JOINT SURVEILLANCE TARGET ATTACK RADAR SYSTEM: UNLIMITED POTENTIAL--LIMITED RESOURCES

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ABSTRACT

JOINT SURVEILLANCE TARGET ATTACK RADAR SYSTEM: UNLIMITED POTENTIAL--LIMITED RESOURCES
by MAJ Timothy P. Albers, 90 pages.

From Desert Storm to Operation Joint Endeavor to Operation Allied Force, the Joint Surveillance Target Attack Radar Systems (JSTARS) mission has evolved and expanded following each contingency it was called upon to support. As these supplementary missions evolved they became essentially doctrine by which JSTARS will look to be employed in future contingencies. The system's technology continues to be upgraded to meet the expanding mission requirements. However, there is a danger that the system's resources will become stretched so thin that no mission will receive the dedication and attention required to simultaneously execute them decisively. This thesis contends that JSTARS performance diminishes with the addition of supplementary missions as a result of the human factors present and not due to radar capability shortcomings.

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TABLE OF CONTENTS

ACRONYMS

ABCCC	Airborne Battlefield Command and Control Center
AC	Attack Control
ACC	Air Component Commander
ACW	Air Control Wing
AFOTEC	Air Force Operational Test and Evaluation Center
AI	Air Interdiction
AIT/O	Airborne Intelligence Technician/Officer
AOT	Airborne Operations Technician
AP	Attack Planning
ASOC	Air Sector Operations Center
ATO	Air Tasking Order
ATSS	Airborne Target Surveillance Supervisor
AWACS	Airborne Warning And Control System
C2	Command and Control
CAOC	Combined Air Operations Center
CAS	Close Air Support
CGS	Common Ground Station
CONOPS	Concept of Operations
CSAR	Combat Search and Rescue

DMCC	Deputy Mission Crew Commander
FRY	Former Republic of Yugoslavia
FTI	Fixed Target Indicator
GDT	Ground Data Terminal
GRCA	Ground Reference Coverage Area
IGSM	Interim Ground Station Module
IOC	Initially Operational Capable
IOT&E	Initial Operational Test and Evaluation
ISR	Intelligence, Surveillance, and Reconnaissance
JFACC	Joint Force Air Component Commander
JOINT STARS	Joint Surveillance Target Attack Radar System
JSWS	Joint Service Workstation
KEZ	Kosovo Engagement Zone
KLA	Kosovo Liberation Army
LCC	Land Component Commander
MARCENT	Marine Central Command
MCC	Mission Crew Commander
MGSM	Medium Ground Station Module
MTA	Military Technical Agreement
MTI	Moving Target Indicator
MTW	Major Theater War

NAI	Named Area of Interest
NATO	North Atlantic Treaty Organization
OAF	Operation Allied Force
OJE	Operation Joint Endeavor
OOTW	Operations Other Than War
OPTEC	Operational Test and Evaluation Command
ORD	Operational Readiness Document
RJ	Rivet Joint
RRCA	Radar Reference Coverage Area
RSR	Radar Service Request
SACEUR	Supreme Allied Commander Europe
SAR	Synthetic Aperture Radar
SCDL	Surveillance and Control Data Link
SD	Senior Director
SDT	Senior Director Technician
SEAD	Suppression of Enemy Air Defense
SMO	Sensor Management Officer
SOTAS	Stand-Off Target Acquisition System
SS	Sector Search
TACC	Tactical Air Control Center
TF	Task Force

TTP	Tactics, Techniques, and Procedures
WAS	Wide Area Surveillance
WD	Weapons Director

LIST OF ILLUSTRATIONS

LIST OF TABLES

CHAPTER 1

INTRODUCTION

> From a warfighters perspective, tactical intelligence was not good. What I got, I had to get myself. It was late and did not give me the chance to exploit. You would have thought that someone would have given me access to Joint STARS.[1]
>
> GEN Ronald Griffin, FM 34-25-1

This sentiment represents the feeling of many of the potential recipients of the Joint Surveillance Target Attack Radar System's (Joint STARS) information and is at the crux of the issue of this thesis. From its inception Joint STARS has been a highly sought after asset by both the land and air component commanders (LCC and ACC). In this age of information operations it is critical to be able to see beyond not just the next hill on the battlefield but beyond the next ten. Many misconceptions and incorrect lessons learned have arisen concerning what Joint STARS can and will do for a supported commander when he is at war or deployed in support of a contingency. This thesis will attempt to clarify some of these misconceptions and incorrect lessons learned.

The military as a whole is continuously fighting the same battle. The military budget shrinks, but the contingencies and requirements have more than tripled. The maxim "do more with less" seems to be the military's battle cry. This issue affects everyone in the military from the infantry soldier in the foxhole to the crewmembers aboard Joint STARS. As older systems and new programs get cut from the budget, existing systems and programs are asked to pick up the slack. Because of the capabilities and potential the Joint STARS system represents, it has

not only survived the majority of the budget cuts, but has become an integral part in every commander's intelligence gathering arsenal. Because Joint STARS is so critical, it has been pushed into service time and time again. In the case of Desert Storm and Operation Joint Endeavor (OJE), Joint STARS was employed before it was actually certified as initially operational capable (IOC). In the cases of OJE and Operation Allied Force (OAF), Joint STARS was employed in an environment that may not have been ideal for optimizing the systems capabilities. This thesis will explore the evolution of the Joint STARS system and its expanding missions. The research will seek to determine if the addition of supplementary missions will cause Joint STARS performance to diminish due to the strain on the system's limited resources.

The Research Question

Joint STARS is currently capable of performing a number of diverse missions. In all likelihood Joint STARS will be called upon to execute them simultaneously in future contingencies. The thesis primary question is, Does the quality of Joint STARS performance diminish with the addition of supplementary missions? In order to answer this question it is imperative to discuss how Joint STARS has gotten to where it is now. To illustrate their situation this thesis will have to answer the secondary and tertiary questions to get down to the facts regarding Joint STARS current status. The secondary research question is, What missions is Joint STARS currently being asked to execute simultaneously? To answer that question this thesis will address the manner in which Joint STARS was employed in Desert Storm, OJE, and OAF. This thesis will also address some of the lessons learned concerning Joint STARS

employment from each of these contingencies. With the answer to the secondary question this thesis will then address the tertiary question, What are the limitations in terms of resource requirements for each of the missions identified in the secondary question? This thesis will then establish a common understanding of the Joint STARS system resources by answering the base question, What are the capabilities of Joint STARS in terms of the personnel and the radar? This thesis will address the current capabilities of the system and how the crew is organized for operations.

Background

To fully understand the nature of the problem this thesis will go back to the inception of the Joint STARS system. As stated earlier, the military budget continues to shrink, while the military requirements continue to grow exponentially. Joint STARS is a product of these military budget constraints. Back in the 1970s the Army was developing a system called the stand-off target acquisition system (SOTAS), while at the same time the Air Force was working on the PAVE MOVER program. The intent behind both of these systems was similar, in that, SOTAS and PAVE MOVER were designed to be employed against the threat of a massive Warsaw Pact ground offensive. However, the SOTAS and the PAVE MOVER purpose were somewhat different. The SOTAS was to be the answer to the Army's need to detect major enemy ground movements at a great distance from friendly forces. The SOTAS would be a dedicated asset for the LCC, specifically as an intelligence, surveillance and reconnaissance (ISR) platform. Its mission was to be the ground commander's eyes for the deep fight. The PAVE MOVER was also being developed to identify enemy ground movements at great

distances. However, its purpose for the ACC was not just for ISR requirements, but so the system could guide aircraft and missiles against the moving target indicators it identified. Therefore, although the two services were developing two systems with similar capabilities, the Air Force and Army were developing them for separate and distinct purposes. Naturally, considering budgetary constraints and the vision of joint operations the two programs were merged under the lead of the Air Force and designated as the Joint STARS program. This merger of systems was not without its difficulties. As can be expected there was resistance to the joint designation of this system by both services. Each service, understandably, wanting the system to itself for its own purposes. Through many long years of cooperation the Joint STARS system did what most joint initiatives are never able to do--succeed.

As time has passed, so has the seemingly narrow focus and purpose that the Army and Air Force originally had for the Joint STARS system. The reality of shrinking budgets and expanding missions is why Joint STARS is called upon to execute multiple missions simultaneously. A system that at one time was relatively focused is now torn between multiple missions. The Joint STARS leadership and crewmembers are in a race to understand and train for not only its original mission, but also the evolving missions it is being called upon to execute. Tactics, techniques, and procedures (TTPs) are being developed as this thesis is being written in an attempt to prepare the Joint STARS crewmembers to take the system to war as a multifaceted, multimission capable system. At the end of this research this thesis will determine if Joint STARS performance diminishes with the addition of supplementary missions. Whatever

the outcome, this thesis will provide recommendations for future employment and/or direction for future research in this area.

Assumptions

The Joint STARS system will be asked to execute multiple missions simultaneously during future operational contingency deployments. Each supplementary mission added to Joint STARS requirements will compete with each other for the limited resources (personnel and radar time line) of the system.

The supported units and agencies will be expecting a high level of support and performance from Joint STARS based on their particular mission and past experiences with Joint STARS.

