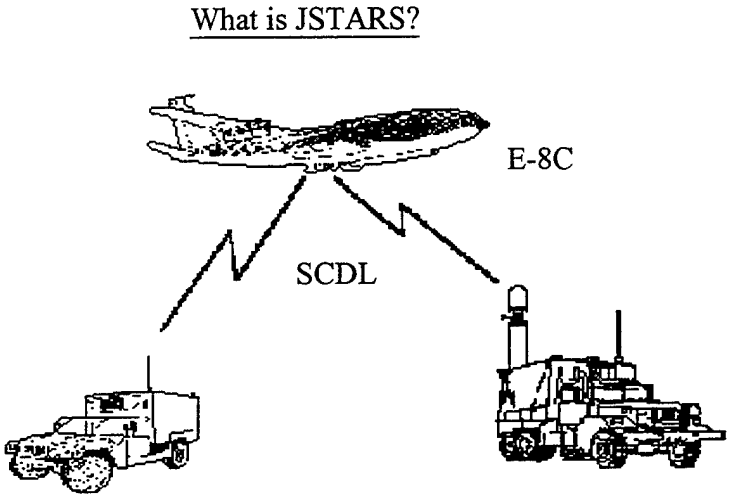

Figure 4. JSTARS communicates to GSM locations via the Surveillance and Control Data Link (SCDL). *Source:* United States Army Intelligence Center and School, Directorate of Combat Developments; figure accessed through the internet in October 1998. URL, http:/huachuca-usaic.army.mil.

JSTARS is a dual service capability designed to monitor the LCC's area of operations (AO). It provides intelligence and targeting support to the LCC. JSTARS WAS-MTI capabability enhances situational awareness for commanders at echelons brigade and above. The system's sector search (SS) and SAR-FTI support Air Force battle management requirements during the planning and execution of strikes against ground targets. The airborne component of JSTARS is a modified Boeing 707 cargo aircraft. General Characteristics of the aircraft include:[32]

1. Primary Function: Ground Surveillance
2. Contractor: Northrop-Grumman Corporation
3. Power Plant: 4 Pratt and Whitney JT3D engines. (18,000 lbs thrust each)
4. Length: 152 feet, 11 inches (46.6m)
5. Height: 42 feet, 6 inches (12.9m)
6. Weight:

   171,000 lbs (77,565Kg) Empty

   155,000 lbs (70, 307 Kg) Max Fuel

   336, 000 lbs (152,408 Kg) Max Gross
7. Wingspan: 145 feet, 9 inches (44.4m)
8. Speed: .84 Mach
9. Range: 11 hours, 20 hours with air refueling
10. Unit Cost: $225 million
11. Crew: Flight crew of 4 plus mission crew of 18 Army and Air Force specialists.

The E-8C houses the AN/PY3 multimode phased array radar. The system performs a SLAR function providing continuous surveillance of a Ground Reference Coverage Area (GRCA). The SLAR is targeted against lines of communications (LOC) and provides MTI information within the area established by the GRCA. LOCs are generally along movement corridors corresponding to roadways, rail lines, navigable rivers, and detectable air corridors associated with slow moving rotary wing aircraft. From a doctrinal perspective the Army expects GRCA coverage to measure 180 kilometers by 180 kilometers. The radar additionally operates in the synthetic aperture radar (SAR) mode to monitor point targets on the ground. Point targets include bridge locations, tactical assembly areas, railroad yards, and border crossing sites. The SAR provides fixed target indications (FTI) and is suitable for detecting changes within the designated target area. Air Force operators onboard the E-8C designate the mode of operation for the radar. Army personnel operate consols designed to communicate with GSMs via the Surveillance Control Data Link (SCDL). Radar Service Requests (RSR) are passed from the GSM to the E-8C via the SCDL. RSRs are processed onboard the aircraft and given a priority based on preestablished requirements stated by the LCC. Army operators interact with Air Force radar controllers to ensure the radar is designated in the appropriate area based on requirements passed from the GSMs. A limiting factor in communications between the E-8C and GSM locations is a line of sight (LOS) requirement. LOS is required for SCDL lock to occur between the GSM and the aircraft.

The SCDL is the singular most important aspect of communications between the airborne E-8C and the ground based GSM. SAR transmissions tend to slow down the

transmission of MTI imagery data. Without LOS, GSM locations cannot communicate with the E-8C. However, a single GSM with LOS of the E-8C can communicate via satellite communications (SATCOM) with multiple GSMs located beyond LOS. The GSM SATCOM retransmission capability slows down the dissemination of radar data.[33]

The ground component of JSTARS is the GSM. Currently the GSM is configured in two versions. The medium-GSM (MGSM) is mounted on a 5 ton 900 series cargo truck. The light-GSM (LGSM) is mounted on a high mobility multipurpose wheeled vehicle (HMMV). "The Army's GSMs receive and analyze the radar imagery data from the E-8C.... The GSMs are distibuted to all echelons brigade and above. It supports surveillance, intelligence, targeting and battle management functions with near real time (NRT) interactive displays which can be reproduced on a remote terminal. The operator provides accurate fixed and moving target locations, speed, target classification, and direction of movement." [34]

The combination of the E-8C and GSM provides the LCC the enhanced situational awareness, targeting, intelligence, and battle management support expected of an information age surveillance system. Addressing the JSTARS development and composition portrays the unique capabilities associated with MTI and FTI radar technology. One might even say that for JSTARS, the RMA began in 1958. Given JSTARS was designed to counter large massed formations invading western Europe, the primary thesis question is yet to be addressed. In order to understand JSTARS effectiveness in peace operations, defining the environment of peace is a logical step in developing the thesis.

Peace Operations

Peace operations are significantly different in construct than conventional warfighting operations. They are not new to the American military and have been a part of America's experience since the country was founded.[35] And yet, peace operations continue to confound military leaders. Complexities abound, and like war no two are alike. Political considerations outweigh the military's tactical and operational requirements. For the purpose of this thesis, the discussion on peace operations will focus on peace enforcement. The concept of peace enforcement includes the potential for the use of combat power. Battlefield operating systems (BOS) are as relevant in peace enforcement as in war. They may be modified to fit the situation, but they are still relevant.

Unlike peacekeeping where all parties agree to the intervention, peace enforcement may occur in an environment where there is no such agreement. Enforcement implies forcing belligerent parties to abide by political arrangements agreed to during the conduct of hostilities. This does not necessarily mean a cease-fire has taken place. It is more like a school teacher breaking up a playground fight. The kids understand the rules and know they should get along. Friction occurs based on frustration, greed, or just being the playground bully. The kids fight, the teacher separates them and keeps an eye on them to make sure they do not start fighting again. If they start fighting again or one kid gets his friends to gang up on the other guy, then naturally the teacher has to take stricter action or get assistance. The problem arises when the teacher only watches two kids and the entire class is on the playground. If another

child gets hurt or wanders away from the play area, the teacher may not notice if fixated on the two who were fighting. This discussion illustrates the complexity associated between the peacekeeper and belligerents in a peace enforcement environment. For the purpose of this thesis, the discussion will focus on keeping an eye on all the kids at the playground, not just two.

During the UNPROFOR experience in Bosnia, the charter to protect UN declared save havens was undermined by senior level UN decision makers. UNPROFOR did not have an established mandate to take aggressive military action. Protecting the UN force from FWF hostile action became part of the scheme of maneuver. Safeguarding the populations of designated areas was untenable. The force had enough problems protecting themselves. (See figure 5.) The fighting continued. The ethnic cleansing continued. And, the butchering of civilian relief workers occurred when not protected by UN combat power. This example is a case of extreme military failure in a peace operation due to political requirements generated at the upper echelons of the UN hierarchy.[36]

Limitations on the use of deadly force challenge the peacekeeper to modify the employment of his combat power. Instead of using maneuver to defeat or destroy an enemy, the peacekeeper must use his skills and capabilities to subdue an adversary in a non-lethal manner. A show of force, otherwise known as a *demonstration,*[37] designed to intimidate may prevent the occurrence of hostile action. Likewise, if belligerents understand their actions are being monitored they will resort to less obvious methods to achieve their aims. The effect may be to subdue their tendency to fight if they suspect the

Figure 3. A wounded French peace keeper in Bosnia. *Source*: Photograph accessed from SFOR picture files, in March, 1998. URL, http:/www.NATO.int.html

peace enforcement force knows what they are doing. It is essential to integrate intelligence, surveillance, and reconnaissance (ISR) systems into the peacekeepers scheme of maneuver. The same type of information provided in wartime is applicable to peace enforcement operations. The application of ISR assets may require modification. Conventional warfighting is still planned within the context of a linear battlefield. In peace enforcement, the area of operation may resemble a chessboard at the height of play. The dispersion of forces lessons the ability to mass in reaction to a perceived threat. Likewise, the dispersion impacts the ability to monitor the entire AO. The geometry of the AO may require devising reconnaissance plans which are nonstandard. The topography of the AO combined with the composition and disposition of former

belligerents may require modification of procedures associated with operation of an ISR system.

Combat trained soldiers, given a focused objective, time and resources to prepare, and led by adaptive and mentally agile leaders at all levels, will perform superbly as peacekeepers....The key is to understand the complexities of the peace operation environment you are facing and then adapt your warfighting skill to meet them.

Major General Joseph Kinzer, *JTF Commander's Handbook for Peace Operations*[38]

Training For Peace

How does a modern warfighting force prepare itself to conduct peace operations? The RMA is intent on increasing the lethality of the fighting force through improving warfighting capabilities. The range and accuracy of weapons continues to increase. Electronic sensors monitor larger areas and provide more detailed information than at any point in history. Communications systems rapidly disseminate information vertically and horizontally at unprecedented rates. How does the force organize and what assets does it deploy to support mission requirements? Intelligence Preparation of the Battlefield supports the tailoring of the appropriate force. Political objectives dictate the desired end state. The structure of the force and the assets at its disposal must support the political and military objectives. Failing to balance the two may jeopardize the success of the mission. This was the case with respects to UNPROFOR operations in Bosnia. The UN must have perceived the FWF would stop fighting once the intervention occurred. Nothing could have been further from the truth.

Training soldiers, airmen, seamen, and marines is the predominant focus of the U.S. military in peacetime.[39] It is better to prepare for war and execute a peace operation than vice versa. Units trained well for war conduct well-disciplined peace operations.[40] The challenge is tempering the warrior's strength with the peacekeeper's patience. Preparing warriors for missions of peace calls upon their unique warfighting skills. Courage, audacity, and boldness are just as relevant to peace enforcement as they are to war. The application of a warrior's skill and personal character conforms to mission requirements. He chooses his tools of war to fit the mission of peace. The warrior's tools undergo changes in the way they are employed to support peace operations. Weapons systems fired in anger to destroy an enemy remain silent yet ready to secure the peace. The warrior remains poised to use his weapons when provoked. ISR systems employed in one manner during war may require modified procedures to effectively support peace enforcement. Today's military modifies the employment of weapons and systems used for fighting to fit the needs of peace.[41]

Understanding the threat is integral to training for both war and peace. In a peace operation the threat manifests itself differently than during war. Warriors should not expect to encounter enemy regiments with two battalions forward and one in reserve. The threat will not conduct itself on timelines consistent with rates of march and doctrinal templates. The threat will take advantage of friendly routine operations and execute actions during periods of relaxed vigilance. Observation of friendly operations will provide the threat the information needed to successfully plan and execute hostile actions. Commanders and staffs must be cognizant of the threat and means of hostile action the

threat can use. Using ISR to monitor the threat must be combined with interacting with them. Showing an FWF commander a picture of an activity he thought was safely clandestine may prevent him doing the same thing again.[42] Of course, the opposite may occur and he might just try to deceive the ISR asset at the next attempt to get away with something. Long periods of threat inaction may suddenly explode with immediate and devastating results. Service personnel must remain alert for potential threats during the execution of peace operations. They must be prepared to defend themselves at all times. Complacency kills warriors.[43]

IFOR's Deployment to Bosnia

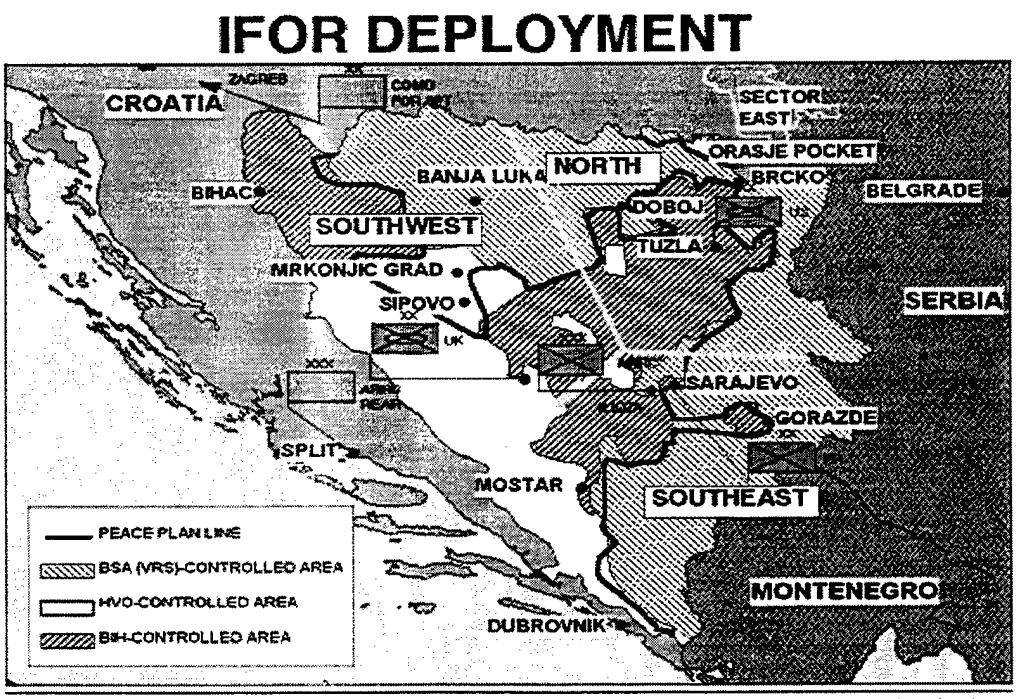

Figure 6. The zone of operation for NATO's Implementation Force (IFOR). *Source:* NATO, map accessed at URL, http://www.nato.int/ifor/ifor.html

As a matter of supporting important national interests, the National Command Authority (NCA) directed the participation of U.S. ground forces in the NATO-led IFOR. As OJE got underway, sporadic fighting continued to occur between opposing elements of the FWF. Soldiers were at risk. The primary threat to ground forces were the numerous antitank and antipersonnel minefields dispersed throughout the region. An estimated eight million mines were emplaced during the course of the war. The majority of them were active. In order to dissuade the FWF from commiting hostile actions against IFOR every means of force protection available was given priority. The NCA's decision to deploy JSTARS in support of IFOR is clearly in support of force protection. However, during the course of thesis research other factors surfaced. Of minimal consequence is the possibility JSTARS was used as part of a strategic deception plan. A much more pragmatic and very American reason revolved around the NATO Aerial Ground Surveillance (AGS) testbed program. Candidate surveillance systems for a core NATO AGS included the UK ASTOR, French CRESO, and the U.S. JSTARS.

Conclusion

This chapter provides the background material upon which much of the thesis development was based. It is an attempt to be as objective as possible through study of the war in Bosnia and the IFOR deployment. The decision to deploy JSTARS in support of IFOR (and later SFOR) included economic, political, and military considerations. The degree of influence the economic and political agendas had on the JSTARS deployment was unknown prior to the start of research. During the course of the deployment in 1996, there were many references to the high level of interest held by the NCA. Inferences

were made that President Clinton ordered specific JSTARS missions to impress the European Allies. Those rumors were never substantiated yet provided an alibi to fly JSTARS outside the parameters of supporting the ground component commander. The deployments translated into a multibillion dollar economic bonanza if JSTARS was selected for the NATO AGS program. JSTARS developmental history conveys the constant state of evolution the system is in. The current level of capability is just one more step up technology's evolutionary ladder. With respect to JSTARS, the Army has undergone an RMA since 1958.