Definitions

The three areas addressed under this section are: Joint STARS missions, crewmembers and their duties, and radar capabilities. The intent behind defining these areas is to develop an appreciation for: what specific missions Joint STARS is being asked to execute; what personnel are available aboard Joint STARS to execute these missions; and what the system's radar is capable of doing for the crewmembers executing these missions. From these definitions there should be a general understanding of how the system is configured and operated for mission use.

The following are missions that Joint STARS is currently being asked to execute simultaneously. It is important that there is a common understanding of what is involved when an asset is tasked with one of these missions. These definitions should not only indicate the

enormous potential the Joint STARS system possesses, but also that to execute or support these missions simultaneously would take an enormous amount of resources.

Air Interdiction (AI). An operation conducted to destroy, neutralize, or delay the enemy's military potential before it can be brought to bear effectively against friendly forces. Detailed integration of each air mission with the fire and movement of friendly forces is not required.[2]

Airborne Battlefield Command and Control Center (ABCCC). A highly capable C2 platform with extensive communications capabilities; provides battle management of airborne assets and supports the air campaign as an airborne extension of the joint air operations center or the air support operations center (Joint STARS would serve in a limited ABCCC role only, due to limitations of communication equipment and personnel).[3]

Close Air Support (CAS). Air action by fixed and rotary-wing aircraft against hostile targets which are in close proximity to friendly forces and which require detailed integration of each air mission with the fire and movement of those forces (CAS is a typical mission assigned to the ABCCC platform and is being considered for Joint STARS in its limited ABCCC role).[4]

Command and Control (C2). The exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures employed by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishment of

a mission. (For the purpose of this thesis C2 will be addressed as the function of "attack support." Attack support is the term Joint STARS crewmembers use to refer to missions that include the functions of air interdiction.) [5]

Intelligence, Surveillance and Reconnaissance (ISR). An operation designed to gather and report information on a specific target or within an assigned area of operation; conducted in accordance with the joint force commander's collection priorities.

The importance of understanding the limited resource of personnel aboard Joint STARS cannot be overstated. There are many misconceptions about how the crew is organized for operations. The following quote from a retired Army lieutenant general shockingly illustrates how uninformed some military leaders are about the Joint STARS system.

> Joint STARS consists of 18 consoles . . . identically configured so the air mission commander can quickly tailor his operators . . . one operator might watch each division area; two watch the Corps deep battle area; two study SAR imagery; three interface with fighter aircraft; two interface with Army, Marine, or Air Force aircraft operating behind enemy lines; three seek out mobile missile launcher indicators; one to manage radar service requests; and two to handle special mission requests.[6]

The truth is, the standard mission crew has twelve, not eighteen, operator consoles available for mission type operations at any given time. Furthermore, each operator is trained for fairly specific functions. Some operators are cross-trained to perform multiple functions, but not all operators are interchangeable. The other six consoles the general referred to are: one aircraft navigator, two communications technicians, and three computer and radar technicians. Although none of these six positions actively participate in standard mission type operations their functions are crucial. Without their contributions and expertise the mission operators could not

do their job. Since their positions do not directly impact the issue of this thesis, their crew positions will not be defined. All of the crewmembers listed below have multiple responsibilities. In basic terms, their position and responsibilities are defined. Figure 1 is a wire diagram of the crew. The standard mission crew is comprised of the following:

Mission Crew Commander (MCC). An Air Force major or lieutenant colonel responsible for the overall management of the crew and makes the final decision on mission related issues.

Deputy Mission Crew Commander (DMCC). An Army major or lieutenant colonel responsible for serving as the LCCs representative onboard. Also serves as the MCC in his absence.

Senior Director (SD). An Air Force captain or major who manages the surveillance and weapons sections and is responsible for coordinating and directing the execution of the mission taskings.

Sensor Management Officer (SMO). An Air Force lieutenant or captain who is responsible for the management of the radar time line and approval of radar service requests (RSRs) in accordance with mission priorities.

Weapons Director (WD). Two Air Force lieutenants or captains who are responsible to the SD for employing direct attack aircraft in an attack support mission and can also function in a surveillance role.

Airborne Intelligence Officer or Technician (AIO/AIT). An Air Force lieutenant, captain or enlisted airman who is responsible for monitoring and providing the crew information

from external intelligence platforms and serves as the threat specialist onboard. Also coordinates with the navigator on air to air threats to the Joint STARS aircraft.

Airborne Target Surveillance Supervisor (ATSS). Two Army non-commissioned officers or enlisted personnel who are responsible to the DMCC for establishing and maintaining datalink and communications with the supported ground unit. Also manages Army radar service requests onboard the aircraft.

Senior Director Technician (SDT). An Air Force noncommissioned officer who is responsible to the SD for the management of the surveillance and tracking within the assigned area of operation and verifies the execution of assigned surveillance taskings.

Airborne Operation Technicians (AOT). Two Air Force non-commissioned officers or enlisted personnel who are responsible to the SDT for the execution of the surveillance and tracking within an assigned area of responsibility.

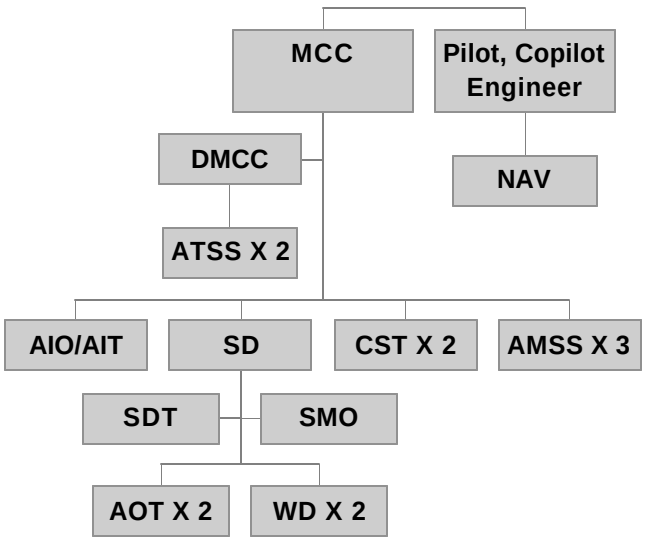

Figure 1. Crewmember Organizational Diagram. *Source:* 93rd Air Control Wing "Command Brief" (Briefing slide, Robins Air Force Base, Georgia, 1999).

The final area to be defined is the radar capabilities. Like the personnel limitations, the importance of understanding the limited resources of the radar onboard Joint STARS cannot be overstated. Much like the misconceptions regarding the personnel capabilities, there are misconceptions regarding the radar capabilities. This thesis will not endeavor to explain the dynamics of the radar itself, but to provide familiarization with the basic modes the radar operates in and the standard method in which it is utilized during operational missions.

The radar on Joint STARS is a 24-foot, canoe-shaped, side-looking, phased array radar housed in a dome-like shelter on the under belly of a Boeing 707 aircraft. The radar is electronically steered in azimuth and mechanically steered in elevation to illuminate the requested search area. Joint STARS normally establishes an orbit which stands-off the requested search area approximately 50 kilometers, and can view out to 250 kilometers. The radar has a field of view of 120 degrees off of the wing and will detect and track moving targets up to 125 knots. The radar operates in two modes: moving target indicator (MTI) and synthetic aperture radar (SAR). In the MTI mode, the radar detects moving vehicles based on the doppler shift return from wheeled vehicles and a double doppler shift from a tracked vehicle. The theory is that the tracks of the tracked vehicle are moving twice as fast as the vehicle itself and, therefore, create a double doppler shift, which indicates a tracked vehicle. This doppler and double-doppler shift is represented on the operator's console as magenta and yellow dots respectively, which in theory represents wheeled versus tracked vehicles. In reality, an operator cannot rely on the systems determination of wheeled versus tracked vehicles. An operator should never attempt to report detection of wheeled versus tracked vehicles unless they have cross-cued the radar

picture with another asset that can positively identify what type of vehicle has been detected. Another misconception is that Joint STARS has identification ability. It should be made clear that Joint STARS has no identification ability. This must be understood by all that utilize Joint STARS. The operator has no identification ability and should only report MTI, not enemy movement. A crewmember should only report enemy MTI when their radar picture has been cross-cued with another asset and positively identified as hostile.

As stated, the Joint STARS radar can operate in two modes: MTI and SAR. Both modes have unique characteristics and capabilities, which are employed during different missions to maximize the abilities of the radar. Radar service requests (RSRs) are requests by supported agencies for the radar to service a specific area and are executed by the radar based on priorities established by the crew during mission planning. These RSRs can and are employed simultaneously. The radar sweeps the areas requested and provides a radar picture to the operators onboard the aircraft in the form of MTI. The frequency that the radar sweeps a given area is based on the priority of the RSR and the requested revisit rate. Normally, the higher priority the RSR is, the higher the requested revisit rate will be and the more time the radar will spend searching in that area. The result of simultaneous RSRs being serviced by the radar at one time can be that the lower priority RSRs do not get serviced in accordance with the revisit rate requested by the supported agency. This is a crucial point to understand because the radar is limited in its ability to fulfill everyone's requests. Like the limitations on the personnel aboard Joint STARS, the radar capability limitations will be defining criteria when the proposed research question is analyzed. See figure 2 for an illustration of the operations of the radar.