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[1] Herbert J. Lloyd, "The Reasons Why," (Camp Casey, Korea: 2nd Infantry Division, 1 July 1998), 200. This quote is attributed to Major George Patton during his tenure at the U.S. Army Command and General Staff College.

[2] U.S. Army, FM 34-25-1, Joint Surveillance Target Attack Radar System (Joint STARS, (Washington DC: Headquarters, Department of the Army, GPO, 3 October 1995), 1-1

[3] Lloyd, 46

[4] Charles A. Fowler, "The Standoff Observation of Enemy Ground Forces, From Project Peek to Joint STARS," (This paper is an *expanded version of a talk given at the MIT Lincoln Laboratory Distinguished Lecture Series* presented by Dr Fowler on 31 January 1996). The document is found on-line at the *Journal of Electronic Defense* internet site: http://www.jedefense.com/jed.html.new.jul97/fowler.html.

[5] Ibid., 3.

[6] Ibid.

[7] Ibid., 4.

[8] Ibid.

[9] Ibid., 5.

[10] Ibid.

[11] Ibid., 6.

[12] Ibid., 8.

[13] Ibid. The development and employment of SOTAS by the Army demonstrates the criticality of MTI technology to the Army. The SLAR radar provides the ground commander with improved situational awareness. The Army did not necessarily refer to it as such back in 1978, but the concept was the same. SOTAS clearly exemplifies the Army's recognition of a need for an airframe mounted wide area surveillance capability. The same capability JSTARS provides today.

[14] Ibid., 9. SOTAS is an example of what the Army continues to experience today. Political ramifications exert influence on decision making to the detriment of the force as a whole. The Reagon Administration is generally viewed as a period of military build up in the United States. It is ironic SOTAS was sidelined at a point when the Iron Curtain was subjected to increasingly hostile rhetoric and an aggressive U.S. military buildup.

[15] Ibid., 9.

[16] Ibid., 10.

[17] Ibid.

[18] Ibid.

[19] Ibid.

[20] Ibid., 12.

[21] Ibid., 12. Fowler points out that Dr. William Perry become the DOD Undersecretary for Research and Engineering. Fowler states, "Perry...set a course that resulted in the overwhelming military superiority that the US demonstrated in the Gulf War (Desert Storm). Perry provided leadership and vigorous support to the Assault breaker program and many other high leverage programs."

[22] Ibid.

[23] Ibid., 12. Fowler points out that, "the Assault Breaker concept was seized upon by all kinds of people and briefed widely with, in many cases, exaggerated claims of effectiveness. It began to sound like attacking the second and third echelon would solve all the problems and the ground forces wouldn't have to do...." This clearly

illustrates a danger the Army must watch out for during this era of the RMA. There are many well intentioned ideas which may not suit the needs of the Army in the twenty-first century. Likewise, the Army must be cautious of illicit proposals generated out of greed in the name of either personal or corporate gain.

[24] Ibid., 23. Some Army reservations were voiced about the decision to go Joint with JSTARS. Their views are summed up in this quote from Fowler's paper. "This is like telling the Air Force that the Army would operate AWACS and furnish them with the data."

[25] Heitman, Roy K., article: *Overnight Star: Acquisition Retrospective.* This article was taken from the Air Force Material Command's public affairs home page on the internet.

[26] Ibid.

[27] Ibid.

[28] Cost estimates for both the Army and Air Force portions of the contract were provided by former members of the Army Staff.

[29] Fowler, 17.

[30] Heitman. Kaminski's remarks were made during an address to the 1996 Institute for Electrical and Electronics Engineers National Radar Conference.

[31] George A. Joulwan, General, USA, Commander in Chief (CINC) of the United States European Command (EUCOM), (statement to the House National Security Committee, Washington DC, March 1996), "Capabilities derived from C4I improvements will increase operational effectiveness through digitization of the battlefield, thereby improving commanders' situational awareness. JSTARS, for instance, has already proven both its capability and deterrent value in Joint Endeavor."

[32] U.S. Air Force, "E-8C Fact Sheet," (Warner Robins Air Force Base, Georgia, 93rd Air Control Wing, 1997).

[33] LTC Jack Kem email to CPT Suzanne Nielsen, "GSM Communications," (Bosnia and Italy: 6 March 1996). The source for the technical information pertaining to the SCDL and GSM SATCOM is email message traffic between the CDR 319th Military Intelligence Battalion and the CDR B Company, 319th Military Intelligence Battalion.

[34] U.S. Army, Intelligence Center and School, Director of Combat Developments.

[35] Lawrence A. Yates, article: "Military Stability and Support Operations: Analogies, Patterns and Recurring Themes," *Military Review,* (July-August 1997), 52.

[36] Gow, James, *Triumph of the Lack of Will,* (New York-Hong Kong, Columbia University Press, 1997), 117. Gow writes, "Questions about Rules of Engagement (RoE)...were directly related to the mandate given to the UN force and conditioned by the UN's traditional mode of operation. This limited RoE to the firing of a single directed round only when subject to directed incoming fire and when the source of that firing could be clearly identified." He goes on to write, "In spite of all its problems, UNPROFOR was undoubtedly alleviating some of Bosnia's misery and probably acting, if not as a deterrent, then as a presence which made the level of violence less than it might have been otherwise." Gow asserts UNPROFOR operations were hamstrung by political decisions. My point here is that military requirements may not get enacted due to political factors influencing decisions at the highest echelons. In this case an overly cautious ROE made absolutely no sense in terms of the actual military situation on the ground.

[37] U.S. Army, FM 100-5, *Operations* (Washington DC: Headquarters Department of the Army, GPO, 14 June 1993), Glossary-3.

[38] Joint Warfighting Center, *Joint Task Force Commander's Handbook for Peace Operations* (Fort Monroe, Va: TRADOC, GPO, 16 June 1997), i. LTG Kinzer's statement asserts the military must train for war to be effective in peace. Like wise, the military must understand how to adapt its warfighting systems to support peace operations. Emerging technologies associated with the RMA are designed to fight wars. Applying warfighting technology to peace operations requires adaptation to the specific threat environment. My view is that JSTARS is a warfighting system. To make JSTARS effective for peace enforcement requires modifying surveillance operations to support requirements on the ground.

[39] FM 100-23, *Operations,* 38.

[40] Ibid., 86. Appendix C of FM 100-23 provides a fair discussion on training for peace operations. A list of subjects is provided for the conduct of unit training in preparation for peacekeeping and peace enforcement missions.

[41] Ibid., 39-40.

[42] An unsubstantiated report claims General Joulwan used a printed copy of a JSTARS or UAV image to intimidate FWF commanders. When confronted with the image the FWF commanders denied the alleged incident. Gen Joulwan then stated since the equipment did not belong to the FWF and it was in an unauthorized location, he

would order AH-64 Apache helicopters to destroy the equipment. The CDRs of the FWF immediately retracted their statements and requested time to remove the offending unit from its discovered location.

[43] On 29 September 1982, a United States Marine Battalion Landing Team entered Beirut, Lebanon as part of a multi-national force (MNF). Their mission, maintain a peaceful environment to allow foreign military's to withdraw from Lebanon. To safeguard Marine personnel from small arms fire and mortars, a concrete building at Beirut International Airport (BIA) was used as a headquarters and barracks. On October 23, 1983 a truck loaded with an estimated 12,000 pounds of TNT penetrated the Marine defensive perimeter and exploded inside the headquarters building at BIA. 241 U.S. military personnel were killed. Almost simultaneously, a similar truck bomb detonated at the Headquarters of the French forces assigned to the MNF.

CHAPTER 5

THE WAR IN BOSNIA

This chapter provides the backdrop for the war in Bosnia. Understanding the political, geographic, and military context of the war highlights the complexity of the mission to dissuade the FWF from fighting. The chapter begins with the formation of the Socialist Federative Republic of Yugoslavia at the end of World War II. Ethnic hatred, prevalent throughout Yugoslav history, was tempered not extinguished during the period 1945 to 1980. During the 1980s, nationalist rhetoric split the fragile union of "Six Socialist Republics (Bosnia-Herzegovina, Croatia, Macedonia, Montenegro, Serbia, and Slovenia) and two Socialist Autonomous Provinces (Kosovo and Vojvodina)."[1] Ultimately nationalist sentiments erupted spawning intense political strife between the formerly cohesive republics. The collision of historical prejudice with economic and political agitation resulted in a brutal four year long civil war.

Political Background of the War

Yugoslavia emerged at the end of World War Two as a nonaligned communist nation.[2] Josip Broz Tito rose to power as the leader of partisan factions fighting the Germans. A Moscow trained communist, Tito relied on western armaments to sustain partisan resistance during the war. His relationship with the Soviet Union cooled as he pushed for recognition of Yugoslavia as an independent state. He staunchly refused to become a satellite of the Soviet bloc.[3] During the cold war, Tito manipulated Western economic support to finance Yugoslavia's economy. Aligning himself economically with the West allowed Tito to hold Moscow at arm's length.[4] Yet Yugoslavia was unable to

transform western financing into sustainable economic infrastructure. As the international debt increased, the internal Yugoslavian economy floundered. By the time of Tito's death in 1980, Yugoslavia was on the brink of economic disaster.[5] For thirty-five years Tito personally developed and managed Yugoslavia's economic and political policies. He personally bound the fabric of Yugoslavian society together from 1945 to 1980. His passing caused a fracture within the fragile stability of Yugoslavian politics. The economic stress Yugoslavia faced in the decade of the 1980's resulted from poorly planned and executed economic policies. The combination of political indemnity and economic insolvency unraveled the fabric of what was formerly Yugoslavia. The following passage clearly sums up the complexity of Yugoslavian politics.

> The country (Yugoslavia) is a multinational state in which no single nationality claims a majority. If one takes the figures of 600,000 as the lower benchmark, there are seven main nationalities, of which one - the Albanian - is non-Slav. The country has no common language: although a large part of the population (over 70%) speaks Serbo-Croat, the fact that this language appears in two major literary variants makes the whole sphere of public communications even in Serbo-Croat an arena for nationalist contestation.
>
> Most nationalities are not located in geographically discrete areas, but commingle in the six republics and two provinces, giving each federal unit a multinational character in turn. The degree of ethnic heterogeneity varies, but the presence of these minorities is often a vociferous reminder of the interdependence of Yugoslavia's constituent parts.
>
> The Yugoslav nationalities are also internally separated by history, so that the existing ethnic map is overlaid with historic frontiers which further complicate (or enrich) national loyalties. The strength of historic versus ethnic frontiers is shown in the separate existence of Bosnia-Herzegovina and Vojvodina, in spite of the fact that these have large Serb populations on the borders with Serbia proper, Croat populations on the borders with the Republic of Croatia, etc.
>
> Finally, the relatively late formation of the Yugoslav state, well after rather than before the arrival of its ethnic components to fully fledged national consciousness, has infused the state with a perception of distinct and sometimes conflicting interests as between Yugoslavia as a whole and its separate component nationalities.[6]

The war in Bosnia began as a result of infighting between three factions. Muslim, Eastern Orthodox, and Roman Catholic populations fell victim to nationalist rhetoric. Historically, each group forms a majority population in separate geographic regions of the Balkans. Smaller intermingled populations from the other two cultures provide a rich ethnic diversity. Generally, the majority population provides the predominant character for the region. Each region formed its own economic and political structures based on distinct cultural tendencies. The Eastern Orthodox Serbs inculcated influences from eastern Europe, Greece, and Russia. Serbian interests developed from economic, religious, and political exchanges with these neighboring countries. Muslims form the core population in the geographic region of Bosnia. Historical ties to Iran, Turkey, and the Ottoman Empire form a more middle eastern orientation in this population's cultural mindset. However, smaller Bosnian Croat and Serbian populations retained their cultural identities. The Roman Catholic populations of Slovenia and Croatia developed more western tendencies. Geographic proximity to western Europe and the religious influence of Rome, predisposed this group to align itself with central European cultures. Tito (a Croat) managed to keep Yugoslavia's internal multicultural differences from disrupting national unity. After Tito's death, cultural agitation slowly fractured a formerly homogenous society.

The Road to War

The dissolution of Yugoslavia began with calls for increased independence for the republics of Slovenia and Croatia. Their primary complaint being the increasing costs associated with supporting the poor southern region of Kosovo. Belgrade taxed the

northern republics to support the economically inferior republics of the south. Nationalist rhetoric increased the secessionist movements in the north. Eventually, secessionist sentiments began to drift south through Bosnia, Kosovo and Macedonia. The increase in nationalist agitation degraded Belgrade's ability to control the outlying regions. As Serbia attempted to retain its authority over the other republics, tension increased.

In 1974 Tito's government instituted the Socialist Autonomous Province (SAP) of Kosovo as an independent region within greater Serbia. As early as April 1981, student unrest in the region prompted Belgrade to send military units into Kosovo.[7] Belgrade's violent suppression resulted in 12 persons killed and more than 150 wounded.[8] The medieval history of Kosovo fanned the flames of ethnic Serb hatred for Kosovo's largely Albanian population. The battle of Kosovo Polje in 1389 became a central theme for Serb antagonists beginning in 1982.[9] Administrative injunctions were proposed by the political elite in Belgrade to stop Albanian claims to Kosovo. Belgrade's media community exacerbated the situation by siding with the anti-Albanian rhetoric. Nationalism raised its head in an effort to devour perceived threats to Serb existence in Kosovo. Albanians were reported plotting the destruction of Serb culture within SAP Kosovo. Rumors surfaced of Albanian atrocities against Serbs. Murders and rapes were rumored to be widespread. Serb officials decried the autonomy of Kosovo asserting it was treason, a mistaken decision generated by the ill-conceived notions of the Tito regime. Serb attempts to gain greater control over Kosovo met with stiff resistance. Kosovo, a Muslim enclave, resented Serbia's attempts to dominate the ethnic Albanian

culture. As a result, Kosovo became the first region in Yugoslavia to suffer from Serbian backlash.

Economic and political friction created an environment for hard line nationalists to emerge as regional leaders. By the mid-1980s, "economic stagnation, mass unemployment, rising inflation, and labour unrest," manifested themselves throughout Yugoslavia.[10] It was in this environment that Slobodan Milosevic began his campaign to assert control over Serbian interests. In April 1987, Milosevic arrived in Kosovo Polje to attend a meeting with Kosovar Serbs. Issues between the minority Serb population and ethnic Albanians prompted Milosevic to address an adhoc meeting. An over zeolous crowd of fifteen thousand Serbs crushed around Milosevic as he attempted to make his way into the meeting place. Local police forces, both Serb and Albanian, attempted to restrict access to the already packed hall. As Milosevic made his way out into the crowd police used batons to intimidate the crowd. Astonished at the melee, Milosevic made his way to a prominent second story window and addressed the crowd. He urged moderation and selection of representatives to state grievances at the meeting. His performance in the window stunned the crowd into obedience and began his rise to the leadership of greater Serbia.