There are several varieties of MTI RSRs available to the crew. These types of MTI RSRs include:

Ground Reference Coverage Area (GRCA). This is a wide-area surveillance (WAS), low-resolution, usually low-priority RSR defined by a search area that the radar will attempt to continually keep in its field of view regardless of its position in the orbit. Normally requested by the LCC to cover up to a corps-sized area (160 by 180 kilometers). A standard request for a revisit rate on a GRCA is sixty seconds. This means the supported unit is requesting that the radar sweep and will provide an updated MTI picture of moving vehicles within the requested area every sixty seconds.

Radar Reference Coverage Area (RRCA). This is also a WAS, low-resolution, low-priority RSR. The difference between this MTI RSR and a GRCA is that the RRCA's search area is defined by a fixed azimuth off of the aircraft wing and does not have a defined search area on the ground. The radar will continue to search ninety degrees off of the wing of the aircraft regardless of where it is in the orbit. This MTI RSR is rarely used for normal operations. The RRCAs standard use by the SMO is to validate the radar as operational enroute to the area of operation.

Sector Search (SS). This MTI RSR provides the ability to provide a higher resolution and a quicker revisit rate for a smaller area than with the wide-area surveillance of a GRCA. This smaller-sized RSR with a quicker revisit rate (usually thirty seconds) supports either the LCC or the ACC by providing a more accurate and timely view of the vehicle activity in the

defined area. The priority for an SS is normally higher than the GRCA and will, therefore, be fully serviced before and more often than the GRCA.

Attack Control (AC). This is a high-resolution, high-priority, high-revisit rate (usually 10 to 12 seconds) MTI RSR. Usually smaller than the SS, the AC is frequently requested by the ACC during attack support operations and is also utilized by the crewmembers during ISR missions to aid in verifying possible vehicle movement. This MTI RSR will provide the most accurate and timely MTI picture. This is the most commonly used RSR to aid the crewmembers in targeting.

Attack Planning (AP). This is similar to the AC in functionality but normally with a lower revisit rate (15 to 20 seconds) and lower priority. Since the difference between the AC and AP is so small, this RSR is rarely used during normal operations. The crewmembers will normally opt for the SS or AC in its place.

Besides the MTI mode, the radar can also operate in a synthetic aperture radar (SAR) mode. This is a mode in which the radar dwells (usually 2 to 3 seconds) on a specific area (usually 2 by 4 kilometers) requested by the operator and creates a radar image or picture of the specific area. The SAR is a high-resolution RSR, which means the radar will spend a large amount of radar time line, relative to the other RSRs, looking at a specific point on the ground. The SAR is normally the highest priority RSR, which means that once it has been approved by the SMO, it will be serviced prior to the completion of any other RSR. The SARs are most frequently used in a change detection role, but may also function in a very limited battle damage assessment role. A SAR can also be taken in the fixed target indicator (FTI) mode. This

provides red dots overlaid on the SAR, which indicates the areas that the radar received the greatest returns from the ground. Among other things, the SAR-FTIs can indicate buildings, stationary vehicles, or assembly areas. The SAR-FTI is a capability utilized by some operators who feel it provides them with better situational awareness of the ground picture.

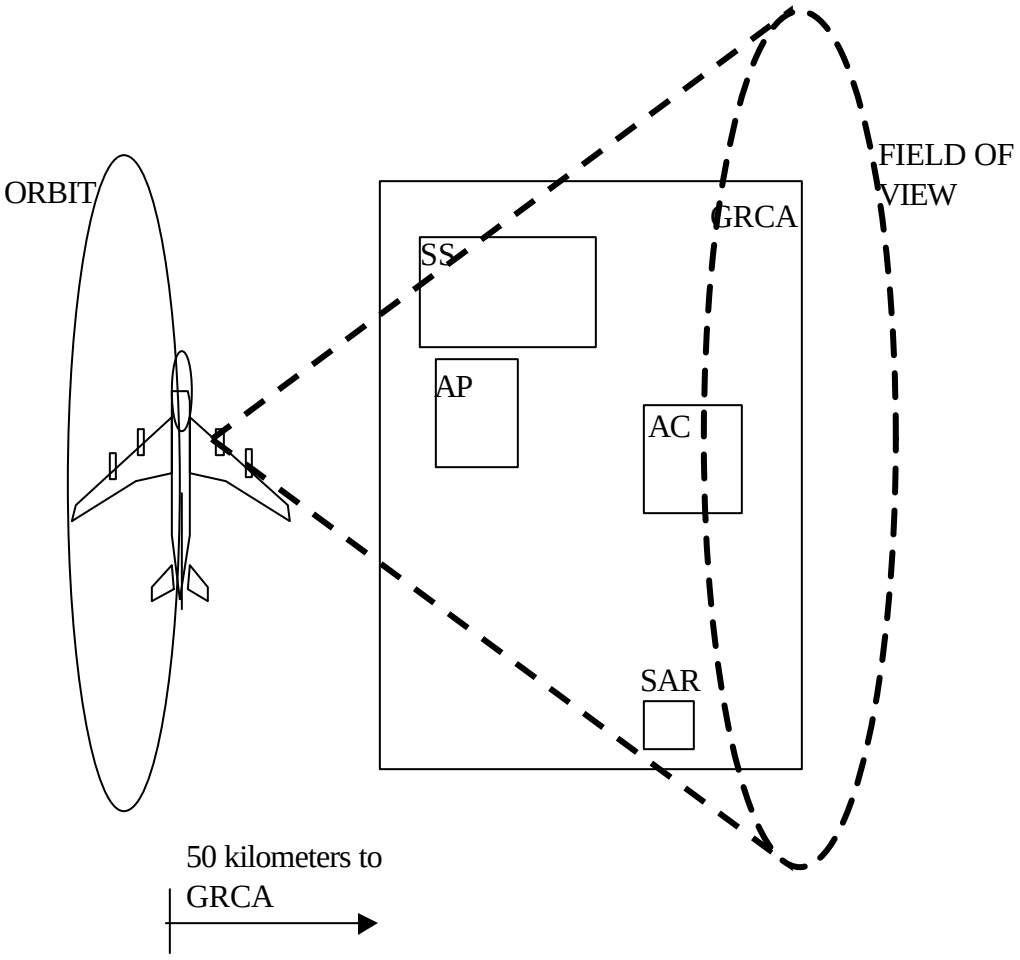

Figure 2. Radar Operations Diagram. *Source:* 93rd Air Control Wing "Command Brief" (Briefing Slide: Robins Air Force Base, Georgia, 1999).

Limitation

This research is limited by the unclassified nature of this thesis. There are certain aspects of the Joint STARS system that will not be included in this research due to the classification of the information.

Delimitation

The system capabilities and its TTPs are evolving on a daily basis. New equipment and procedures are being developed constantly in an effort to keep up with the demands placed upon the system. This research will be constrained to what is currently on the aircraft and functions as part of the system on a daily basis. Engineers are constantly developing and testing new radar technology to improve Joint STARS capabilities. Furthermore, efforts are being made to fit the aircraft with what is being called Crews 2000. Crews 2000 is an attempt to add additional workspaces for additional crewmembers to access. This would allow the crew to expand in relation to the expanding mission. These initiatives to improve the radar capabilities and to increase the number of operators onboard Joint STARS indicate that the leadership of Joint STARS has identified and is working to overcome the two biggest limitations Joint STARS currently has: radar capabilities and number of operators. This thesis will not consider Crews 2000 or any other aircraft or radar modifications as a viable working part of the daily mission configuration. Furthermore, when analyzing the contribution and utility of Joint STARS in Desert Storm, OJE and OAF, this thesis will focus only on aspects of the operation which were directly effected by Joint STARS and not on the overall operation itself. In other words, this

thesis is not to be an analysis of any of those operations, but of Joint STARS missions and its performance of those missions within the contingencies.

Significance of the Study

The significance of this study is obvious. Joint STARS is an incredibly capable system which, when used properly, can be an enormous force multiplier. However, the system resources (personnel and radar) could be getting stretched thin in an effort to "do more with less." The results of this are also obvious. Without the right focus and priorities these resources may be stretched too thin and Joint STARS may be unable to accomplish any of its assigned tasks to its full potential. The personnel and the radar have finite capabilities. The current challenge for the crewmembers is to balance these limited resources to the best of their abilities to effectively execute all of their assigned missions.

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

[2]U.S. Army, Marine Corps, Navy, and Air Force, FM 100-103-2, MCWP 3-25.2, NWP 3-56.2, and AFTTP (I) 3-2.17, *Multiservice Procedures for the Theater Air-Ground System (TAGS)* (Washington, DC: GPO**,** 9 July 1998), III-1.

[3]Ibid., III-15.

[4]Ibid., III-2.

[5]Ibid., III-13.

[6]LTG (Ret.) Ronald L. Watts, "Joint STARS: A Force XXI Enabler," *Military Review* 76, No. 6 (August 1996): 19.

CHAPTER 2

REVIEW OF LITERATURE

This chapter addresses the literature in circulation on Joint STARS. The intent of this chapter is to show the beginnings of the evolution of the Joint STARS mission and to establish an understanding of its performance during this evolution. Specifically, a review of Desert Storm and OJE will be researched in terms of: Joint STARS mission(s), the support plan for the operation, and its reported performance in that mission. Information from the following sources were reviewed: Air Force manuals, joint publications, Army field manuals, previously produced manuscripts relating to Joint STARS employment, government documents which address Joint STARS related matters, and articles from various services and sources which provide pertinent information relating to one or more of the areas of interest. For the purpose of this thesis Operation Joint Guard will not be considered separately, but as part of OJE. One thing that needs to be understood when reviewing the literature is that the performance of Joint STARS during Desert Storm versus OJE cannot be easily compared and contrasted. The difference is in the fact that one is a major theater war (MTW) while the other is operations other than war (OOTW). The OOTW are military activities during peacetime and conflict that do not necessarily involve armed clashes between two organized forces.[1] Furthermore, the two operations occurred in vastly different environments. The mission and environment for Joint STARS during Desert Storm was clearly more in line with its strengths as a system, and therefore, the vast majority of the literature clearly defines Joint STARS performance as a huge

success. Conversely, the literature on OJE is not as overwhelmingly in support of the capabilities of Joint STARS. The intent of this thesis is to go beyond the differences in the type of operation and environment Joint STARS is employed in. It is obvious that the performance can and will fluctuate based on those factors alone. Instead this thesis will concentrate on the basics of the support and performance, based on the addition of supplementary missions. This research was conducted by studying the existing data on this subject and determining what was still pertinent, but more importantly what was credible. Numerous sources have written about the capabilities of Joint STARS and its perceived success or failure during contingency employments. Many sources may have certain biases, good and bad, based on their perspective and experiences. This thesis attempts to capture all of these perspectives, and put them into context. Their input can be used to come to a final conclusion concerning the affects of supplementary missions on Joint STARS performance.

Joint STARS in Desert Storm

Background. In 1990, Joint STARS was still in the research and testing phase of development. The initial operational testing and evaluation (IOTE) was still years in the future. In fact, Joint STARS would not officially be validated as IOC until 1997. However, this did not stop Joint STARS from being removed from its development status and thrust into combat. General H. Norman Schwarzkopf, commander of the coalition forces, requested Joint STARS be rushed into service for Desert Storm after he had seen the system tested in a North Atlantic Treaty Organization (NATO) exercise.[2] This request from General Schwarzkopf for Joint STARS came on 17 December 1990. Four days later, the Joint Chiefs of Staff tasked the

services to deploy two prototype Joint STARS aircraft in less than thirty days.[3] On 11 January 1991, six years before Joint STARS was scheduled to enter service, the aircraft were taken out of the developmental test and evaluation program and deployed to Riyadh in Saudi Arabia.[4] Joint STARS flew its first mission two days after its arrival. This alone was a tremendous achievement considering Joint STARS was not even declared IOC.

Mission. The primary mission for Joint STARS was to provide wide-area surveillance of the coalitions area of operation. Specifically, its mission was ISR in the theater of operations. The intent for Joint STARS was twofold: provide near real time radar imagery data of enemy movement to the ground commanders in support of their decision-making process and provide possible targeting information for the direct attack assets so the attack assets could shape the battlefield through interdiction. Even though some of the Joint STARS information was used as targeting data for air interdiction, the specific tasking of controlling direct attack aircraft in an attack support function was not part of the Joint STARS mission.

Support Plan. During Desert Storm, Joint STARS was controlled by the Joint Force Air Component Commander (JFACC). In other words, the JFACC had the final say on mission priority and tasking authority over Joint STARS. Five interim ground station modules (IGSM) were in theater to receive the radar data provided by Joint STARS. The radar data was sent via the surveillance and control data link (SCDL) to IGSMs located at the VII Corps headquarters, XVIII Airborne Corps headquarters, Army Central Command (ARCENT) headquarters, Marine Central Command (MARCENT) headquarters, and the Tactical Air Control Center (TACC).[5] The IGSM is a modified five-ton cargo truck, staffed by a team of

Army personnel, consisting of a ground data terminal (GDT), a communications system, and an operations system. Together, these systems allow operators the ability to manipulate data received from the Joint STARS aircraft.[6] The IGSM was the primary receiver of Joint STARS data for the supported agencies. Due to the rapid deployment of Joint STARS to Desert Storm, only five IGSMs were available to support ground operations. Therefore, not everyone who desired a Joint STARS feed was able to receive it. Besides being able to just see Joint STARS data with an IGSM, the supported units with IGSMs also had the capability to requests RSRs through the SCDL. In other words, the IGSMs can request that Joint STARS orient the radar to highlight a specific area to provide accurate data on the movement within a defined area.

The support piece for Joint STARS during Desert Storm was relatively simple for a number of reasons. First of all, Joint STARS was a relatively unknown quantity and, therefore, was not initially clamored for by all the operational units. Second, there were only five IGSMs in theater that could potentially submit RSRs to be executed. But, probably most importantly, its mission was relatively straightforward--serve as an ISR platform under the direct control of the JFACC, providing the data requested. By all accounts of the literature reviewed, the support Joint STARS provided was excellent. The only dissenting reviews came from those who wanted Joint STARS data but were unable to receive it due to the shortage of IGSMs. But this is not an indictment on the ability of Joint STARS to provide outstanding support, but a reflection of the state of the Joint STARS program prior to it being declared IOC.

Performance. The environment and type of operation could not have been much better for Joint STARS to operate in. The vast desert with virtually no foliage or mountainous terrain allowed Joint STARS to operate with little or no terrain masking of its radar. In other words, there was really nowhere for the Iraqi forces to hide that the Joint STARS radar could not detect them. The literature in this area is pretty much unanimous in respect to Joint STARS unqualified success. Joint STARS provided coalition air and ground commanders with unprecedented situational awareness regarding the developing Iraqi threat.[7] This is just one of many sources that lauded Joint STARS contributions during Desert Storm. The following is a scenario that is continually referred to throughout the literature review due to its obvious portrayal of Joint STARS potential as a force multiplier. The scenario is of Joint STARS contributions during the Battle of Al Khafji. The success of this operation alone may have begun the evolution of Joint STARS into what it is today.

On the night of 29 January 1991, Joint STARS detected elements of two Iraqi heavy divisions--the 5th Mechanized and 3rd Armored--moving toward coalition positions at Al Khafji. Exploiting the unprecedented situational awareness of Joint STARS, coalition leaders quickly concentrated airpower in the form of A-10s, AC-130s, AV-8Bs, F/A-18s, and armed helicopters against the advancing Iraqi forces. Three days later more than 1,000 attack sorties had caused immense damage to two Iraqi divisions. As one Iraqi veteran noted, at Al Khafji his brigade suffered more damage in thirty minutes than it had in eight years during the Iran-Iraq War.[8]

In summary, Joint STARS performance, from all accounts, appears to have been a huge success. Joint STARS deployed on short notice, before it was considered operationally capable, flew an incredible 54 combat missions on 49 consecutive nights, logging over 542 hours in combat.[9] For the first time in the entire history of military operations, General Schwartzkopf and his commanders had the ability to take away the cover of darkness, seeing in real time the movement of both friendly and enemy forces over a wide area. This ability gave them the situational awareness that allowed them to get within the Iraqi planning cycle.[10] The unqualified success of Joint STARS in Desert Storm not only proved its enormous capabilities, but also pointed out its enormous potential. Following Joint STARS performance in Desert Storm much more would be expected and asked for of Joint STARS in the future.

Joint STARS in Operation Joint Endeavor

Background. After Desert Storm, Joint STARS went back to the development and testing phase. But it would not be long before Joint STARS services would be requested again. This time, again before Joint STARS was considered IOC, the Supreme Allied Commander Europe (SACEUR) General George A. Joulwan requested Joint STARS in support of Operation Joint Endeavor. There was some skepticism that accompanied Joint STARS deployment this time. As mentioned earlier, during Desert Storm Joint STARS was operating in a major theater war, in an environment tailor made to play to the strengths of the system. This deployment would require Joint STARS to operate in a peacekeeping role, in an environment that was clearly not favorable to the successful employment of the system. But due to the

potential the system represented and possibly some political considerations, Joint STARS deployed two aircraft in December of 1995, in support of OJE.

Mission. Joint STARS overarching mission was to help with the enforcement of the Dayton Peace Accord's directives. Again, like in Desert Storm, its primary mission was ISR in the theater of operations. Specifically, General Joulwan's vision was that Joint STARS, in conjunction with cross cued collectors, most notably the Airborne Reconnaissance Low system, would serve as his tools to monitor the zone of separation, allowing him to gauge and enforce compliance with the accord.[11] General Joulwan's intent, with the support of Joint STARS imagery, was to be able to clearly identify violations of the Dayton Peace Accord and provide evidence of those violations to the governing authority and the Bosnian leadership.

Support Plan. During OJE, the Combined Air Operations Center (CAOC) was responsible for the tasking of Joint STARS. Therefore, again like in Desert Storm, the JFACC had the final say on mission priority and tasking authority over Joint STARS. The GSM distribution was as follows: three Medium Ground Station Modules (MGSM) in Italy in support of the Combined Joint Special Operation Task Force, GSM Task Force Headquarters, and the CAOC; five MGSMs in Bosnia-Herzegovina in support of the headquarters of the allied units in theater; two MGSMs in Hungary in support of United States Army Europe Forward, and the aviation element; two in Germany at Rhein Main Air Force Base co-located with Joint STARS forward operating base.[12] The MGSM was an updated version of the IGSM, which was fielded during Desert Storm.