Milosevic's tactics focused on emotional issues important to Serb interests throughout Yugoslavia. He merely accused the other political groups of attempting to suppress Serbian culture and overthrow the longtime policies established during Tito's reign. By 1989 Serb protests were widespread throughout the Balkans. The poor economic situation added fuel to Milosevic's rhetoric. By targeting Croats and Muslims,

Milosevic found the common threat needed to bind the entire Yugoslavian Serb population together. Citing "Injustices done to the Serbian people,"[11] (whether real or concocted is another issue), Serb nationalism rose from an emotional call to protect Serb interests throughout Yugoslavia. What started in Kosovo over allegations against the Albanian majority migrated to Vojvodina and Croatia. Croats and Muslims became the targets for Serb anger in areas outside Kosovo. As the other political entities throughout the Balkans became aware of Milosevic's tactics, leaders rose to challenge the Serbs.

During Milosevic's rise to power in Serbia, a similar character developed itself in Croatia. Franjo Tudjman rallied Croat nationalism promising economic prosperity for an independent Croatia.[12] Tudjman focused Croat anger against the Serbs and Yugoslavia.[13] During the first meeting of the Croation Democratic Union (HDZ) during February 1990 in Zagreb, Tudjman referred to the Nazi installed Ustashe as expressing "The historical aspirations of the Croatian people for their own state."[14] This referral to an otherwise oppressive period of history shocked many people. It was the beginning of an anti-Serb campaign deliberately designed to foster secessionist sentiments. Focusing on the privileges of the Serb population, Tudjman vowed to reduce the number of Serbs in Croatia. His political rhetoric indicated an intent to devoid Croatia of anything associated with Serbian culture. Using television and newspaper media, Tudjman began a fierce nationalist propaganda campaign.[15]

Tudjman's antipathy towards Croatia's minority Serb population took substantial political form. He changed the Croatian constitution to reflect the status of Serbs as a minority. Previously Serbs perceived they shared equally in the political and economic

undertakings of the Croatian Republic. Tudjman's open disdain towards Serbs relegated their position to insignificance. Recognizing the surmounting attacks against their cultural identity the Serbs reacted defensively. As early as May 1990 the Serbian Democratic Party broke all contact with Tudjman and his political allies. In June 1990 a regional Serb political convention declared the "Sovereignty and autonomy of the Serbian people in Croatia."[16] Throughout the summer of 1990, the Belgrade media derided the political posturing of the Tudjman regime. Referring to the horrors of the Nazi occupation the media presented the case for Serbian autonomy within Croatia itself. Establishing historical precedence for Croat atrocities against Serbs in World War I and World War II, the Belgrade media trumpeted suspicions about Tudjman's actions. A Serb National Council in Croatia announced its rejection of all constitutional changes implemented by the Tudjman regime.[17] The Croats immediately acted to suppress Serb intentions going so far as to announce an inventory of weapons owned by all Serbs.[18]

As the situation in Croatia deteriorated, increased polarization of the Serb population in Croatia occurred. In August 1990, a clash between Croatian police and Serb reserve police forced the issue to a head within the Yugoslavian hierarchy. An operation to disarm the reserve police in the village of Benkovac met with resistance by armed Serbs from surrounding villages. The Serbs seized the reserve police weapons prior to arrival of the Croatian police. Croat reaction included sending Army forces into the region to suppress the Serb actions. The Yugoslav Army intervened and forced the Croatian dispatched forces to stop the operation.[19] Tudjman forcefully demanded Belgrade to explain the Army's actions. The Yugoslav president, Borisav Jovic,

announced the right of all people to freely express themselves. Jovic's response ensured the rift between Belgrade and Zagreb was complete. By October 1990 the entire Serb population in Croatia was alienated against Tudjman.

In Western Yugoslavia, the Republic of Slovenia stood resilient against the agitation of "internal Serbian affairs."[20] The Slovenes sensed an "eastward" leaning on the part of the Belgrade government. President Kucan preferred a multiparty configuration based on Tito style Socialist principles. As Serb posturing became increasingly aggressive throughout Yugoslavia, the Kucan administration designed its own internal propaganda campaign. Noting the plight of Albanian silver miners in Kosovo, the Slovene government announced support for perceived Serb persecution of Albanians in Kosovo. The Serbs regarded the Slovene position as hypocritical pointing out the previous Slovene resistance to supporting the financially troubled Republic of Kosovo. Milosevic inflamed the situation by calling for a countrywide Serbian boycott of all Slovene made products. During this period a flurry of angry debates barraged the political landscape in Yugoslavia. Belgrade held the position of a centralized Federal regime. The nationalist movements in Croatia and Slovenia progressed a different rates. The purely secession minded Slovenes clouded the ambivalence of Croatian decision makers. At the meeting of the "14th (Extraordinary) Congress of the League of Communists of Yugoslavia...in January 1990," [21] the debate culminated. After an arduous debate pitting Milosevic against Kucan, the Slovenes sensed they were politically cornered. The Slovene delegation walked out of the meeting effectively bringing an end to the League of Communists. On 2 July 1991 Slovenia

announced its secession. Kosovo followed suit followed by Croatia, the Bosnian Serbs, and Macedonia. By January 1992, the Socialist Federative Republic of Yugoslavia ceased to exist.

The War Begins

Historically, the Yugoslav Army held a level of prestige in political circles not known in other Communist nations. The voice of the Army was powerful and politicians were careful to cultivate close relationships with senior defense officials. Milosevic courted the Army through publicly acknowledging its importance. His efforts resulted in strong backing by the Army for support of the continuation of a federalized government. As the nationalist rhetoric increased throughout Yugoslavia, the Army became increasingly concerned over stability and security for the region. One of the first actions taken by the Army was to consolidate all territorial defense forces under centralized control of the Army. Milosevic, backed by the Army, decreed there would be no autonomous military force anywhere within the borders of Yugoslavia. Considering Croatia held upwards of forty percent of the entire defense manufacturing infrastructure, it became clear to Belgrade that disarmament would be necessary. As the federal government invoked the centralized control of all territorial defense forces, Croatian authorities resorted to smuggling weapons to arm their military.

The secession of Slovenia posed immediate challenges for the Belgrade regime. In particular was the loss of revenue from international border crossings. This concerned the Army whose budget had suffered from dwindling Federal reserves. The revenues generated at the border crossings provided significant resourcing for the military.

Military authorities in Belgrade designed a show of force to confront the situation in Slovenia. A military operation designed to occupy key border crossings and an international airport failed to resolve the situation. The military did not act decisively to end the Slovene's secessionist movement. Slovenia's territorial defense forces quickly surrounded Army garrisons in Slovenia and prevented movement of Army forces. Both sides took minimum casualties in the standoff. Forty Federal soldiers were reported killed against nine Slovenian soldiers. By 18 July 1991 Belgrade ordered the military to halt. Federal Army forces in Slovenia were withdrawn and redeployed to Croatia and Bosnia-Herzegovina.[22] The war in Slovenia lasted ten days. At its conclusion, Belgrade gave up efforts to retain control of the break away republic. The Slovenes won the short but important war and declared their independence from the rest of Yugoslavia.

The summer of 1991 saw the beginning of the war in Croatia. Under the guise of protecting Serb populations in Croatia, the Army sought to quickly dispel the capabilities of organized Croatian military forces. One aspect of the fighting in Croatia arose around the composition of volunteer forces. Four distinct groups of volunteers found themselves defending Croatia against the Yugoslav Army. The first group were legitimate volunteers. They sincerely believed in defending the rights of Croatians against the aggression of the Serbs. The second group was made up of forced volunteers who were given a choice to join the fighting or die. These volunteers were impressed through coercion and threats to themselves and their families. The third group of volunteers included ordinary criminals. They served their own purposes and many became rich selling war booty on the black market. A fourth group, referred to as "weekend

volunteers" went into the war zone only on weekends and only to pillage. These groups increased in number and size as the war continued. Individual groups ranged from thirty to one thousand men.[23]

Full scale war erupted in Croatia by August 1991. By December, one third of the republic was occupied by Serb forces. Many communities were completely destroyed along with existing communications infrastructure. Over five-hundred thousand refugees fled the fighting.[24] The war in Croatia began as a result of the Yugoslav political structure's failure to compromise. The Belgrade government conducted the war in Croatia as a means to expand its territorial holdings. Croat resistance, proving more resilient than anticipated forced the Serbs into a strategy of ethnic cleansing. The Krajina enclave in Croatia was declared a Serb only zone. As the Federal Army advanced through Croatia it destroyed entire villages formerly occupied by Croats. Croatian territorial defense units surrounded Yugoslav Army garrisons. Their tactics resulted more often in standoffs with Army guns pointing outward and Croatian guns pointing inward.[25]

On 14 September 1991 the Serb attack on the town of Vukovar began. Residents who remained sought shelter in basements. According to witness reports intense shelling followed by a mechanized infantry assault laid siege to the town. It took the attacking force more than three months to finally secure the town. On November 20, Serb forces took over the remains of Vukovar. After rounding up the local population the Serbs segregated their prisoners based on gender. Male prisoners were herded off to unknown destinations never to be heard from again. Women and children were sent to Vojvodina

as a means to cleansing the area of Croat inhabitants. The following provides an impression of the state of the Serb military in 1991.

> The pattern of attack was that of Kijevo writ large: the JNA providing the heavy weapons and infantry support to the local Serb paramilitaries, together with volunteers from Serbia proper. But a striking feature emerged: the failure, despite overwhelming firepower superiority, to make commensurate territorial progress. The attack on Vukovar revealed the shambles to which the dissolution of Yugoslavia had reduced the country's once-proud fighting force. The level of desertion, particularly among non-Serb officers and conscripts, was high. So was the degree to which the conscripts, in the face of battle, disobeyed orders. JNA officers complained that they couldn't get their boys to leave their armored vehicles. Morale in the JNA slumped as weeks went by and Europe's fourth-largest Army proved incapable of overpowering a small town with a handful of beleaguered and ill-equipped Croatian defenders.[26]

The Battle for Vukovar is endemic of Serb operations in Croatia. Most notably is the lack of discipline displayed by the Serb forces. A preponderance of the Serb fighting force were conscripts. Young men who were more at ease in their parent's home than fighting for political notions of Serbian sovereignty. The war in Croatia was not a one-sided affair. As brutal as Serb forces were in carrying out their mission, similar circumstances befell Serb communities at the hands of Croatian military forces. In January 1992 a cease-fire was negotiated between the Croats and the Serbs paving the way for the introduction of United Nations peacekeepers into Croatia. As the fighting subsided in Croatia, Serb forces found themselves deploying into Bosnia. As Serb military options became increasingly limited, their next focus became the geographically centered republic of Bosnia-Herzegovina.

In February 1992, a proposed referendum supporting the secession of Bosnia-Herzegovina was held. At the urging of the Bosnian Serb parliamentary leader Radovan

Karadzic, Serbs boycotted the vote. Bosnian Muslims and Croats voted overwhelmingly to secede. The Bosnian enthusiasm for secession masked the deliberate warnings Karadzic had made in 1991. He maintained Serbia would never allow Bosnia to secede. In the period between January and May 1992, Serb preparation of the hills overlooking Sarajevo foreshadowed events to come. As the European Union considered recognizing Bosnia as a political entity Serb forces under the command of General Ratko Mladic continued to move heavy artillery into positions around Sarajevo. Immediately following Bosnia's recognition as an independent state, Mladic ordered the shelling of Sarajevo.[27] It was the Serb intent to win the war in Bosnia within six days. The shelling of Sarajevo continued throughout the summer of 1992 and well past the fall.

During 1992 a UN sanction imposed an arms embargo against the Serbs. The impact seems to have allowed the Croats to retake the Krajina region and Bosnians to stem the fighting in the vicinity of Sarajevo. The efforts of the international community to enact the Vance-Owen peace plan failed in the wake of installing a new American president in January 1993. Fighting continued in 1993 and 1994 until under threat of NATO airstrikes Serb forces stopped their attempts to win terrain in Bosnia. In the summer of 1995 Serb aggression was again countered by NATO airpower. The subsequent actions brought the FWF to the negotiating table in Dayton, Ohio. On 14 November 1995 the FWF initialed an agreement to stop the fighting. The inital agreement prompted the Clinton Administration to direct the deployment of an "enabling force" in preparation for NATO's IFOR deployment. As the FWF withdrew from contested areas, heavy weapons were consolidated at storage areas. In many cases the

soldiers who manned the equipment during the fighting stayed in the vicinity of the storage sites. IFOR force protection requirements mandated constant surveillance of the storage sites to determine any illicit activity. As preparation for the deployment began, coordination took place to integrate JSTARS as an operational surveillance platform. The situation throughout the Balkans would provide an operational evaluation of JSTARS suitability for supporting peace enforcement operations.

Conclusion

The Balkan conflict was actually a series of three different wars prosecuted over a period of four years. Each of the three wars clearly developed as a result of competing political philosophies. The Serb government in Belgrade desired to maintain the status quo as determined in the post World War II years by Tito. The federal Army maintained its identity based on the fundamental principle of a united Yugoslavia. As the economic situation deteriorated within Yugoslavia, secessionist movement increased in the republics hardest pressed for revenues. Ethnic suspicions additionally aroused secessionist feelings. The central government in Belgrade acted to prevent the destruction of a homogenous Yugoslavia. The military action undertaken in Slovenia provided a precursor to events in Croatia and Bosnia. An undisciplined military force made up of largely conscripts was unable to execute military requirements supporting Yugoslavian national interests. The break away republic of Slovenia saw more profit in autonomy than in supporting its poor neighbors to the south. The military's inability to prevent Slovenia from seceding indicated early on the challenges Serbia would face in attempting to reign in the other republics.

The haphazard execution of Serbia's military operations overextended its capabilities. Engaging the Slovenes merely distracted the Serbs from the military requirements associated with operations in Croatia. Unable to generate sufficient combat power to overwhelm Croat opposition, the Serbs resorted to brutal tactics designed to intimidate and control ethnic Croat and Muslim populations. By January 1992 the situation in Croatia was beyond the limited capability of Serbia's military. Croatian territorial defense forces were able to neutralize the Serb Army's ability to establish significant gains in the region. As the Serbs withdrew from Croatia, the issue of Bosnian secession reared itself. In a last ditch effort to hang on to its final vestige of its previous glory, Belgrade attempted to retain Bosnia. The shelling of Sarajevo had no affect on the Bosnian decision to secede.

During the period 1993 to 1994 an arms embargo reduced Serb warfighting capabilities. The Serbs continued hostile actions during this time period. The introduction of UN peacekeepers provided little incentive for Belgrade to change its imperial position towards the other republics. NATO airpower induced the Serbs to negotiate an end to the fighting in November 1995. The signing of the Dayton Peace Accords prompted U.S. establishment of an enabling force in support of NATO's Implementation Force. As an additional force protection measure, the U.S. government deployed JSTARS to provide surveillance of FWF weapons storage sites. The intent, provide NATO forces early warning of activity indicating FWF intent to conduct hostile actions.

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[1] Branka Magas, *The Destruction of Yugoslavia, Tracking the Break-up 1980-92* (London and New York: Verso, 1993), 16.

[2] G. Scott Davis, *Religion and Justice in the War Over Bosnia* (New York and London: Routledge, 1996), 12. Davis reports alleged atrocities during World War II committed by ethnic Serbs against Muslims.

[3] Tito's ability to hold Yugoslavia together is unique in terms of post World War Two Europe. He effectively prevented Yugoslavia's multiethnic population from dividing the country based on religious and cultural lines. His ability to fend off Soviet claims to the Balkans provides an interesting template for countries associated with the nonaligned movement. Through economic ties to the west, Tito established a political base of support in the event Moscow chose to militarily intervene in the region. This somewhat ambiguous political relationship between opposing Cold War forces may have resulted in hesitation on the part of the international community to intervene early in Yugoslavia's civil war.

[4] This is my interpretation of Tito's methodology. During World War II, Western governments backed Tito's partisan movement against the Nazis. Tito took advantage of this relationship during the post war period and used it to stall Soviet agendas involving Yugoslavia. He masterfully created a political situation in which Yugoslavia philosophically aligned itself with Moscow. Yet economically, Tito indulged western interests associated with containing Soviet influence.