Performance. The performance of Joint STARS during OJE, unlike during Desert Storm, is debatable. The environment and the type of operation were clearly not in line with the strengths of the system like they were during Desert Storm. The mountainous terrain severely hindered the ability of Joint STARS to provide continuous surveillance due to the terrain masking of the radar. Terrain masking, or "radar shadowing" occurs when the elevation of the mountains impedes the radar's view of the movement on the ground. Therefore, in "radar shadowing" conditions, vehicles can move undetected and SARs will not come out in the effected areas. Furthermore, the asymmetric battlefield in which Joint STARS was operating in made it extremely difficult to differentiate friendly and neutral vehicular traffic from that of enemy movement. Those two factors are frequently addressed and most people agree that Joint STARS was degraded due to their effect.

However, what is not as readily addressed, and what this thesis will focus on, was the effects of supplementary missions on Joint STARS primary mission. The addition of supplementary missions and competing priorities appears to be a subtler problem that developed during OJE. From the literature review it is clear that the ISR mission for the LCC was not the one and only mission ongoing, and may not have the been the primary mission in the eyes of the ultimate tasking authority, the CAOC. These competing priorities may have led to perceived failures of the system, which may actually have been due to the lack of prioritization and focus on what was or should have been the primary mission. One such competing mission was the requirement of the Air Force Operational Test and Evaluation Center (AFOTEC) and the U.S. Army Operational Test and Evaluation Command (OPTEC) to conduct an operational

evaluation of the system which was conducted during Operation Joint Endeavor.[13] The need to meet the requirements of the testing by AFOTEC and OPTEC may have, at times, conflicted with the support requested and required by other agencies. Another competing interest revolved around the pending decision by NATO on its selection of a ground surveillance system. The Italians and British have the CRESO and ASTOR, respectively, which were comparable systems competing with Joint STARS for the selection. Therefore, tactical considerations potentially conflicted with national-level military and economic agendas.[14] Obviously, both the testing and the ground surveillance system selection have enormous political and budgetary ramifications. It is easy to see how the needs of the LCC or the ACC could be neglected in favor of these political and budgetary considerations. The other competing requirement, however, is at least a viable mission for Joint STARS. As stated earlier, Joint STARS demonstrated enormous potential during Desert Storm. Operation Joint Endeavor gave the system the opportunity to exercise some of the initiatives that the developers and the leadership felt could and should be part of Joint STARS standard operating procedures. Specifically, Joint STARS began training extensively with the other airborne assets on the attack support mission. The deployment gave them an extraordinary opportunity to work on TTPs for the control of direct attack aircraft in an attack support role. This opportunity and training would prove invaluable in transitioning Joint STARS into a fully capable command and control platform. Unlike for Desert Storm, there were not an abundance of success stories for Joint STARS during OJE. However, a fairly common understanding of Joint STARS contribution to OJE was its ability to provide SARs to General Joulwan and his staff who apparently identified

Bosnian violations of the Dayton Peace Accord. The U.S. Air Force Secretary, Sheila Widnall's statement is a testament to this contribution, "the NATO commanders enforcing the separation have taken to slapping those pictures (SARs) down in front of the Serbs saying, see you can't do anything we don't know about."[15] Since that was at least part of General Joulwan's vision and intent for Joint STARS it is clear that Joint STARS was successful in some respects.

With this evolution in training and capabilities, the Air Force was beginning to actualize its needs established in the original operational requirements document, which all along called for Joint STARS to perform attack support and/or command and control functions. So, at the conclusion of OJE, Joint STARS was no longer a single-mission focused platform, but a multi-mission capable one. As occurred in OJE and could be foreseen in the future, the requirements of the Air Force and the Army would need to be more clearly deconflicted to ensure both services were receiving the support they required. But budgetary considerations and the requirement to do more with less will continue to expand and evolve the role and missions of Joint STARS. But the question still remains--does the addition of supplementary missions diminish the performance of Joint STARS?

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[1]US Army, FM 100-5, *Operations* (Washington, DC: Department of the Army, June 1993), Glossary-6.

[2]Grumman Corps, "Shooting Star," *Economist*, 25 May 1991, 77.

[3]"Why NATO Needs Joint STARS," *NATOs Sixteen Nations*, 1994, 19.

[4]Eric H. Biass and Roy Braybrook, "Northrup Grumman Joint STARS," *Armada Internationa*l, October-November 1997, 52.

[5]COL Douglas M. Carlson, USAF., "Joint STARS. Success in the Desert. What Next?" (Air War College, Air University, 1992), 3.

[6]Department of the Army, FM 34-25-1, *Joint Surveillance Target Attack Radar System (Joint STARS*) (Washington, DC: Department of the Army, 3 October 1995), 2-10.

[7]LtCol. Price T. Bingham, USAF, "Forward…From the Sea with Joint STARS," *Marine Corps Gazette*, January 1996, 29.

[8]LtCol Price T. Bingham, USAF, "Revolutionizing Warfare Through Interdiction" *Airpower Journal* 10, no. 1 (spring 1996): 33.

[9]David Hughes, "Joint STARS Officials Provide Data for Missile Defense Plan Analysis," *Aviation Week & Space Technology*, 27 April 1992, 70.

[10]"Why NATO Needs Joint STARS," *NATOs Sixteen Nations*, 1994, 20.

[11]LTC Collin A. Agee, USA, "Joint STARS in Bosnia: Too much data too little Intel?" *Military Intelligence Professional Bulletin*, October-December 1996,7.

[12]MAJ Harry V. Phillips, USA, "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" (Master of Military Art and Science Thesis, U.S. Army Command and General Staff College, 1998), 95-96.

[13]FAS, Intelligence Resource Program, "Joint Surveillance Target Attack Radar System" [report on-line]; available from http://www.fas.org/irp/program/collect/jstars/ htm; Internet, 3.

[14]Agee, 8.

[15]Biass and Braybrook, 53.

CHAPTER 3

RESEARCH METHODOLOGY

Within this chapter an examination of how the requirements of a mission relate to the limitations of Joint STARS will be examined. This should explain how support could diminish with the addition of supplementary missions. The basis of working through this methodology will take the shape of a matrix. The ratings associated with the matrix were derived from a survey conducted on current Army and Air Force crewmembers of the 93rd Air Control Wing (Joint STARS) from Robins Air Force Base, Georgia. Forty-percent (50 out of 125) of the surveys sent out were returned. Respondents differed in their duty positions on the aircraft and their ranks varied from E-4 to 0-5. The survey is attached as an appendix to this thesis. Given the survey scenario, the crewmembers were asked to analyze missions against the systems limitations in terms of: personnel required to support the missions, radar time line required to support the missions, and the level of focus associated with the missions (focus is looked at in terms of a crewmembers ability to support a second mission while executing one). The questions in the survey were rated against a Likert type scale (1 equaling strongly disagree and 5 equaling strongly agree). The answers from each question were individually summed up and the totals of like questions were compared. This comparison is the basis for the ratings assigned in the matrix. Statistical analysis was also conducted on the survey results. Statistically significant differences were identified and are depicted at the end of this chapter. The survey scenario provided to the crewmembers is the following:

Situation: Kosovo type scenario; air campaign ongoing; Milosevic refuses to pull Serbian ground forces out of Kosovo; NATO has decided to use ground forces to forcibly defeat and drive Serbian forces out of Kosovo.

Joint STARS Mission(s): The joint forces commander (JFC) has directed that Joint STARS support Kosovo engagement zone (KEZ) attack support operations which will continue throughout the ground offensive. He also directs you to support the ground forces as they execute their attack (three common ground stations are supporting the ground forces) and that you perform a limited ABCCC function. No clear priority between missions has been established by the JFC.

Current situation: The crew must begin mission planning for the next days mission which will require that the crew execute all of these missions simultaneously to the best of their ability.

The matrix in table 1 was developed from the survey responses.

Table 1. Mission versus Limitation Matrix

Mission / Limitation	ISR	Attack Support	Limited ABCCC
Personnel	Medium	Medium	High
Radar Time line	High	Medium	Low
Level Of Focus	Low	Medium	High

Based on the survey feedback and from my experience serving as a Joint STARS crewmember, the rest of this chapter will be spent clarifying how the crewmembers came to their conclusions. First, how the crew would go about mission planning this operation will be discussed. Then, each mission will be looked at in terms of the limitations associated with it.