[5] Expectations associated with Yugoslavia's 1975-1979 economic plan did not materialize. Economic growth in Kosovo rose at a rate much lower than anticipated. Throughout the country, the impact of western debt and slow economic growth contributed to social unrest. The northern republics of Slovenia and Croatia were taxed to support the less developed republics. Over time this economic situation became a political time bomb resulting in calls for secession from the rest of Yugoslavia.

[6] Magas, 3.

[7] At the time of this writing in April 1998, news reports indicated unrest is again brewing in Kosovo. During this current situation, reports of Albanian and Serbian military units along each other's borders make the situation appear ominous. Unrest has again been generated out of austere economic conditions plaguing Kosovo.

[8] Ibid., 3.

[9] Davis, 24, 33.

[10] Magas, 54.

[11] Jasminka Udovicki and James Ridgeway, *Yugoslavia's Ethnic Nightmare: the Inside Story of Europe's Unfolding Ordeal* (New York: Lawrence Hill Books, 1995), 90.

[12] Ibid., 93.

[13] Ibid.

[14] Ibid., 94.

[15] Ibid.

[16] Ibid., 96.

[17] Ibid., 97.

[18] Ibid., 97.

[19] Ibid.

[20] The government of Slovene President Milan Kucan viewed much of what was happening in Yugoslavia as internal to Serbia. Recognizing the Federal authority of Belgrade significantly deteriorated after the installation of Milosevic as President of Serbia. The political maneuvering of the Serbs was viewed as "Stalinist tactics." This view encouraged the Kucan administration to accept secession as a means to promote stable Socialist principles. As an entity, Slovenia was more predisposed than the other republics to secede from Yugoslavia. Antagonism between Belgrade and the Slovenian government in Ljubljana continued to swell until the unilateral secession of Slovenia in June 1991.

[21] Ibid., 101.

[22] Ibid., 131-134.

[23] Ibid., 136-137.

[24] Magas, 301.

[25] Laura Silber and Allan Little, *Yugoslavia: Death of a Nation* (USA: TV Books, Inc., Distributed by Penguin USA, Silber and Little, 1995 and 1996), 174.

[26] Ibid., 177.

[27] Jasminka Udovicki and James Ridgeway *Burn This House: The Making and Unmaking of Yugoslavia* (Durham and London: Duke University Press, 1997), 184.

CHAPTER 6

CASE STUDY

The Need for JSTARS

In December 1995 and October 1996, JSTARS deployed in support of Operation Joint Endeavor (OJE) force protection requirements. The Commander in Chief United States European Command (CINC EUCOM) is reported to have requested JSTARS through the Joint Chiefs of Staff (JCS). The Pentagon approved General George A. Joulwan's request in order to assist monitoring potentially hostile actions by the FWF. General Joulwan's dual position as the Supreme Allied Commander Europe (SACEUR) made him additionally responsible for the security of all forces deploying as part of IFOR. He was predisposed to understanding the FWF's ability to wage war. Four years of fighting made the FWF a credible threat to NATO's peace enforcement mission. JSTARS' ability to monitor large areas of the Balkans aptly supported allied requirements.[1]

The IFOR deployment came during a period of intense congressional scrutiny of the JSTARS program. Funding requirements were at issue. The end of the Balkan wars provided a unique opportunity to evaluate JSTARS. The system was scheduled for multiservice operational tests and evaluation (MOT&E). Air Force and Army operational test and evaluation commands (AFOTEC and OPTEC respectively) viewed the IFOR deployment as a ready made test environment. Both Services scheduled testing of the airborne and ground components as part of the 1995 deployment. Funding for production schedules was at stake. JSTARS proponents eagerly sought to demonstrate its abilities to convince the U.S. Congress of the system's importance to the military. A successful

deployment supporting the IFOR mission was key to unlocking millions of dollars for development and production. The following excerpt from an Army OPTEC post Bosnia assessment conveys the importance of testing the GSM.[2] "The purpose of the Joint STARS multiservice operational test and evaluation (MOT&E) is to determine if the Joint STARS is effective and suitable against the criteria established in the operational user's requirements documentation. The measurements made and conclusions drawn from the MOT&E will culminate in presentation at the Defense Acquisition Board Review to help determine if Joint Stars should enter full rate production." It is assumed for purposes of this thesis that AFOTEC documentation, referring to the E-8C, is written in a similar language.

Lastly, demonstrating JSTARS to NATO was a critical aspect of the U.S. government's plan for winning the AGS contract. There was intense international competition. Four governments submitted candidate systems for the central position supporting a future NATO ground surveillance capability. The U.S., French, British, and Italian governments submitted candidate airborne systems. Four countries including the U.S. submitted nominations for candidate ground component systems. The U.S, Germany, Norway, and Denmark each submitted candidate ground component systems. (See figure 7.) Much of the focus for the 1995 deployment involved demonstrating JSTARS to senior NATO officials. In 1996 the same requirement held without the weight of an organized MOT&E. The competition for the NATO AGS contract was ongoing. The political importance of winning was one of national prestige.

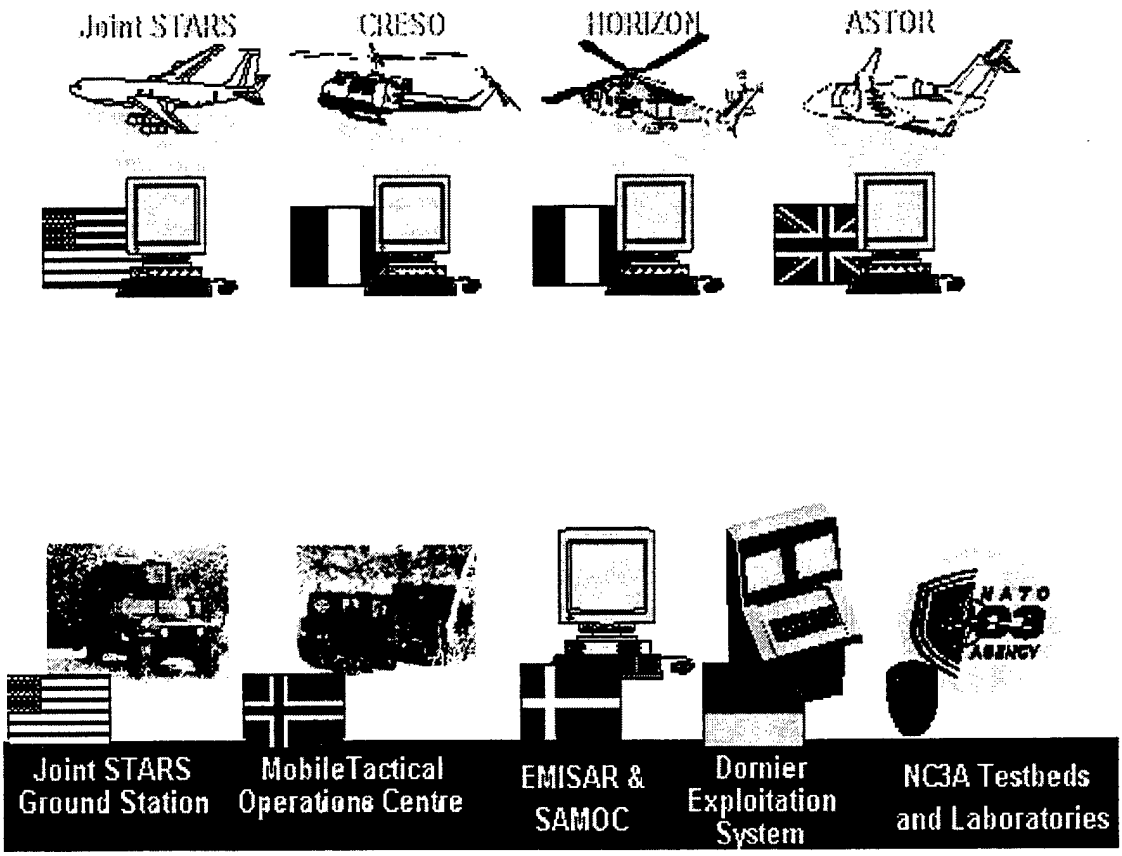

Figure 7. Candidate Systems for the NATO Alliance Ground System (AGS) Testbed System[3] *Source:* NATO, internet site, "AGS Testbed" (Brussels: C3 Agency (NC3A), accessed on 14 May 1998. The NC3A internet site is located at: http:// www. stc. nato. int/acdiv/surv/agstb.htm.

Introduction: In the Beginning

NATO's involvement in Bosnia began well before the IFOR deployment. European forces involved with UNPROFOR experienced the horrors of the Balkan wars first hand.[4] Ground forces deployed to protect safe havens designated by the UN Security Council. NATO air forces enforced UN mandates, conducted resupply missions, and targeted hostile forces on the ground..

> On 29 June (1992) the Security Council resolved to provide peacekeeping forces to protect the flow of humanitarian relief supplies into Sarajevo

> Airport, under the protection of UNPROFOR, whose charter was extended to include peace operations in Bosnia. NATO airpower became involved in the region at about the same time. Direct cooperation between the UN and NATO began on 16 October, when, by prearrangement, the UN issued United Nations Security Council Resolution (UNSCR) 781, banning all military flight operations over Bosnia, and NATO activated Operation SKY WATCH to observe and report violations of that ban. On 31 March 1993, the UN issued UNSCR 816, banning all flights not authorized by the UN and authorizing member states to take all necessary actions to enforce that ban. NATO replaced SKY WATCH with Operation DENY FLIGHT to signify the new element of force. Over subsequent months, NATO and the UN added other missions to DENY FLIGHT, including close air support (CAS) to protect UN personnel under attack, offensive air support (OAS) to punish factions violating UNSCRs, and suppression of enemy air defenses (SEAD) to protect NATO aircraft flying the other missions. To coordinate planning and particularly the targets identified for attack in these missions, NATO's North Atlantic Council (NAC) also activated at the start of DENY FLIGHT a joint target coordination board (JTCB), composed of senior NATO and UN tactical commanders concerned with the use of airpower in the region and its consequences. These developments and the planning that went into them constituted an incremental, evolutionary process that laid the foundations for DELIBERATE FORCE.[5]

According to Colonel (USAF) Robert C. Owen[6], the U.S. considered the wars in Bosnia to be "episodic."[7] Colonel Owen maintains the U.S. view of the Balkan situation was different from o the prevalent view held by European nations. The U.S. position held that the wars were in fact "opportunistic."[8] An episodic aberration occurring as a result of the influence of charismatic leaders. The European position held that Balkan peoples were culturally disposed to open violence. This difference from mainstream European thought put the U.S. at odds with its allies. The difference also created a separation in the ability of NATO and the UN to concur on the appropriate response to the Balkan situation.[9]

Another aspect of NATO involvement in the Balkans prior to OJE was the relative lack of doctrinal planning guidance available to NATO air campaign planners. A

convoluted and confusing chain of command impaired NATO's ability to plan air operations as well. "The Bosnian region fell under the purview of NATO's 5th Allied Tactical Air Force (5 ATAF)...."[10] Staffing of the NATO air components did not support planning complex operations over Bosnia. The fact that 5 ATAF, and its higher headquarters, Allied Air Forces Southern Command (AIRSOUTH), were subordinate to U.S. Navy admirals commanding Allied Forces Southern Europe (AFSOUTH) further complicated things. Lastly, in terms of peace operations, the U.S. and NATO varied in the development of their respective air planning doctrine. "NATO..air planning doctrine...focuses on coalition considerations but is largely silent on (peace operations), while U.S. joint doctrine,....does not fully integrate coalition considerations...."[11] There was in fact, a "...virtual absence of guidance for conducting multicoalition peace operations...."[12]

An outgrowth of NATO's planning for air operations over Bosnia was the creation of a "Combined Air Operations Center (CAOC)," at Vincenza, Italy.[13] The commanding general of United States Air Force Europe (USAFE), General Robert C. Oaks, dispatched an experienced subordinate to determine CAOC requirements. Major General James E. "Bear" Chambers began the process. Replacing outdated equipment and improving command and control (C2) operations, Maj Gen Chambers quickly organized the newly formed CAOC. Outfitting the CAOC with improved systems included incorporation of NATO's Linked Operations-Intelligence Centers Europe (LOCE) system. LOCE provided a means to disseminate and receive NATO intelligence information regarding the FWF. Establishing the CAOC provided a C2 node for directing and coordinating air operations over Bosnia.

The CAOC began operations on 12 April 1993.[14] It planned and executed five separate air campaigns over Bosnia. Most were in support of UNSCR requirements restricting operations in Balkan airspace.[15] The JSTARS deployments in 1995 and 1996 were planned exclusively by the CAOC. In order to better coordinate the planning of intelligence, surveillance, and reconnaissance (ISR) missions, the CAOC established the the Intelligence, Surveillance, and reconnaissance Cell (ISARC) concept. The ISARC provided guidance on where to fly and what information to collect.

> Since air operations began over the Balkans in 1993, we have learned many lessons on the optimal employment of ISR assets. Initially, the tasking process for ISR assets was based on "cold war" procedures and was simply not responsive to the fluid environment of the Balkans. Procedures were established and put into place with an overarching objective to support the compressed ATM cycle; thereby, the capability to change or redirect efforts could be accomplished in near-real time. Thus began the Intelligence, Surveillance, and Reconnaissance Cell (ISARC) concept.
>
> Although still in its infancy, the ISARC, an entity of the Combined Air Operations Center (CAOC), has proven critical in shaping the battlefield for operations within the Balkans. Our approach is a simple one...centralized management of air and space ISR assets; it enables the Stabilization force (SFOR) to proactive, rather than reactive, to the changing battle space. The mechanism in place is robust to ensure the ISR cycle is responsive to all command elements...air, land...or maritime within ever-shortening time constraints.[16]

The draft CONOPS cited above illustrates the central role of CAOC planning to ISR employment supporting NATO ground forces in Bosnia. The CAOC plays a critical role in planning and coordinating air operations over the Balkans. When NATO conducted Operation DELIBERATE FORCE in August and September 1995, the CAOC planned the execution of all strike missions. For that operation, "...NATO flew 3,515 missions, dropped 1,026 bombs on 338 aimpoints...."[17] Similar levels of coordination and planning were conducted during the earlier missions. DELIBERATE FORCE differed from earlier operations. When thirty-five civilians were killed in an

indiscriminate mortar attack against a market in Sarajevo, NATO responded with air strikes against Serb artillery positions. This was the first time airpower was used in an unrestricted manner in Bosnia. Previously, UN imposed limitations prevented the use of air strikes in retaliation for such aggression.[18] DELIBERATE FORCE combined with the effects of a major Croatian ground offensive and international sanctions forced Serb negotiators to agree to the Dayton Peace Accords.[19]

When CINC EUCOM requested JSTARS support for the IFOR deployment in December 1995, the CAOC played a central role in managing the employment of the system. As a NATO command center, the CAOC dealt directly with IFOR's Allied Command Europe Rapid Reaction Corps (ARRC) Headquartered in Sarajevo. (See figure 8). A year later, in November 1996, the CAOC would again control JSTARS operations during the transition from IFOR to SFOR.[20]

Getting to Bosnia

"J-STARS does for the ground battle what AWACS does for the air battle. The capability to provide near-real-time battlefield surveillance and targeting information for both the Air Force...and the Army...is essential also in contests such as the one in Bosnia-Herzegovina."[21]

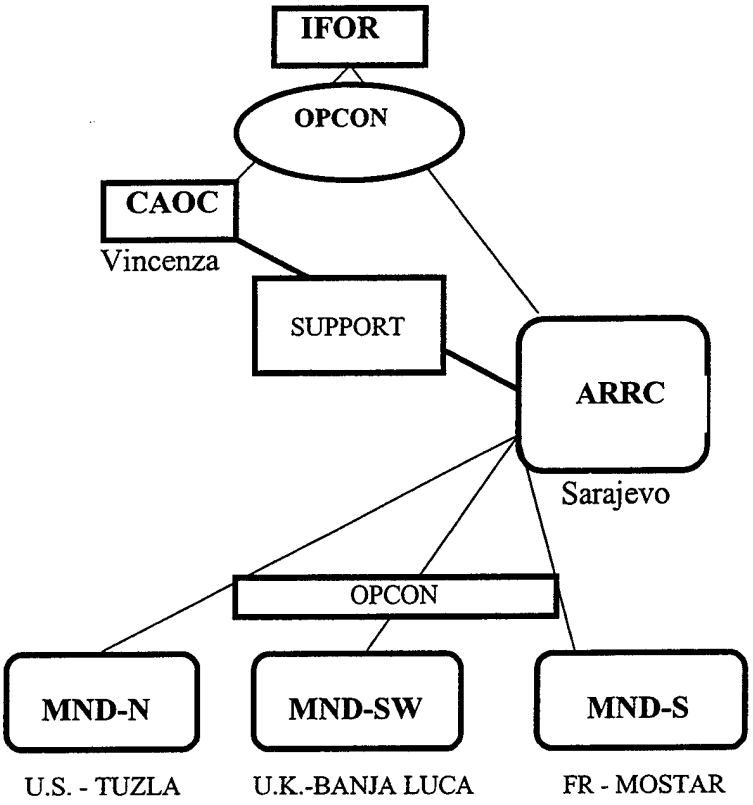

Figure 3. CAOC Command Relationship to IFOR *Source:* General Sir Michael Walker (U.K.), briefing: "Many Countries, One Team" (Fort Leavenworth, Ks.: TRADOC, U.S. Army Command and General Staff College, 18 May 1998).

As NATO prepared to deploy the IFOR contingent to Bosnia, in support of the Dayton Peace Accords, several factors were considered. First and foremost was the potential threat from the FWF. After four years of fighting, the FWF was considered capable of disrupting the NATO peace enforcement effort. The most likely course of action was for inter-faction hostility. The potential threat against NATO forces was considered much less. However, IFOR personnel deploying in 1995 were subjected to hostile fire by elements of the FWF.[22] Even though the Dayton Accords were in effect, sporadic fighting occurred during the earliest part of the deployment.

1995 Logistics and Deployment Planning

In 1995 the U.S. Army had two military intelligence (MI) battalions capable of supporting a JSTARS deployment to Bosnia. The 303rd MI battalion at Fort Hood, Texas and the 319th MI (Airborne) at Fort Bragg, North Carolina. The GSMs at each battalion were distinctly different. The 303rd maintained a fleet of "Light Ground Station Modules" (LGSM) and the 319th maintained a fleet of "Medium Ground Station Modules" (MGSM). LGSMs mounted on HMMV vehicles are significantly smaller than MGSMs mounted on five ton trucks. Functionally, both systems conducted the same missions. However, the size difference caused challenges for movement planning.

U.S. Army Forces Command (FORSCOM) tasked III Corps at Fort Hood to provide the operational command and control headquarters. In December 1995 the commander of the 303rd MI battalion deployed with a composite LGSM and MGSM task force. In December 1995, "The deployment of the GSMs in support of Operation JOINT ENDEAVOR presented a unique challenge because it did not consist of a direct or general (DS or GS) support intelligence and electronic warfare (IEW) team assigned to a division or corps....,intelligence soldiers, civilians, and equipment deployed from seven CONUS (Continental United States) locations.[23]

Planning for the December 1995 deployment was conducted by the 303rd MI Battalion Commander and staff. Deployment issues included the movement of CONUS based personnel from multiple locations to the initial staging base (ISB) at Rhine Main Air Base in Frankfurt, Germany. Departure locations included, Fort Hood, Texas; Fort Bragg, North Carolina; Fort Huachuca, Arizona; fort Monmouth, New Jersey; Hunter Army Airfield, Georgia;, OPTEC, and the Joint Test force form Patrick Air Force Base ,

Florida. Additionally, planning was conducted to include Motorola contractor personnel into each phase of the movement.[24] The detailed planning conducted by the 303rd MI Battalion resulted in all deploying equipment and personnel to reach Rhine Main within ten days of receiving the JCS deployment order.

Monthly movement planning meetings were conducted to facilitate addressing issues at each deploying unit. "These planning meetings provided the opportunity to discuss and develop detailed movement and load plans for deploying personnel and equipment...details such as the need for additional vehicles to ensure seating for Motorola contractors, movement of the GSM-specific Prescribed Load List and Authorized Stockage List, and maintenance support.[25]" Considerations were made to task organize individual teams with personnel and equipment necessary to accomplish the team's mission. Assigning maintenance personnel to each team facilitated getting vehicles and generators fixed when necessary. Each team contained the requisite expertise to conduct electronic equipment, airconditioning, and vehicle maintenance.

By August 1995, 303rd MI Battalion personnel were carefully sifting through reams of logistical and aircraft load planning paperwork. Contact with supporting units increased as time progressed. The establishment of teams to assist in the actual deployment facilitated getting equipment and personnel through various stations which were required prior to boarding an aircraft. One such station included storage of hazardous material. The issue of where and when to draw ammunition posed challenges for deployment planning. The ability to draw ammunition in theater simplified the overall movement process. However, FORSCOM directed deploying units to draw from their own ammunition inventories. This placed increased safety requirements on

personnel and equipment during the preparation for movement. High explosive forty millimeter ammunition caused the greatest concern. The accidental discharge of one forty millimeter round could have catastrophic affects onboard on aircraft high over the Atlantic Ocean.

Other issues impacting deployment planning included the Army's decision to field the MGSM just prior to movement. The 319th MI Battalion at Fort Bragg initially planned to deploy Interim GSMs (IGSM). As a result of the Army's decision, the 319th rapidly conducted new equipment training. The assigned GSM operators deployed with brand new equipment. The experience level for 319th operators equated to the amount of time spent conducting the new equipment training. Trained Motorola contractor personnel were assigned to deploy with each MGSM. The contractors provided the technical expertise to operate and maintain each MGSM.

The last issue to pose challenges for deployment planning included where each GSM would deploy to once in theater. The associated logistics and personnel support suffered from the inability to effectively coordinate with the supporting commands in advance. "Planning the deployment of each system was slow and continually changed due to the lack of guidance concerning final site selection, supporting units, and aircraft delays."[26] Finally decisions were made to deploy GSM assets to the following locations. There were ten separate GSM sites in total.

1. Italy: San Vito, Combined Joint Special Operations Task Force (CJSOTF); Aviano, GSM Task Force Headquarters; and Vincenza, CAOC.

2. Germany: Rhein Main Air Force Base, JSTARS E-8 forward operating base (FOB).

3. Hungary: Taszar, USAREUR Forward (primarily staffed by V Corps), and Kapsovar, location of an aviation detachment.[27]

4. Bosnia-Herzegovina: Five MGSM locations were established with allied units at Gornji Vakuf, Sarajevo, Tuzla, Biejla, and Vlasenica. The mission of each GSM was to provide the intelligence section of each supported headquarters with WAS-MTI and SAR imagery.

Logistics support at the allied locations was poorly coordinated ahead of time. Eucom logistics planners tasked United States Air Forces in Europe (USAFE) to provide support to the teams in Italy and Germany. USAREUR was tasked to support teams operating in Bosnia-Herzegovina and Hungary. Drawbacks to the Eucom plan included the following:[28]

1. "The plan reached the soldiers and executors at the headquarters responsible for implementing the plan months into the deployment."

2. "There was no established memorandum of agreement for international logistics support that outlined the specifics of support required."

3. "Critical GSM components were not sent with the supporting headquarters because there was no established baseline for critical components with high failure rates."

4. "We did not have a habitual support relationship with our supported headquarters."

Soldier initiative resulted in work around solutions to many of the logistics problems encountered during the 1995 deployment. Each team deployed with enough supplies to sustain itself for twenty days. Using parts sparingly, and making contacts at the supported command's logistics staff served to offset the lack of routine resupply of

GSM related spare parts. For the most part, soldiers were taken care of by the supported command.[29] They were provided shelter, food, and fuel for their vehicles. Depending on the location, resupply of vehicle and generator parts was questionable. The 303rd headquarters at Aviano began assembling small push packages. Parts and soldier comfort items were flown onboard NATO aircraft into the respective locations. GSM personnel would meet the airplane and download their "package" as the aircraft unloaded and prepared for a quick departure to another location. [30]

The planning for the Army's portion of the deployment was conducted in detail by the 303rd MI Battalion. The task organization of GSM teams to include support personnel is an important lesson learned. The relative lack of sophisticated coordination by theater level staffs provided the GSM task force with logistical challenges. The tasking of USAFE and USAREUR to provide logistics support proved sufficient within the boundaries of American facilities. Logistical coordination with allied armies appears to have fallen by the wayside. The predominant issue appears to have been the lack of spare parts for the GSMs themselves and U.S. Army vehicle maintenance. Soldier support issues were worked out on the ground upon arrival of each team at their respective location.

The 1995 Employment of JSTARS

Depending on the source, the 1995 JSTARS deployment went either exceptionally well, or did not offer much in the way of tactical intelligence. Army and Air Force documents reflect both views. Suprisingly, Air Force documentation is generally positive with respects to the E-8's overall performance. The number of limitations imposed on JSTARS flying operations apparently had minimal impact on the role of JSTARS as a

battle management tool. Limitations placed on the E-8 originated from three separate issues.

1. Civilian air traffic control patterns imposed airspace limitations. The European air traffic control community restricted the E-8's operational airspace. Safety concerns limited where the airplane could fly. The direct result of this was a limitation to the E-8 aircrew to adjust mission orbits to offset the effects of terrain radar shadowing. Areas of rugged mountainous terrain posed significant challenges to radar operations. Within the French sector alone, eighty percent of the terrain was mountain or hills.

2. Radar shadowing had the impact of limiting where the E-8C could monitor. Often GSM operators would detect suspicious movement only to lose it as the terrain masked the radar's ability to follow the movement.[31]

3. The operational environment did not readily support the application of JSTARS operations. Unlike Desert Storm where the enemy and terrain favored the use of JSTARS, the situation in Bosnia was much more challenging.[32] The following comments by Lieutenant Colonel Collin Agee dispel any doubt of the magnitude of the challenge faced by JSTARS radar and GSM operators.

a. "A non-standard enemy, at dispersed locations. The most immediate threats to the Peace Implementation force (IFOR) was mines and snipers, neither of which Joint STARS could detect."

b. "A zone of separation (ZOS) that plotted on the map like a drunk serpent.

c. "Extensive civilian traffic along the same routes used by the military. In fact, freedom of movement was one of IFOR's measures of success, so as the mission succeeded, the use of Joint STARS to track military movement got harder. Of note,

however, is the fact that Joint STARS excelled at documenting this increased freedom of movement, both quantitatively and geographically."

d. "Truly rugged terrain, with 70 to 80 percent of the land mass of the former Yugoslavia covered by hills and mountains. In the French sector, radar shadowing was 84 percent. smooth surfaces on some of the mountain faces generated false returns that were interpreted as moving target indicators (MTIs); a software fix is in the works."

e. "Considerable forested areas."

f. "Varied terrain ranging from mountains to karst, with numerous basins and valleys.

g. "Air supremacy, but active surface-to-air missiles and significant impediments to the most favorable orbits and aerial refueling locations due to civilian air traffic."

h. "A SASO (*support and stability operations:* similar to MOOTW in meaning), environment in which a conventional attack was a last resort."

In preparation for movement into the locations within Bosnia, GSM teams underwent a program of training, testing, and certification. As part of CINC USAREUR's requirement to evaluate personnel and equipment the GSM teams participated in mine awareness training at Hohenfels, Germany. This training exposed them to the dangers associated with operations in Bosnia. (During a briefing I attended in 1996, it was estimated there were over eight million mines still emplaced in throughout the Balkans). After the training in Hohenfels, GSM teams traveled to Augsburg, Germany for training certification with the 66th Military Intelligence Group. This training served to expose CONUS based soldiers to USAREUR procedures. It served as familiarization training with certain intelligence systems and ensured GSM operators

understood theater intelligence architecture. Once the training in Augsburg was complete, the soldiers were then bussed to Taszar, Hungary to meet their equipment. At Taszar, the soldiers conducted final preparations prior to deploying further south into Bosnia.

The purpose of each GSM team was to support the headquarters it collocated with. Team members were responsible for coordinating communications requirements with the Air Force JSTARS Wing at Rhein Main Air Force Base. Once prepped for a mission team members familiarized with key named areas of interest (NAI) associated with the upcoming mission. Their job was to monitor the area designated by the supported command's G2 and report unusual activity. On one such mission the GSM team collocated with 1st Brigade Combat Team, Task Force Eagle, reported suspicious activity vicinity the Sava River. The area was clearly within the 1st Bde AO. Upon investigation it was determined the movement was in fact a river crossing site where FWF heavy weapons systems were secretly infiltrated across the river. It was a ferry operation which ceased to operate after discovery by JSTARS. This incident by itself is an indication of the impact JSTARS might have made during the 1995 deployment.

Command and Control

The December 1995 JSTARS deployment to Bosnia posed a serious dilemma with respect to command and control (C2). An adhoc JSTARS unit was assembled to perform the mission. Designated the 4500th Joint Surveillance Squadron (JSS) the unit was built around one pre-production E-8A and one E-8C. After arriving in Europe software upgrades were installed onboard both aircraft to enhance performance. The 4500th JSS became the parent unit for the Army's GSM task force.

EUCOM directed the 4500th to conduct C2 of the GSMs in accordance with a USAFE written concept of operations (CONOPS). This effectively placed the Army GSM Task Force Commander subordinate to the Commander of the 4500th. The Air Force commander of the 4500th (Colonel Debusk) was in reality the equivalent of an Army TRADOC System Manager (TSM). The focus of the mission for Colonel DeBusk was to support IFOR ground commanders in Bosnia. His natural tendency however was to ensure JSTARS performed well during evaluations conducted as part of the MOT&E. Likewise, the designation of the GSM Task Force Commander as a subordinate to Colonel DeBusk, effectively took him out of position to protect Army interests in theater. The GSM Task Force Commander became enmeshed in supporting his teams spread throughout Europe. As previously addressed mediocre logistics planning subjected the French based GSM team to significant challenges. To convey the degree of futility the operational mission suffered, the following is extracted directly from an email document generated by the GSM Task Force Commander on 13 January 1996.

> This HQ is consumed with measures of effectiveness. I suppose it reflects the MOT&E focus associated with this deployment. I spent a good part of yesterday...delving into the current statistics and seeing how we make them more reflective of reality...What we discovered was that the current percentage of RSRs satisfied is a very twisted statistic Currently, GSM sites identify their requirements based on requests from their respective G2s...standing or forecast requests...become part of the preplanned target load, if they are...passed during the mission they are listed as Dynamic taskings. The Air Force statisticians have only been briefing level of satisfaction of Dynamic requests - which they are pretty good at...this morning...there were 45 GSM derived preplanned requests and...0 of them had been serviced because the airplane was overrun with preplanned SARs levied by the CAOC.[33]

The purpose of citing this quotation is to point out what began happening during the JSTARS deployment in 1995. The CAOC tasked the E-8 as it saw fit disregarding

the negative impact on support to the Army commanders. What is being portrayed in this example is an undisciplined attitude on the part of the CAOC towards JSTARS tasking requirements. Either CAOC mission planners did not understand Army requirements in theater, or they simply ignored the idea of Army requirements and prioritized Air Force requirements ahead of everything else. The impact this caused in the first deployment was to deny Army commanders the ability to have their requirements serviced. By shooting primarily SAR imagery, based on Air Force battle management requirements, the CAOC effectively blocked the E-8 from processing preplanned Army requirements associated with WAS-MTI. This denied Army commanders JSTARS MTI imagery which may have provided valuable information. Whatever the reason, a disservice to Army commanders resulted from poorly conceived mission taskings generated at the CAOC.