Mission Planning

Upon receipt of the mission, the entire crew would gather for an initial mission-planning brief. The purpose for this initial brief is to provide an overview of the mission for the entire crew so everyone is clear about what the overall taskings are and what the timing for the mission will be. Once this brief is complete, the crew will break down into their functional groups to begin the detailed mission planning process. For the sake of brevity, the specific mission planning functions of the flight deck (pilots, navigators, and engineers) and the technicians (radar and communications) will not be addressed. Suffice to say, without these specialty positions the mission would not have a chance for success. They are an integral part and work closely with the rest of the crew throughout the mission planning process. The focus will be on the "operators" who specifically manipulate the system resources while executing the mission. After the initial brief, the operations, Army and intelligence sections will gather to create an in-depth plan for the execution of the mission. The senior director (SD) is in charge of the operations section. He controls the majority of the operators and takes the lead in developing and synchronizing the various sections. The key is to ensure that all tasking requirements are being met and each section is cooperating, coordinating and assisting each of the other sections. The SD will base the plan on mission priorities. Normally, priorities are set by the controlling or

tasking agency in theater. It is critical that a tasking chain of command is not only established, but also adhered to. For example, during Operation Allied Force, Joint STARS taskings came from the Combined Air Operations Center (CAOC). However, in many instances, detailed prioritization is not included in the mission taskings and it is left up to the crew to prioritize the taskings and allocate resources (i.e. personnel and radar time line) to meet all the requirements based on their understanding of priorities. Once priorities are established and crewmembers are assigned specific functions, in accordance with the Joint STARS tasking, the operators begin their individual preparation and coordination for mission execution. Two other meetings, the coordination and operations specialized, will be held as the mission planning progresses to ensure the entire crew is synchronized and that all taskings are supportable and assigned to an individual or section. The importance of mission planning cannot be overemphasized. In most cases, success or failure of a mission is determined by the time and effort expended during mission planning.

Intelligence, Surveillance, and Reconnaissance

General: ISR is generally associated with support to the LCC. As stated earlier, the typical type of support required by the LCC is wide-area surveillance of a corps or smaller area of operation. In the case of Desert Storm, the LCC was mainly interested in Joint STARS ability to identify major force movements in the deep fight. Ideally, Joint STARS would identify and report these large force movements out to 250 kilometers from friendly forces. The early identification of major enemy force movements in the deep area not only assists the LCC in confirming or denying an enemy course action, but also allows time for the LCC to maneuver

and counter the enemy actions. In the case of OJE, where the battlefield was not a linear one like during Desert Storm the LCC still wanted wide-area surveillance, but with a different focus. The surveillance was directed more at identifying violations of the Dayton Peace Accords and attempting to conduct analysis of the traffic patterns throughout the area of operation.[1] In the situation presented by the survey scenario, Joint STARS is supporting the LCCs surveillance requirements through the three CGSs that are in theater supporting the maneuver units.

Personnel: The matrix rates the ISR mission as "medium" in terms of personnel. The attack support mission was also rated medium based on the relative closeness of the survey responses between ISR and Attack Support. The lead crewmembers on ISR missions are the DMCC and the ATSSs. These personnel are the onboard Army representatives and will normally conduct the majority of the coordination with the ground forces during mission planning. Some of the key issues the Army representatives will bring to mission planning include: Army task organization, operations orders, LCC priority intelligence requirements (PIR) and named areas of interest (NAI), requested surveillance area and radar revisit rate, and all the supported CGS information.[2] Since ISR is not the only mission the crew has to execute in the survey scenario provided, the crew will have to clearly define the role each crewmember will serve in support of the mission taskings. At a minimum, the following personnel would have to be involved in accomplishing the ISR mission: the MCC, the DMCC, both ATSSs, the SD, the SMO, the SDT, and an AOT. The MCC and the DMCC would oversee the mission, with the DMCC taking the lead. The ATSSs would be responsible for the data link and communications with the CGSs, ensuring their requests were being serviced, and assisting with

the surveillance tasks. The SD would maintain situational awareness on the tasking requirements and review reports being sent offboard. The SMO would support the ISR operations by managing the RSRs in accordance with the priorities established during mission planning. The SDT would manage the tracking and surveillance requirements. The AOT would conduct the tracking requirements and develop surveillance reports.[3] Ideally, more crewmembers would be dedicated to the ISR mission, but the bare minimum would be the crewmembers listed above. As you will see, this will not be the only mission these crewmembers will support given the three-mission requirement in the survey scenario.

Radar Time Line: The matrix rates the ISR mission as "high" in terms of radar time line required. The radar requirements for an ISR mission are normally driven by a request from the LCC. The standard request from an LCC is for continuous wide area surveillance with a radar revisit rate of sixty seconds. Most supported ground units will be willing to shrink their requested search area to ensure that their unit gets a 60-second revisit rate. Remember, when the LCC wants a 60-second revisit rate it means he wants the radar to do a complete scan of the area he requested every sixty seconds. This will provide him with an updated radar picture of the MTI in his area every sixty seconds. With that update rate, the LCC should have a reliable picture of what is moving in his area of responsibility and allow him to make informed decisions on force employment. Along with the wide-area surveillance, the CGSs may also request higher priority RSR and SARS to highlight specific areas of interest. These RSRs are normally shorter in duration and provide a more timely and detailed look at the requested area. These RSRs will compete for radar time with other requests, but alone will not jeopardize the

ability to satisfy the LCCs initial request for wide-area surveillance with an update rate of every sixty seconds. However, these higher priority RSR and SAR requests take a toll on the radar's limited capabilities. Those additional RSRs, in conjunction with the standing wide-area surveillance request, are why the ISR mission is seen as requiring the most radar time line.

Level of Focus: The matrix rates the ISR mission as "low" in terms of focus. The survey results show that the ISR mission requires only slightly less focus than the attack support mission, but much less than the limited ABCCC mission. Again, focus is looked at in terms of the crew's ability to do another mission while conducting the ISR mission. So the survey results are saying that the crewmembers feels that Joint STARS can execute the ISR mission and also support a secondary mission at the same time. The nature of ISR is unlike that of attack support or limited ABCCC. Even though the data provided by Joint STARS to the LCC in an ISR mission can be utilized for targeting, the crewmembers are not directly controlling any ground unit to execute fires against a target. Therefore, the time criticality may not be as great for the crewmember conducting an ISR mission as it is for the crewmember conducting attack support or the limited ABCCC mission. Furthermore, a temporary diversion or loss of situational awareness by a crewmember conducting ISR does not carry the same consequences as a crewmember conducting the limited ABCCC mission. The lesser time criticality and lower consequences of a loss of focus while conducting ISR versus the other missions explains why it is considered low in the level of focus required.

Attack Support

General: Attack support operations are generally associated with support to the ACC. As stated earlier, attack support operations were not conducted during Desert Storm. Joint STARS data was utilized for targeting, but Joint STARS did not direct attack aircraft onto targets. Attack support operations were not conducting during OJE either. Attack support training was conducted during OJE, but Joint STARS never directed aircraft that dropped munitions on enemy forces. Operation Allied Force (OAF) was the first time Joint STARS crewmembers conducted attack support operations against an enemy force. The conduct of Joint STARS during OAF will be addressed in chapter 4. But generally speaking, when the ACC develops the air-tasking order (ATO), direct attack aircraft will be tasked to conduct attack support operations on ground targets within a prescribed area of responsibility. Joint STARS may be given the authority to control those aircraft during an air interdiction mission. Joint STARS function in this capacity is to identify potential targets and direct attack assets onto those targets for possible prosecution in accordance with the rules of engagement and at the attack aircraft's discretion.

Personnel: The matrix rates the attack support mission as "medium" in terms of personnel. The lead crewmembers on attack support missions are the SD and the WDs. These personnel will conduct the majority of the coordination during mission planning with the direct attack aircraft assigned missions in the ATO. Some of the key information the SD will bring to mission planning include: attack aircraft fragged in the ATO that Joint STARS will control, their capabilities, payload, flight timing, call signs and frequencies.[4] Again, since attack support is not

the only mission the crew has to execute in the survey scenario provided, the crew will have to clearly define the role each crewmember will serve in support of the mission taskings. At a minimum, the following personnel would have to be involved in accomplishing the attack support mission: the MCC, the DMCC, the SD, both WDs, the SMO, and both AOTs. The MCC would oversee the mission. The DMCC would provide updates on the friendly ground force situation and on potential targets through Army sources. The SD would take the lead on developing the plan and serve as the final authority during attack support operations. The WDs would take the lead on the coordination with the direct attack assets during mission planning and be responsible for identifying potential targets and for directing the attack aircraft onto the targets. The SMO would support the attack support operations by managing the radar service requests in accordance with the priorities established during mission planning. The AOTs would conduct tracking in support of the development of potential targets for the WDs to pass to the attack aircraft.[5] As can be seen, some of these crewmembers were already tasked to support the ISR mission. Multitasking will be a requirement for all crewmembers given the multi-mission scenario.

Radar Time Line: The matrix rates the attack support mission as "medium" in terms of radar time line required. The radar requirements for an attack support mission are normally not specified by the ACC. Radar service requests in support of attack support operations are submitted by operators, as required, to accurately identify and track potential targets. The standard RSR utilized by crewmembers to identify and track potential targets are attack control (AC) areas. As stated earlier, these areas are smaller in dimension (usually around 10 by 10

kilometers) than a WAS RSR, but are a higher priority and provide for a quicker revisit rate (usually around 15 seconds). The quicker revisit rate is necessary to provide the most accurate radar picture of potential targets. The accuracy of tracking these potential targets is crucial when trying to direct attack aircraft onto the potential targets for prosecution. Normally, ACs are limited in their duration to the minimum time required to prosecute a target and then it is deleted from the radar's list of tasks. Also utilized by the operators during attack support operations are SARs. The SARs allow the operator to have a radar image of the ground and facilitate the process of directing an attack asset onto stationary targets. Again, the RSRs requested to support the attack support mission will compete with the RSRs required to complete the ISR mission. This competition for radar time line can present conflicts when trying to satisfy all the tasking requirements simultaneously. It is critical for the crew to clearly prioritize RSRs and for the SMO to strictly adhere to the tasking priorities and the radar time line requirements.