The 1995 Redeployment

GSM teams were directed to move by air directly from their deployment location back to CONUS. Coordination with headquarters EUCOM resulted in strategic airlift redeploying teams from Tuzla, Sarajevo, Taszar, Aviano and Rhein Main. Each lift required HAZMAT trained aircraft load planners. The ammunition the unit deployed with from CONUS was required to return to home station. Customs inspections relaxed vehicle cleanliness standards for the teams redeploying from Bosnia. Once the GSM teams began movement back to CONUS, Task Force C2 of the move became important.

The Task Force headquarters at Aviano monitored the redeployment of all teams. Functions included coordinating for billeting and arms room support at all "intermediate stops" enroute back to the U.S. The Task Force staff kept the parent units of respective

GSM teams informed of aircraft arrival times, personnel manifests, equipment onboard, and HAZMAT. This information was used in turn by the receiving unit to prepare for the team's arrival. Aircraft delays forced GSM teams to wait until aircraft became available. The Task Force staff kept team leaders informed about when to expect aircraft for their team's departure. Changes to redeployment schedules were monitored at Aviano to maintain an accurate accountability of which team was where and when. Throughout the entire redeployment phase, the Task Force staff informed the 4500th, USAREUR, EUCOM, USAFE, and movement control personnel of the disposition of returning teams.

The 1996 Deployment

In 1996, FORSCOM designated the 319th MI Battalion as the lead unit for planning and execution of the deployment. Beginning in June 1996, the 319th started to hear rumblings about the follow on deployment. Preparations at Fort Bragg and Fort Hood started long before official notification of the deployment in September. Informal coordination with the JSTARS 93rd Air Control Wing at Warner Robins Air Force Base, Georgia kept the 319th abreast of deployment information. Throughout the summer of 1996 training exercises were conducted between the 319th and the 93rd. It was considered essential for GSM teams to get as much live training with the E-8 aircraft as possible. Once deployed, the training was over. Additional training requirements surfaced in the area of force protection. GSM team members were trained on appropriate during a vehicular ambush. Additionally, quick reaction training with personal weapons was conducted to make the soldiers instinctively aware of how to use their weapons if a threat appeared.

The summer of 1996 was spent training and preparing GSM teams and the 319th MI Battalion staff. For the 1996 deployment the decision was made to task organize the GSM teams along the lines of the previous year. The staff complement deploying in 1996 was designed to perform two functions. The first was traditional C2 and logistics support. The second was to improvise a centrally controlled intelligence analysis cell. The function of the cell was to provide intelligence information tailored to the needs of the JSTARS teams in theater. Additionally, a comprehensive intelligence report was designed for dissemination on the NATO Linked Operations-Intelligence Centers Europe (LOCE: pronounced "low-key") system.

Improvising based on lessons learned from the first deployment, the 319th's staff planning used detailed guidance from the battalion commander. Following his direction, a 120-soldier "Task Force Dragon" was created. The primary difference between Task Force GSM and Task Force Dragon was the inclusion of the intelligence analysis cell. Additionally, Task Force Dragon did not deploy GSM teams to Rhein Main Air Base. By the end of August 1996, Task Force Dragon was prepared for deployment.

The planning, deployment, mission execution, and redeployment paralleled the 303rd's experience from the following year. The level of coordination conducted by the 319th was well beyond the normal echelon of coordination for a corps level intelligence operations battalion. Direct coordination with FORSCOM, EUCOM, U.S. Transportation Command (TRANSCOM), 303rd MI Battalion, and headquarters USAREUR was conducted with minimal interference from higher echelon staffs. 525th MI Brigade and XVIII Airborne Corps staffs monitored 319th preparation for deployment. However, they never became directly involved during the actual planning

phase. All coordination was conducted directly between the 319th and supporting commands. Simultaneously, the 319th continued to conduct its intelligence support mission for XVIII Airborne Corps. The mission at Fort Bragg was not impeded by preparation for the deployment. It may have taken longer in some cases, but it was not impeded.

On 27 September 1996, CINC EUCOM sent a "request for forces" messages to the JCS. The date-time-group of the message was 271740zulu September 1996. The message requested JCS to authorize JSTARS support during the upcoming transition period between IFOR and SFOR. The message requested "sufficient aircraft to fly one 8 hour mission per day, six days per week."[34] The message projected an initial operation capability date of 15 November 1996. The tentative end of mission date was provided as 31 December 1996. The message additionally stated JSTARS would be OPCON to EUCOM with tasking authority originating at the CAOC.

On 12 October 1996, the 319th received official word to prepare for deployment. An advanced coordination team was required to be in Stuttgart for a coordination meeting on 16 October 1996. The advanced coordination team was identified weeks earlier as part of the summer planning effort. The team deployed from Fort Bragg on 14 September 1996 and arrived in Germany on 15 September 1996. A quick coordination meeting was conducted in Heidleberg, with G2 USAREUR representatives, on 15 September prior to the 16 September EUCOM coordination meeting. The 16 October EUCOM meeting included representatives from USAFE, USAREUR, the 93rd ACW (redesignated the 93rd Air Expeditionary Group (AEG)), and EUCOM staff personnel. Issues discussed included personnel support, NATO level coordination with the French and British,

European satellite communications requirements, logistics concerns, and strategic airlift. The most important topic of discussion, C2, failed to persuade the EUCOM staffers to change the CONOPS from the previous year. An Air Force Major from ECJ35 was the EUCOM JSTARS deployment action officer. His answers to questions posed to him about C2 and CONOPS indicated there was no plan to change from the previous year. This resulted in a smaller meeting with senior personnel present to express dissatisfaction with the EUCOM decision not to change the CONOPS. EUCOM representatives at the meeting saw no reason to change the CONOPS. The decision stood and the CONOPS remained unchanged. The impact on JSTARS operations was inevitably negative.

By 26 October 1996 coordination teams were established at Rhein Main with the 93rd AEG, Taszar, Hungary with USAREUR Forward, and Aviano with the 31st Fighter Wing. On 28 October 1996 the first GSM teams arrived in Europe. The initial staging base at Taszar provided movement control and deployment preparation prior to actually moving into Bosnia. Ammunition was drawn from the ammunition supply point at Taszar. Premovement coordination was conducted with the G2 staffs of Task Force Eagle in Tuzla and at the ARRC headquarters in Sarajevo. The transition period between IFOR and SFOR was underway. By 12 November all Task Force Dragon GSM teams were in position. The first operational JSTARS mission was flown on 15 November 1996.

The period prior to 15 November was used by LANDCENT and 93rd AEG personnel to plan JSTARS mission requests. From the start of the first mission it became apparent the CAOC was not interested in supporting Army requirements on the ground in Bosnia. The primary targets directed by the CAOC included SAR imagery files of an

extensive Croation air defense artillery weapons storage site. The site was collocated with an operational airfield. The E-8 operational orbits held no logic to either Task Force Dragon or 93rd AEG personnel flying on board the aircraft. Missions were targeted in areas with no relation to tactical requirements of Army forces on the ground. At one point CINC LANDCENT, General William Crouch, visited the MGSM operating from the Ilidza Compound in Sarajevo. When briefed on the mission, General Crouch exclaimed it made no sense for the E-8 to target the area near Tuzla. He wanted the aircraft to fly an orbit allowing it to target areas in the vicinity of the French multinational division south in Mostar. There remained confusion throughout the entire deployment over the CAOC's tasking methodologies.

Additionally, the 93rd AEG reported missions as having a much higher status than what Task force Dragon would have assigned to them. Sporadic imagery combined with flying in low interest areas did nothing to spark enthusiasm for JSTARS operations. The 1996 deployment met with a luke warm reception at best throughout the entire. theater. The following provides an overview of the attitudes displayed toward JSTARS GSMs being deployed to respective headquarters.

1. Heidleberg, Germany (headquarters USAREUR). G2 personnel were responsive and helpful. Senior G3 officers did not know what to do with Task Force Dragon. The transition between 1st Armored Division and 1st Infantry Division was occurring at the same time.[35] Deploying JSTARS GSM teams into Bosnia was not the most pressing issue for the USAREUR staff. Task Force Dragon was an unknown, presumed to be OPCON to EUCOM. The term "ADCON" for administrative control was used during initial coordination with the senior USAREUR G3 Operations officer,

Lieutenant Colonel McFeeters. He was used to dealing with combat units. Supporting an "AIRBORNE" military intelligence battalion from Fort Bragg was overshadowed by the IFOR to SFOR transition. Dealing with a specially tailored JSTARS GSM task force clouded the situation even more. The USAREUR staff provided the best assistance they could muster. The JSTARS deployment was relatively obscure with respect to facilitating the success of entire transition operation. USAREUR's crisis action team (CAT) efficiently supported arrangements to get Task Force Dragon into theater despite the magnitude of their daily workload.

2. Taszar, Hungary (USAREUR Forward/V Corps). Officers assigned to assist movement into theater were very helpful. However, a senior V Corps G2 officer exclaimed "no-one requested JSTARS and there is most likely a lack of enthusiasm for your arrival. You are going to have find a misson and sell it."[36]

3. Rhein Main Airbase (93rd AEG): A senior Air Force officer assigned to the 93rd exclaimed, "We do not know which airbase we will operate out of."[37] A number of different NATO airbases were being considered as the 93rd's FOB. Two of the proposed locations were in Germany and one was in France. The final decision was Rhein Main Airbase.

4. Sarajevo (ARRC and LANDCENT), The intelligence staff was quickly responsive and immediately incorporated JSTARS operations into their collection planning.

5. Mostar (French), The French were the most hesitant to accept JSTARS support. They refused initial overtures to deploy an LGSM to colocate with their headquarters. It took until 3 December before the French acquiesced and allowed an

LGSM to deploy into their location. The LGSM team was deployed with the French for a period of two weeks.

6. Tuzla (Task Force Eagle) Perhaps the most lukewarm of all MND locations. The American attitude was straight forward in that they wanted a surveillance tool they considered useful.

7. Banja Luca (British), The British offered little to no misgivings about working with an American MGSM team. They readily accepted the team and put them to work in support of their intelligence section.

8. Ramstein Airbase, The USAFE personnel supporting the JSTARS deployment in 1996 were outstanding. Major Bill Carr from the USAFE DCSOPS was an ardent supporter of getting the 319th MI Battalion's people and equipment deployed. Bill was probably the most level headed officer involved with the deployment. His assistance was invaluable. The 319th did not deploy a GSM to Ramstein.

Overall the two deployments were conducted identically from a planning and deployment standpoint. Changes were made in the second deployment to facilitate greater situational awareness on the part of the GSM teams themselves. Significant lessons learned included task organizing the GSM teams, creating a centralized intelligence operation cell, and locating the GSM Task Force headquarters at a location suitable for travel to all team locations. Inevitably there was hesitation to accept the GSMs since JSTARS was not considered useful at the tactical level. Many indications and considerations pointed to JSTARS being severely limited in utility during the Bosnia missions. However, the system proved itself when it detected movement across the Sava River. Lastly, the manner in which the CAOC tasked JSTARS tended to block the

system's ability to support IFOR surveillance requirements. This may have created a negative impact on the part of Army commanders being supported by GSMs during both deployments. The missions did prove the resilience of GSM teams themselves and the ability to deploy and communicate in very rugged terrain. Whether the surveillance missions were successful depends on what was expected from them. It is my tentative conclusion that the systems performed as designed with limitations due to improper tasking. The CAOC is centrally responsible for managing the JSTARS missions and overwhelmed radar and GSM operators with secondary targeting requirements.

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[1] U.S. Department of Defense (DOD), *BOSNIA Country Handbook* (Washington DC: Department of Defense, GPO, May 1996), 3-1 to 3-8. Chapter 3 of this handbook provides information on the terrain of the former Yugoslavia. The region is depicted as mountainous with up to 80% of the land area described as mountain or hills. The road networks are described as hard surfaced with numerous bridges and traversing rough terrain. As of 1989, records indicate the region maintained 123,000 kilometers of roads. This is an important aspect when considering the use of JSTARS. Rugged terrain crossed by an innumerable number of road networks limits the effectiveness of WAS-MTI. Terrain shadowing combined with serpentine road systems presents a significant challenge to GSM operators.

[2] U.S. Army, OPTEC, memorandum, *SECTION I- PURPOSE AND BACKGROUND*, (McClean, Va: Maj Sedrick Carrol, undated), paragraph 1.0. This draft OPTEC document provides the purpose and description of the MOT&E. This document was provided in its draft form by Major Sedrick Carrol stating it was his own composition. Maj Carrol performed duties as an OPTEC GSM evaluator during the 1995 deployment. He was located with two GSM systems operating in Kaposvar, Hungary. Maj Carrol has given permission for the use of his name in this document and submitted the information to me knowingly as draft official U.S. Army documentation. All material provided by Maj Carrol is unclassified.

[3] NATO's Alliance Ground Surveillance Testbed program sponsored development for an allied wide area surveillance capability. The United States, Italy, France, and United Kingdom submitted nominations for the AGS airborne component. The United States, Germany, Denmark, and Norway submitted candidate systems for the AGS ground component.

[4] French and British forces were involved with the UNPROFOR effort. Other countries participated as well. As the fighting continued in Bosnia UN personnel were occasionally injured in the fighting. During my stay in Sarajevo in November 1996, French officers told me of running a gauntlet of direct and indirect fires to resupply the garrison at the Sarajevo airport. During an April 1998 briefing at the U.S. Army Command and General Staff College, an English Major spoke of humanitarian convoys being butchered. UNPROFOR in my opinion was dealt a bad hand by civilian decision makers. Unable to protect innocent non-combatants and being targeted themselves, members of UNPROFOR experienced first hand the brutality of the Balkan wars.

[5] Robert C. Owen, Colonel, USAF, "The Balkans Air Campaign Study: Part 1," *Airpower Journal,* undated. This document was found on Air University's internet home page. An endnote to the paper states, "At the time of the printing of this Summary, the main report was in the final stage of revision at Air University, and on file in the Air Force Historical Research Agency at Maxwell Air Force Base, Ala. The total report currently consists of 13 chapters written by 11 different authors." accessed at URL, http://www.au.af.mil /au/awc/awchome.html

[6] Ibid. "Colonel (USAF) Robert C. Owen (BA, MA, UCLA; MA, PhD, Duke University) is the dean of the School of Advanced Airpower Studies, Maxwell Air Force Base, Alabama. His previous assignments have included professor of airpower studies at the School of Advanced Airpower Studies; chief, Joint Doctrine Branch, Doctrine Division, Headquarters USAF, Pentagon, Washington, DC; executive officer and instructor pilot, 34th Tactical Airlift Training Group, Little Rock Air Force Base, Arkansas; and assistant professor of history, US Air Force Academy. Colonel Owen Has published articles in such periodicals as *Airpower Journal* and *Comparative Strategy*, among others."

[7] Ibid.

[8] Ibid. Colonel Owen explains the U.S. political position as one of believing charismatic demagogues inflamed emotions to achieve personal political agendas. He further states this position eventually results in "...a strategy of peace enforcement aimed at coercing the appropriate warlords to accept peace and redress wrongs."