Level of Focus: The matrix rates the attack support mission as "medium" in terms of focus. The survey results show that attack support requires slightly more focus than the ISR, but much less than the limited ABCCC mission. The survey results are saying that the crewmembers feel that Joint STARS can execute the attack support mission and also support a secondary mission at the same time. The SD and WDs who are controlling the direct attack aircraft onto targets must maintain continuous situational awareness on where the direct attack assets are, what type munitions the attack assets are carrying, where the potential target is, and what the air defense threat in the area is. If the SD or the WD lose situational awareness on any

of these issues they can easily create the opportunity for mistakes or accidents. The time criticality and requirement of continuous situational awareness while conducting attack support explains why it is considered medium in the level of focus required.

Limited Airborne Battlefield Command and Control Center

General: Limited ABCCC operations are generally associated with support to the LCC and ACC. Limited ABCCC operations were not conducted by Joint STARS during Desert Storm or OJE. Operation Allied Force (OAF) was the first time Joint STARS crewmembers conducted limited ABCCC operations in a hostile environment. In fact, Joint STARS had not even conducted training on the limited ABCCC mission at home station prior to executing it during OAF. Chapter 4 will address in more detail the limited ABCCC mission Joint STARS conducted during OAF. For now, a brief differentiation will be made between the limited ABCCC mission that Joint STARS was called upon to execute in OAF and the limited ABCCC mission Joint STARS is currently developing concept of operations (CONOPS) and TTP for. During OAF, Joint STARS performed a truly limited ABCCC mission by simply checking attack aircraft in on a designated frequency as the attack aircraft entered the area of operations, assigning an orbit altitude, and then passing them off to an airborne forward air controller (AFAC). The limited ABCCC mission that is being developed as the future Joint STARS mission is much more difficult and involved. The limited ABCCC mission envisioned for Joint STARS takes on many more of the standard ABCCC functions. The most taxing of these functions on the Joint STARS crew would be to act as an airborne air support operations center (ASOC) with the inclusion of the close air support (CAS) mission. The ASOC plans,

coordinates, and directs aerospace support for land forces, normally at corps level and below. It is responsible for the integration of aerospace operations within its assigned corps sector to include CAS, AI, theater airlift, ISR and UAVs, suppression of enemy air defense (SEAD), and combat search and rescue (CSAR).[6] Due to the limitations Joint STARS has in personnel and communications equipment, which would prevent them from executing the entire ABCCC mission, the 93rd ACW is developing CONOPS and TTP for specific functions within the ABCCC mission. Therefore, this initiative is still referred to as a limited ABCCC mission. What functions Joint STARS will ultimately take on in a limited ABCCC role is to be determined. The 93rd ACW is currently utilizing the National Training Center and other training exercises to determine what Joint STARS can and cannot feasibly do in this role. At a minimum, Joint STARS appears to be planning to execute the fighter flow management role, as well as, the CAS role. The survey responses were based on the latter of the two limited ABCCC missions discussed. Therefore, the following observations are based on the proposed limited ABCCC mission for Joint STARS.

Personnel: The matrix rates the limited ABCCC mission as "high" in terms of personnel. As stated earlier, the exact function(s) Joint STARS will assume during a limited ABCCC mission are unclear at this time. However, based on the training the crewmembers have undergone for the limited ABCCC mission, the crewmembers feel it will be highly personnel intensive. Since the 93rd ACW is still working on TTPs, there is relatively little data being released on how the crew will organize for this mission. Therefore, educated assumptions will be made based on the limited information received and from my experience with Joint STARS.

Assuming the 93rd ACW takes on the fighter flow management and the CAS role, Joint STARS would most likely require the following personnel to accomplishing the limited ABCCC mission: the MCC, the DMCC, the SD, both WDs, the AIO, the SDT, an ATSS and both AOTs. Exact functions for each crewmember cannot be determined at this time. However, this mission can be looked at in terms of an extremely complicated attack support (AI) mission. The complications arise due to the close proximity of friendly forces to the enemy ground forces targeted for prosecution. Many of the functions these crewmembers executed during the attack support mission will be similar to those conducted during the limited ABCCC mission. The exception is with the DMCC and the ATSS who would be an integral part in the coordination with the friendly forces. Constant communications and situation updates on friendly force dispositions would be vital to ensuring fratricide was avoided. Furthermore, the added function of fighter flow management would effectively take at least one crewmember away from all taskings so that crewmember could concentrate on that one function. But again, remember in accordance with the scenario, most of the crewmembers just listed are also tasked with supporting the ISR and attack support mission. So at this point, all of the crewmembers are supporting at least two missions and some are being required to support all three.

Radar Time Line: The matrix rates the limited ABCCC mission as "low" in terms of radar time line required. This is no surprise based on the fact that the current ABCCC platform does not even have an air to ground radar. Therefore, there is no real requirement for the limited ABCCC mission to utilize the radar. However, since Joint STARS does have an air to ground radar, RSRs would most likely be used in support of the CAS role to gain situational

awareness on the ground activity. But the extent of the RSRs requested would not place a very large burden on the radar's capabilities. That is why the survey results show the limited ABCCC mission as low in terms of radar time line required.

Level of Focus: The matrix rates the limited ABCCC mission as "high" in terms of focus. It was pretty clear from the survey results that the crewmembers did not feel Joint STARS would be able to easily support another mission while conducting the limited ABCCC mission. The high levels of focus, concentration, and situational awareness required to effectively execute the limited ABCCC mission is due to the constant requirement of complete synchronization of not only all the crewmembers aboard, but also with the attack aircraft Joint STARS is directing and the ground forces they are supporting.

Summary

The intent of this chapter was to analyze the missions Joint STARS is being asked to execute simultaneously in terms of the limitations of the system. The tool by which the missions and limitations were analyzed was a survey of current Joint STARS crewmembers. The survey results were the basis for the production of the mission and limitations matrix. With the matrix the missions were rated, relative to each other, against the limitations of the system. Based on the responses from the survey and the associated matrix developed, it appears reasonable to assume that it is feasible that Joint STARS performance could diminish with the addition of supplementary missions. Considering this reasonable assumption that Joint STARS performance could diminish with the addition of supplementary missions, chapter 4 will analyze OAF in an attempt to determine if, in fact, Joint STARS performance has diminished due to the

addition of supplementary missions. But before moving on to chapter 4, more specific details concerning the survey results will be addressed.

Survey: Statistically Significant Results

As stated earlier, the answers from each question were individually summed up and the totals of like questions were compared. This comparison was the basis for the ratings assigned in the matrix. However, within the survey data, the statistical analysis revealed some interesting results. As might be expected, there are some significant differences in the way the Army and the Air Force view this system and its capabilities. These differences in opinion were identified through an analysis of the survey data. The following are the statistically significant differences identified through statistical analysis of the survey data.

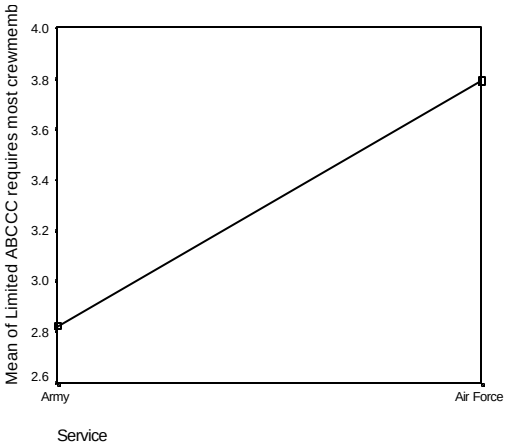
The charts in table 2 and figure 3 show that there is a statistically significant difference in the way the Army and the Air Force view Joint STARS requirements in terms of crewmembers while conducting the limited ABCCC mission versus the ISR mission. As depicted by the charts, the Army believes the ISR mission requires the most crewmembers to accomplish. The Air Force, on the other hand, believes that the limited ABCCC mission requires the most crewmembers to accomplish. It appears that the difference between the Army and Air Force responses comes from the fact that the Army is unfamiliar with what the limited ABCCC mission will require in terms of personnel. Joint STARS has only just begun the training for the limited ABCCC mission so no one is exactly clear on what it will take to accomplish from a personnel standpoint. In all probability though the transition to the limited ABCCC mission would be more difficult for the Army personnel who generally do not have an ABCCC background to fall

back on like some of the Air Force personnel. This being the case, the Army respondents answered this set of questions predictably by falling back on what they are most familiar with and what they believe should be the crews primary mission and, therefore, receive the most crewmembers support--ISR. On the other hand, the Air Force respondents relied more on their experience with the ABCCC mission and predictably answered this set of questions based on their greater understanding of the ABCCC mission.