[9] Ibid. Owen writes, "building such consensus support for increasingly robust use of airpower over Bosnia was a difficult and months-long diplomatic process. Little wonder that...the debate over the sustaining causes of the war (was) one of the major obstacles to Western efforts to deal with the crisis.

[10] Ibid.

[11] Ibid.

[12] Ibid. Owen points out, "it was an important void in the context of NATO air planning because the overall focus of UN strategy and the operational focus of NATO air commanders began to diverge almost at the start of DENY FLIGHT."

[13] Ibid.

[14] United States Air Force Europe (USAFE), (CAOC mission briefing, 3 October 1996). This information is taken from a CAOC briefing found on the internet at: http://ramuacws1.ramstein.af.smil.mi./31fw/caoc/mission/03oct96/miss-s02.html.

[15] The following UNSCRs were supported by CAOC planning and execution from 1993 through 1995. UNSCR 816: NO FLY ZONE, 12 April 1993, UNSCR 836: CAS, 22 July 1993/OFFENSIVE AIR OPERATIONS, 14 August 1993/OFFENSIVE AIR OPERATIONS, Aug-Sept 1995, and the Dayton Peace Plan, 14 Dec 1995. Operation DENY FLIGHT coincided with UNSCR 836.

[16] Department of the Air Force, Memorandum for CAOC/C2, "Subject: Intelligence, Surveillance, and Reconnaissance Cell (ISARC) Concept of Operations (CONOPS), (Headquarters United States Air Forces in Europe, 15 May 1997), 2. This document was found on the internet at http://www1.ramstein.af.smil.mil/ilink-s/isr/CAOC-ISARC-CONOPS-draft.htm. The memorandum points out that the CAOC-C2 requested assistance in "documenting a CONOPS for the ISARC," in November 1995. The unapproved draft used in this notation is dated May 1997.

[17] Tim Ripley, "Air War Bosnia," (Motorbooks International, Osceola, Wisconsin, 1996), 6.

[18] Ibid. Ripley includes a letter written by Maj Gen (USAF) Hal M. Homburg describing the impetus for and conduct of DELIBERATE FORCE.

[19] James S. Corum, "Airpower and Peace Enforcement," (Air Power Journal, Winter 1996), 11. This refutes MG Homburg's observation that airpower by itself forced Serb negotiators to the peace table.

[20] In December 1996, NATO replaced the term IFOR with "Supplemental Force" or SFOR as the designation for the higher headquarters of all NATO ground forces performing peace enforcement in Bosnia. The ARRC was simultaneously relieved by Allied I and Forces Central Command (LANDCENT). This transition of headquarters coincided with a transition of Command from General Sir Michael Walker (U.K.) to General William Crouch (U.S.). General Crouch performed duties as Commander in Chief United States Army Europe (USAREUR) as well.

[21] Roberto Corsini, Colonel, Italian Air Force, "The Balkan War, What Role for Airpower?" *Air Power Journal*, (Winter 95), 10.

[22] During the deployment of a GSM team to Sarajevo in 1995, two incidents occurred. The first happened on Christmas Day, 25 Dec 1995 during the team's arrival at Sarajevo airport. A mortar attack at the airport caught members of the GSM team in the open. There were no injuries or damage sustained during the attack. The second incident involved team members traveling from Zetra Stadium to the ARC Headquarters at Ilidza. An RPG-7 (anti-tank rocket) was fired at a moving trolley car. GSM team members were in a HMMV within 30 yards of the trolley. Shrapnel from the exploding projectile hit the HMMV causing extensive damage. There were no U.S. personnel injuries. Three civilians on the trolley car were killed.

[23] James V. Hintz III (Captain, USA) and Lester W. Pinkney (Major, USA), article: "Operation JOINT ENDEAVOR: Logistics Supporting the GSM Task Force," *Military Intelligence Professional Bulletin*, (October, 1995). This article was accessed on the internet on 5 May 1998. The internet url accessed is: http://huachuca-usaic.army.mil/contlearni...ructure/media/mipb/octdec96/hintz-pi.html.

[24] Ibid.

[25] Ibid.

[26] Ibid.

[27] The GSM team located at Taszar, Hungary was collocated with a United States Air Force "Predator" unmanned aerial vehicle (UAV). The intent for this was to facilitate cross cueing between JSTARS and the UAV. Once JSTARS detected suspicious activity, Air Force operators would fly the UAV to the location to get a close up look at what was taking place.

[28] Hintz and Pinkney.

[29] The exception to this occurred in Sarajevo. As the French were being relieved by the ARRC, an MGSM arrived in Sarajevo. Escorted by LTC Jack Kem, Commander of 319th MI Battalion, the team was refused entry into the safe confines of French facilities. LTC Kem mentioned to me on a number of occasions how dangerous the situation was in Sarajevo during December 1995. He described being "hidden" within the jumble of trucks and equipment at Zetra stadium (the 1984 Winter Olympic skating facility). A foreign officer assigned to the ARRC took care of Kem and his people in the face of outright French animosity. On one occasion LTC Kem realized the crowd of soldiers inside Zetra was taking sniper fire. He and some other officers present herded the crowd into a secure stairwell. LTC Kem pointed out the exact area this took place during my stay at Zetra in 1996.

[30] Ibid.

[31] Kristin M. Baker, (Captain, USA), article: "Operation JOINT ENDEAVOR, Joint STARS in the Balkans," *Military Intelligence Professional Bulletin*, (Oct-Dec 1996). This article was accessed through the internet on 5 May 1998. The corresponding url address is: http://huachuca-usaic.army.mil /contlearni ..astructure/media /mipb/ octdec96/baker.html.

[32] Collin A. Agee (LTC, USA), article: "Joint STARS in Bosnia, Too Much Data--Too Little Intel?" *Military Intelligence Professional Bulletin* (MIPB), (Oct-Dec 1996). This article was accessed through the internet on 5 May 1998. I had previously read the article during the summer of 1997. LTC Agee is very conservative in his evaluation of JSTARS' performance in 1995. This article was accessed at the associated url: http://huachuca-usaic.army.mil/contlearni...restructure/media/mipb/octdec96/agee.html.

[33] Steven Rotkoff, email: "Subject: Update 13 Jan" (GSM Site 9: Army GSM Task Force, 1/13/96), 1.

[34] USAREUR, briefing slide titled "BACKGROUND," (undated).

[35] JSTARS' deployment in November 1996 supported the transition between IFOR and SFOR. 1st Armored Division (1st AD) deployed "Task Force Eagle" to Tuzla, Bosnia-Herzegovina in December 1995 as part of the IFOR contingent. 1st Infantry Division relieved 1st AD in December 1996. The transition period from IFOR to SFOR was roughly three months from October 1996 to December 1996. JSTARS' deployment in 1996 occurred in the middle of the ground force transition. A battalion's worth of GSM teams was not a significant issue to the USAREUR G3 staff. The issue still remained how to best conduct C2 for Task Force Dragon. LTC McFeeters addressed the situation in an appropriate manner for the level of information he had to work with. The EUCOM staff had not made it clear to USAREUR what the C2 relationship for Task Force Dragon was supposed to be. And USAREUR was too busy conducting a relief in place in Bosnia to be concerned about the consequences of a short term deployment being driven by Air Force decision makers.

[36] These comments were made by Colonel Max McFarland to Lieutenant Colonel Jack Kem, at USAREUR Forward Headquarters, Taszar, Hungary in October 1996. This set the tone for the reception Task Force Dragon received in Tuzla. The G2 staff at Taszar was very helpful. And the initial staging base operation was efficiently run. The problem was, no one in the Army had requested JSTARS support for the Bosnia. The U.S. intelligence infrastructure in theater did not know how to effectively use JSTARS.

[37] This statement was made by an Air Force Lieutenant Colonel responsible for the 93rd AEG's advance party. Air Force officers where establishing support for the E-8C and personnel assigned to the 93rd. Liaison personnel from the 319th were hosted by the 93rd as well.

CHAPTER 7

FINDINGS AND CONCLUSION

JSTARS is a Warfighting System

"JSTARS in Bosnia is like a nuclear submarine in Kansas - A great weapon system in the wrong environment."[1] Prior to the IFOR deployment, senior leadership in military and political circles correctly determined the need for robust friendly force protection. They also understood the requirement to "measure" the lethality of friendly response to hostile action. JSTARS by definition appeared to support both requirements. The leaders were wrong. The fundamental issue with JSTARS' support to OJE is not the system's capability but rather the application of its capability. The enemy, terrain, and intelligence requirements associated with Operation JOINT ENDEAVOR did not substantiate a conventional JSTARS' deployment. The system is designed to conduct surveillance and targeting of large moving enemy formations over vast expanses of unobscured terrain. JSTARS is not designed to monitor static target locations for long periods or threatening activity which occurs sporadically.

1. The SAR capability on JSTARS is designed to detect and locate the disposition of moving enemy forces during the enemy's conduct of a halt. The value of the SAR FTI is in relation to "time-distance" calculations pertaining to the enemy formation's rate of movement. FTI also supports providing indications of hasty defensive preparations. 2. The radar's WAS-MTI capability is significantly degraded by rugged, mountainous terrain. The terrain in Bosnia is the absolute worst (next to Korea) for the application of WAS-MTI. Radar shadowing, created by extreme topographic relief,

prohibits monitoring of MTI from source of origin to point of termination. The mountainous terrain interrupts the radar's field of view and creates "blind spots" where JSTARS cannot see. Movement of hostile formations in Bosnia cannot be monitored once they enter a blind spot.

3. MTI was potentially most effective during the early period after conflict termination. Once civilian traffic began to increase on Balkan roadways, the ability of JSTARS to discern between hostile, friendly, and civilian traffic added to the already monumental task of MTI analysis.

4. Limitations imposed on E-8 airspace reduced flexibility and impaired the aircrew's ability to move the airplane to a more suitable orbit location.

Undue Influence

The United States Army and the United States Air Force have both succumbed to political economic pressures pertaining to JSTARS potential in the European military market. The NATO Alliance Ground Surveillance (AGS) testbed program exerted undue influence on both services. It was common knowledge the Clinton Administration placed great importance on the success of the JSTARS mission in Bosnia. This primarily impacted the Air Force which was tasked to "show off" JSTARS during NATO airshows, and demonstrate operational capabilities to senior NATO officials.

1. JSTARS flew to the Paris Airshow as a demonstration of its "global reach" capability. During the summer of 1997 the 93rd ACW deployed a team to Sarajevo. They operated a small modular ground terminal with similar capabilities as the GSM.

The E-8 conducted a "fly by" demonstration to show off the system's rapid deployment capability. After overflying in vicinity of the Balkans, the E-8 landed in Paris.

2. Many high level demonstrations were designed to convince NATO leadership to support JSTARS as the AGS core system. During the 1995-1996 deployment SACEUR (General Joulwan) visited the 4500th JSS at Rhein Main. It was understood that the Commander, 4500th JSS worked directly for Joulwan.[2] Prior to redeployment in January 1997 the 93rd AEG prepared a demonstration flight hosting the NATO Secretary General. The intention of the demonstration flight was to show the Secretary General automobile traffic on European hiway systems. It was designed to influence the Secretary General to support JSTARS in the AGS competition. Both of these examples are indicative of the influence placed on the Air Force to ensure a successful deployment.

3. During the 1996 deployment, members of the 93rd AEG exercised with headquarters LANDCENT two months prior to the actual deployment. Their mission was to facilitate LANDCENT incorporation of JSTARS into intelligence surveillance missions. The LANDCENT "C2" was the primary staff responsible for planning the integration of JSTARS into operational requirements.

4. The 93rd AEG liaison officers prepared and presented JSTARS information briefings to multinational intelligence staffs during the 1996 deployment. During a briefing to the G2 staff of MND-S (the French Airborne "Salamander" Division), the liaison team constantly referred to JSTARS targeting capabilities against bridge structures. This made absolutely no sense to me at the time. In retrospect, the briefing was part of the overall "sales pitch" the U.S. was giving the Europeans.

5. The U.S. effort to secure the NATO AGS contract failed to materialize during the Winter 1997 meeting of the NATO Conference of National Armaments Directors CNAD). The U.S. offer of an "early-payer" proposal in November 1997, was turned down "largely due to economic considerations....The proposal would have fully funded the program in 1998 and have provided much of the 1999 funding. The CNAD has decided to initiate an intensive search for fresh concepts and acquisition options, which are to be considered in its Spring 1998 meeting, according to DOD."[3]

Under the control of CAOC mission planners, the E-8 conducted numerous SAR-FTI missions. As stated in chapter 6, the resulting impact precluded timely servicing of Army WAS-MTI requirements. (In this context, Army refers to the ARRC, LANDCENT, and the subordinate multinational divisions). Timely servicing of ground targets was denied throughout the area of operations. Air Force radar operators onboard the E-8 were overloaded with prioritized targets supporting Air Force requirements. The focus on one major air defense weapons holding site and airfield, effectively precluded support of Army requirements. The origin of the SAR taskings appears to be the Intelligence, Surveillance, and Reconnaissance Cell (ISARC) at the CAOC in Aviano.[4]

1. "Initially, the tasking process for ISR assets was based on "cold war" procedures and was simply not responsive to the fluid environment of the Balkans. (ISARC) "Procedures were established and put into place with an overarching objective to support the compressed ATM cycle;" thereby, the capability to change or redirect efforts could be accomplished in near-real time."[5]

2. "The ISARC has proven critical in shaping the battlefield for operations within the Balkans. Our approach is a simple one...centralized management of air and space ISR assets to support all phases of the operation. It provides one-stop shopping to task or dynamically retask ISR assets; it enables the Stabilization Force (SFOR) to be proactive, rather than reactive to the changing battle space."[6]

3. "The ISARC construct provides for multinational understanding and active participation of ISR process through a matrix tasking approach, capitalizing on the strengths of each national asset. However, the most important function of the ISARC is to gather what is needed and to get that information to the (consumer)." [7]

The Air Force Position

The Air Force has consistently maintained JSTARS performed well beyond the expectations anticipated prior to each deployment. Giving credit where credit is due, the Air Force personnel associated with the 4500th JSS, and the 93rd AEG all performed their missions in an exemplary manner. The issue is not with the people but rather the airplane they fly. "We exceeded by a wide margin our initial mission," said Colonel Ben Robinson, 93rd ACW commander. "We exposed 40 percent of the wing to deployed operations, trained over 40 aircrew members and reduced our deployed (personnel) by 12 percent; there wasn't an area that we weren't successful in."[8] The "good news" story given by Colonel Robinson accurately reflects the performance of his people. In the open press, it deceptively gives the impression the E-8 airplane performed to standard as well.

Positive comments were made in praise of the JSTARS performance during the first deployment. General Joulwan is reported to have given it high marks in supporting

the IFOR mission. The 4500th JSS gave itself great credit for supporting a number of ground related missions. These include the following:[9]

1. Crossing the Sava River by 1st Armored Division.
2. Monitoring mass grave sites.
3. Detecting the movement of armor units through the UK area of operations.
4. Confirmation of SA-2, SA-6, sites.
5. Zone of separation (ZOS) violations.
6. Battle damage assessment of Bridges.
7. Railroad lines of communications.
8. Weapons collection points.
9. Zaluzani airfield cantonment area/cross cueing.
10 Vlasenica heavy storage area/MTI activity into collection point.

In contrast to the above list of supported ground requirements, the following provides fidelity on the ability to responsively support the missions listed above.

> Employing the system as peace time surveillance platform has challenged the operators. Using MTI, SAR, and FTI effectively is a continuous learning process. SAR will not show vehicles and should be used as a tool to show context for the MTI. Using FTI to confirm stopped vehicles is not always accurate due to weather, time of day, and orbit. Appears FTI is of little utility in this AO. Monitoring the ZOS may not be the correct mission for this platform, but we are being judged against it. The ZOS is a beehive of activity but we cannot distinguish between the killer bees vice the domestic variety.[10]

The Air Force considers the two deployments to Bosnia as being successful. The Air Force' enthusiasm for JSTARS supporting peace operations is undaunted. They cite lessons learned and acknowledge there were shortcomings. The issue of logistic support

for both the E-8 and GSM teams is highlighted as requiring high level coordination on the international level. The 93rd AEG had as much of a challenge determining the location of their forward operating base as the 319th MI Battalion had getting an LGSM into Mostar with the French. In both deployments, the Air Force points out the support provided to the ground component. They do not consider that many of the targets they covered had nothing to do with operational requirements.

The Army Position

As they are predisposed to be, Army personnel associated with the JSTARS effort in Bosnia have many less laudatory comments to provide. Acknowledging the system's proven effectiveness in wartime, many Army critics have reason to doubt the system's utility in peace operations, especially in an environment like Bosnia's. During the 1995-1996 deployment, JSTARS was seen as providing minimal useful information. "The time and effort expended generally wasn't worth the intelligence value obtained....JSTARS is a proven warfighting asset, but it is not a peace(enforcing) asset....JSTARS...certainly is (a valuable asset) if employed in the right environment with the right mission....However, Operation Joint Endeavor was neither the right environment nor the right mission. The JSTARS had several limitations in this environment, most of which we should have identified beforehand and thus prevented the deployment of this expensive asset."[11]

The working relationship between Army GSM Teams and the E-8 aircrews was often challenged by the "flexibility" the ISARC perceived JSTARS as having. On

occasion the ISARC would designate a target area requiring a change to the scheduled orbit. The following comment summarizes the issue from the ground level perspective;

> JSTARS...orbits were established well in advance but varied little from last year. As a result the pre-established orbits were modified several times and new orbits added. This is not a significant problem until the orbits are changed without notice during the mission. Some missions used four different orbits or have alternated between two or three during one mission with no apparent reason other than the air force "wants to." This leads to distrust from the (GSM) operators and the units the GSMs are supporting. It also results in confusion and delays while selecting and reconfiguring the master GSM. Changing orbits decreases on station time and degrades the ability of an operator to satisfy his/her taskings. Providing usable intelligence given these problems is difficult and limited.[12]
>
> The mission times continued to change for no apparent reason. Most of the units the GSM teams were supporting wanted night time/early morning surveillance. The mission times changed to late morning/rarely afternoon. It is difficult for JSTARS to provide good intelligence when there is a lot of civilian traffic on the roads. Even though the teams had no control over this matter they were still partly blamed (by the unit they were supporting) for the problem.[13]

One of the primary differences between Army GSM Teams and Air Force E-8 Aircrews is the human dimension. The GSM Teams are in contact with their supported command twenty-four hours a day. Working relationships are established between people. The same Team conducts GSM operations mission, after mission, after mission. E-8 aircrews invariably change out for every mission. The E-8's crew never establishes a "human" working relationship with supported commands on the ground. This lack of human interface translates into different perceptions of what the ground commander really needs from a JSTARS mission. It is imperative for the GSM to have priority in the E-8 onboard decision making process. The Army element onboard the E-8 must represent the GSM's interests during coordination of mission requirements.

The Army is not without positive comments about JSTARS performance in Bosnia.

1. "JSTARS actively assisted in the development of TTPs for synchronizing and massing tactical effects. The JSTARS synchronized with Task Force Eagle's ground and aviation units to track movement of personnel and equipment by ground. JSTARS was capable of spotting targets both day and night, correctly identifying the targets, and reporting back accurate information."[14]

2. "Twice during 1996 the Joint STARS system was deployed to support the Joint Endeavor peace-keeping operation. The system proved to be an invaluable asset during these operations. Not only did it allow the maneuver commanders to track the ground deployment of their own forces, it provided the status of existing structures such as bridges and buildings using its SAR."

The Department of Defense's Position

The Department of Defense (DOD) makes assessments of newly introduced system capabilities through its Directorate of Operational Testing and Evaluation (DOT&E). Assessments are made at various stages of the procurement process and generally coincide with appropriate "milestone" requirements. A representative from DOT&E testifies before Congress on the suitability of a specific program for continued funding. In the case of JSTARS, DOD has found the system to be adequate for the conduct of MOOTW.[15] However, the system is not found to be adequate for all operations.[16]

Limitations observed during OJE include problems of masking and clutter leading to surveillance activity reports that could have been misinterpreted by

commanders and staffs, and only partially demonstrated capabilities to support target attack and battle management. Not withstanding JSTARS' acknowledged military utility in Desert Storm and OJE, many of the required capabilities of JSTARS have not yet been demonstrated. Other capabilities have been demonstrated but not yet at required levels or intensities.

In the current configuration, the JSTARS aircraft has not demonstrated the ability to operate at the required maximum altitude; adequate tactics, techniques, or procedures to integrate JSTARS into operational theaters have not yet been developed; JSTARS exceeded the break rate and failed the mission reliability rate during OJE. During OJE, JSTARS did not achieve the effective time-on-station requirement. Although this was improving towards the latter half of the deployment (1995-1996), it shows no indication that it will meet its Key Performance Parameter objective of 90 percent without significant change from the tested configuration. Extensive contractor support was vital to the overall success of JSTARS during OJE, but at a contractor support level in excess of the existing Air Force support plan. Because of these and other suitability issues, JSTARS did not meet its overall suitability requirements in OJE and, without corrective actions, would not be suitable in higher intensity conflicts.[17]

Issues

Command and Control: Subordination of Army GSM Task Force elements to the Air Force JSTARS chain of command diminishes JSTARS support to Army forces conducting peace enforcement operations. This command relationship relinquishes the ability of the Army Commander to freely act on behalf of supported commands. The Army GSM Task Force should always reside within the command structure of the Ground Component Commander (unless political requirements dictate otherwise).

Doctrinal Differences: The Air Force views JSTARS as a single focus battle management system. Providing wide area surveillance is considered a secondary mission for the JSTARS aircraft. This application supports the Army's conventional warfighting requirements. It does little in support of peace enforcement operations. The Air Force has failed to grasp the importance of providing Ground Commanders the ability to

monitor extensive expanses of terrain. In Bosnia, CAOC generated SAR requirements were prioritized over WAS-MTI requirements generated by ground commanders.[18]

Radar Utilization: The application of JSTARS AN/PY3 multimode radar system did not support WAS-MTI requirements. Air Force systems management officers (SMO) designated both the area the radar monitored and the mode in which the radar monitored a target area. In most instances, the SMO designated multiple sector search operations with relatively high radar revisit rates. Use of the radar in this manner supports battle management at the expense of wide area surveillance. Both FM 34-25-1 and TO1E-8C-43-1-2 state WAS-MTI is the radar's primary mode. The establishment of a Ground Reference Coverage Area (GRCA) covering a 180 kilometer by 180 kilometer area using a 60 second radar revisit rate is the optimum means for providing ground surveillance. Once a GRCA is established, "high interest" areas can be designated for sector search with higher radar revisit rates providing increased resolution.

METT-T: Peace enforcement operations in Bosnia require JSTARS mission planners to consider the factors of mission, enemy, time, terrain, and troops (METT-T). The static nature of targets, the Ground Components Commander's mission to conduct PEO, and the extreme topographical relief combine to challenge conventional JSTARS surveillance operations. To be successful in Bosnia (or peace operations in general), planners must start with a series of multiple sequential missions targeting the same area to provide GSM operators time to conduct pattern analysis. Properly employed, JSTARS has the potential to provide significant coverage to CINC-PEO requirements. In Bosnia, this equates to monitoring freedom of movement throughout the entire area of operations.

The CAOC did not do this during the two JSTARS deployments described in this thesis. CAOC planners scheduled JSTARS requirements base on availability of fighter aircraft to conduct ground attack battle management training.

Synthetic Aperture Radar (SAR): SAR was the Air Force system of choice during JSTARS's deployments to Bosnia. Numerous SAR missions were conducted against static targets containing air defense weapons systems. This is inconsistent with the effective use of ISR assets. U2 reconnaissance aircraft and national imaging systems provide higher resolution SAR than the four meter resolution provided by JSTARS. The other systems are capable of providing resolution at one meter and much more useful for detailed planning requiring measurements of the surface area. The primary issue associated with JSTARS execution of SAR missions is the system's inability to process WAS-MTI radar imagery. The large file size of SAR imagery clogs bandwidth associated with the surveillance control data link (SCDL). Buffers within the processors onboard the E-8 and inside Army GSMs spool the MTI imagery until the processing of the SAR is complete. This detracts from monitoring the ground commander's AO and providing enhanced situational awareness.

Summary and Conclusion

Army and Air Force priorities for the employment of JSTARS support to OJE were are conflict. The two positions diverge in terms of target priorities and utilization of the AN/PY3 radar. The Army position relies on JSTARS' surveillance capabilities for intelligence collection providing WAS-MTI. MTI sector search is used in support of targeting operations. The Air Force considers JSTARS a ground attack battle

management tool. The functionality is similar to a ground-oriented AWACS. The Air Force SMO on board the E-8 designates multiple sector search patterns to establish an area replicating a GRCA. The faster radar revisit rates within each sector search area provide increased target resolution for attack planning and target attack operations. The issue for resolution within the context of peace enforcement operations is which mode (WAS-MTI or SS) is more relevant.

With respect to JSTARS operations, the Air Force holds the lion share of the cards. Unless engaged by the Army on the "doctrinal front," the Air Force will exert de'facto operational control of how JSTARS is employed on future battlefields. Without the wide area surveillance provided by JSTARS, the ability of Army ground commanders to monitor large geographic areas is significantly reduced. Developing a Joint JSTARS TTP would be a step in the right direction. The purpose of the TTP would be to iron out individual service issues associated with employing the E-8's radar. The TTP must support the full range of military operations as required by the National Security and National Military Strategies. The Army needs to leverage the capability of the E-8's multimode radar in support of mission requirements. Time, money, and people have been invested to make sure JSTARS accomplishes what it is intended to do in support of Army operations. Perhaps it will take dead soldiers on the ground to convince the Air Force of JSTARS role as an intelligence platform.

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[1] Steven Rotkoff, LTC, USA. email message to Maj Harry Phillips, "JSTARS," (Fort Hood, Texas: 19 May 1997). LTC Rotkoff's statement is a result of his experience with the Task Force GSM deployment in December 1995. As the Commander, 303rd MI Battalion, LTC Rotkoff deployed forward to address C2 issues. His primary role during

the deployment revolved supporting GSM soldier support and logistical requirements. LTC Rotkoff is currently performing duties as the G2, 1st Cavalry Division, III Corps, Fort Hood, Texas. He is involved in planning the deployment of 1st Cavalry Division soldiers and equipment during the summer of 1998. I have LTC Rotkoff's permission to use his name in conjunction with his statement. As he said, "I stand by my comments."

[2] Ibid.

[3] John Norwood, article: "US withdraws joint STARS proposal," *Journal of Electronic Defense*, Horizon House Publications Inc., (December 1997), 18.

[4] Tara Leweling, Captain, U.S. Air Force, memorandum: "Intelligence, Surveillance, and Reconnaissance Cell (ISARC) Concept of Operations (CONOPS), (Ramstein Air Base, HEADQUARTERS, United States Air Forces in Europe (USAFE), 15 May 1997), 2. Capt Leweling is one of the personnel at the 16 October 1996 coordination meeting at EUCOM who argued there was no need to modify the JSTARS CONOPS. She was widely regarded by the 93rd AEG as being the cause of the CAOC's confusion in tasking JSTARS. She did not understand the role of the CAOC as it supported the land component in theater. Her mission in life as she understood it was to focus on air defense weapons systems posing a threat to NATO air forces. Her good intentions in supporting Air Force requirements stripped the Army of meaningful ISR support. IFOR soldiers performed their dangerous missions on the ground without benefit of focused ISARC efforts to support their mission. This is an example of the danger befalling the Army's reliance on Air Force controlled ISR systems. (note: as an aside, Capt Leweling reportedly got extremely airsick during her familiarization flight onboard the E-8. The aircrew was more than a bit amused).

[5] Ibid.

[6] Ibid.

[7] Ibid.

[8] Heather Meissner, 2LT, U.S. Air Force, article: "Joint STARS returns from first deployment," (Warner Robins Air Force Base, Georgia: 93rd Air Control Wing, Air Force News, News Service, 30 January 1997), 1.

[9] U.S. Air Force, 4500th Joint Stars Squadron, briefing: "Lessons Learned," (Rhein Main Air Base, Germany: 21 March 1996). Each one of the listed examples comes directly from the briefing.

[10] James R. Young, Colonel, USA, memorandum: "MEMORANDUM for Lieutenant General Menoher, Deputy Chief of Staff for Intelligence, United States Army, Information Paper on Joint STARS Responsiveness," (Rhein Main Air Base, Germany: 4500th JSS, 18 February 1996), 3. The first paragraph in Colonel Young's memorandum to Lieutenant General Menoher reads, "1. PROBLEM: There is a perception with JOINT ENDEAVOR tactical commanders that JOINT STARS is not responsive to tasking." Paragraph 2 reads, "BACKGROUND: The concept developed for operating in support of JOINT ENDEAVOR presents numerous challenges. Some of the work arounds implemented to accomplish the mission, stretch the limits of our system which reduces our ability to be responsive in every case. Our efforts to serve every possible command result in the system being exercised beyond the program design. Every customer can not receive the same priority support, thus responsive support to every request is not possible."

[11]Tony Capaccio, "An Army Bosnia Review Rates JSTARS A White Elephant," (Washington DC: National Press Building, "Defense Week," 25 November 1996), 1. The Cappacio article explores comments made by U.S. Army Captain Rhonda Cook. Cpt Cook was assigned as an intelligence analyst to Task Force Eagle during the first JSTARS deployment to Bosnia. Her comments were published ten days after the second mission to Bosnia started.

[12] Suzanne C. Nielsen, CPT, USA, memorandum, "MEMORANDUM For CDR, 319th MI Battalion, Subject: Operation Joint Endeavor After Action Review," (Fort Bragg, North Carolina: B Company, 319th Military Intelligence Battalion, 27 March 1997), 4.

[13] Ibid., 6.

[14] U.S. Army, article: "Technology Enhances Ability to Document Compliance and Mass Tactical Effects, " (Fort Leavenworth, Kansas: Center for Army Lessons Learned (CALL), undated). This document was accessed through the internet 16 September 1997. The internet url address is: http://calldb. army.mil:80 /efsweb/ WebFile/ tmp/HYSBQRKPSLSQ/CALL-IRR-TF-167-0.txt.

[15] U.S. Department of Defense, paper, "FY 96 Annual Report, Joint Surveillance Target Attack Radar System (JSTARS)," (Washington DC: DOD, DOT&E, undated).

[16] Ibid.

[17] Ibid.

[18] In Bosnia, the Air Force failed to adequately support Theater developed surveillance requirements. Rather than making JSTARS responsive to the needs of ground commanders, CAOC generated requirements prioritized training missions with NATO air forces. JSTARS flew where the fighters flew. Army ground surveillance requirements were dismissed.

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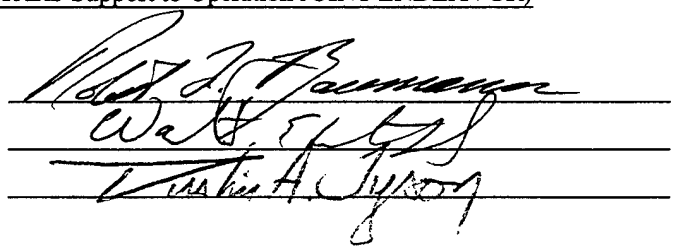

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