Table 2. Statistical Data--Crewmember Requirements

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Q1 Limited ABCCC requires most crewmembers	Between Groups	10.434	1	10.434	10.020	.003
	Within Groups	49.986	48	1.041		
	Total	60.420	49			
Q2 ISR requires most crewmembers	Between Groups	18.481	1	18.481	15.423	.000
	Within Groups	57.519	48	1.198		
	Total	76.000	49			
Q3 Attack Support requires most crewmembers	Between Groups	3.145	1	3.145	2.890	.096
	Within Groups	52.235	48	1.088		
	Total	55.380	49			



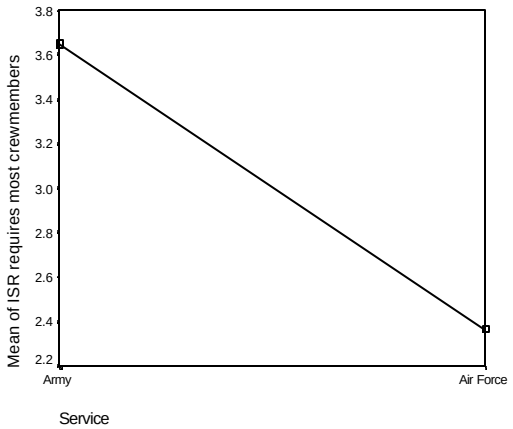


Figure 3. Statistical Data--Crewmember Requirements

The charts in table 3 and figure 4 show that there is a statistically significant difference in the way the Army and the Air Force view Joint STARS requirements in terms of radar time line required to support the ISR versus the attack support mission. As depicted by the charts, the Army believes the ISR mission requires the most radar time line. The Air Force, on the other hand, believes that the attack support mission requires the most radar time line. The difference between the Army and Air Force responses may simply be a function of the mission they are most familiar with and more closely support. In other words, the Army respondents relied on their experience supporting the LCC when answering this set of questions. In doing that, the Army respondents focused on all the radar requirements the LCC requests to support his mission and determined that all the LCCs requests must be taking the majority of the radar time line. Furthermore, again, the Army answered this set of questions predictably by falling back on what it believes should be the crews primary mission and, therefore, receive the most radar time line--ISR. On the other hand, the Air Force respondents relied on their experience supporting the attack support mission and predictably answered this set of questions based on their knowledge and greater understanding of it. In doing that, the Air Force respondents focused on all the radar requirements the ACC requests to support his mission and determined that all the ACCs requests must be taking the majority of the radar time line.

Table 3. Statistical Data--Radar Requirements

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Q4 Limited ABCCC requires most radar timeline	Between Groups	3.209E-02	1	3.209E-02	.059	.809
	Within Groups	25.968	48	.541		
	Total	26.000	49			
Q5 ISR requires most radar timeline	Between Groups	5.284	1	5.284	5.869	.019
	Within Groups	43.216	48	.900		
	Total	48.500	49			
Q6 Attack Support requires most radar timeline	Between Groups	5.312	1	5.312	4.602	.037
	Within Groups	55.408	48	1.154		
	Total	60.720	49			

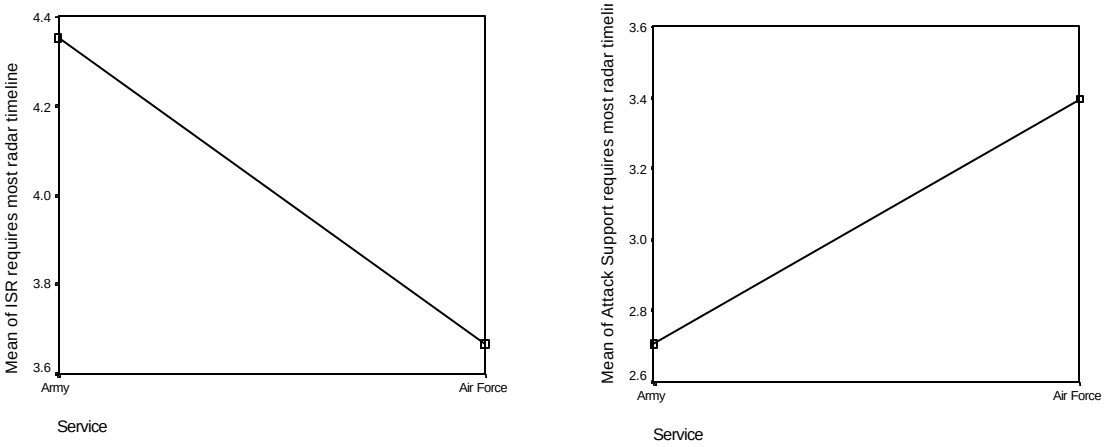


Figure 4. Statistical Data--Radar Requirements

The charts in table 4 and figure 5 show that there is a statistically significant difference in the way the Army and the Air Force view Joint STARS ability to conduct the ISR mission and easily support another mission at the same time. As depicted by the charts, the Army believes Joint STARS cannot easily support another mission while conducting the ISR mission. The Air Force, on the other hand, believes that Joint STARS can easily support another mission while conducting the ISR mission. This difference is in keeping with the way the Army has responded to the other questions. It shows an ISR centric thinking of the Joint STARS mission. In other

words, the Army respondents again relied on their experience supporting the LCC when answering this set of questions. In doing that, the Army respondents focused on all the tasks and requirements for supporting the LCC and determined that Joint STARS would be unable to easily support another mission if they were to adequately focus on support to the LCC. On the other hand, the Air Force respondents answered this set of questions with the mind-set that the ISR mission will be a part of every Joint STARS mission tasking. Therefore, the Air Force respondents appear to be more comfortable expanding Joint STARS missions to include those beyond ISR with the belief that Joint STARS can easily support ISR and another mission.

Table 4. Statistical Data--ISR Requirements

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Q7 Primary ABCCC - easy to support other missons	Between Groups	.566	1	.566	.426	.517
	Within Groups	63.754	48	1.328		
	Total	64.320	49			
Q8 Primary ISR - easy to support other missions	Between Groups	10.396	1	10.396	7.381	.009
	Within Groups	67.604	48	1.408		
	Total	78.000	49			
Q9 Primary Attack Support - easy to support other missions	Between Groups	7.219E-02	1	7.219E-02	.045	.832
	Within Groups	76.428	48	1.592		
	Total	76.500	49			

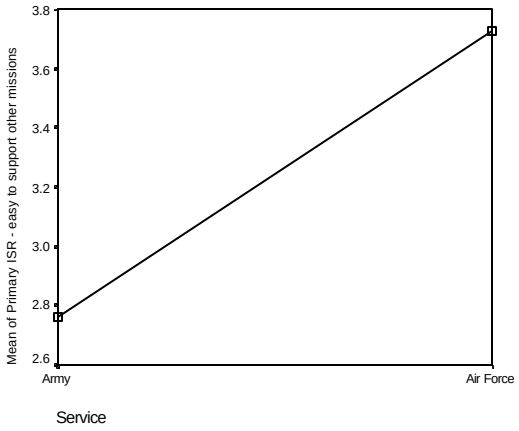


Figure 5. Statistical Data--ISR Requirements

Summary of the Statistical Differences

It is no real surprise that the survey results would conclude that there are some statistically significant differences in the way the Army and Air Force view the Joint STARS system and its application. The three examples above are just the most significant of the differences identified through analysis of the survey data. The fact that the Army has an ISR centric view of the system is understandable. It is also understandable that the Air Force would have a perspective on Joint STARS that would more readily include other missions. Specifically, the natural inclusion of the attack support mission that was part of the Air Force's initial vision when developing the Joint STARS system. Although there are some significant differences in the way the Army and the Air Force view Joint STARS, chapter 4 will show that there is at least one thing that they completely agree upon.

[1]CPT Kristin M. Baker, USA, "Operation Joint Endeavor: Joint STARS in the Balkans," *Military Intelligence Professional Bulletin* 22, no. 4 (October-December 1996,):29.

[2]U.S. Air Force, *Standard Operating Procedures for JSTARS, 93rd Operations Group* (Robins Air Force Base, GA: U.S. Air Force, 15 March 2000), 21.

[3]Ibid., 35.

[4]Ibid., 23.

[5]Ibid., 29.

[6]U.S. Army, Marine Corps, Navy, and Air Force, FM 100-103-2, MCWP 3-25.2, NWP 3-56.2, and AFTTP (I) 3-2.17, *Multiservice Procedures for the Theater Air-Ground System (TAGS)* (Washington, DC: GPO, 9 July 1998), III-15.

CHAPTER 4

ANALYSIS

The intent of this chapter is to conduct an in-depth analysis of Joint STARS mission and performance in Kosovo during Operation Allied Force (OAF). The matrix developed in chapter 3 and the survey results will be utilized to develop performance matrices for Joint STARS during OAF. The matrices are intended to show if the quality of performance Joint STARS provided diminished with the addition of supplementary missions. The support and performance ratings are somewhat subjective, but are based on the analysis of the literature review, take into account the matrix developed in the methodology chapter and include objective data collected from the survey. I will also provide my insight from a crewmember's perspective. I served as a DMCC aboard Joint STARS during OAF. My experience also includes serving as an instructor and evaluator for the DMCC position for over two years in the Training Squadron of the 93rd Air Control Wing.

This chapter will begin with a brief background and chronology of events that led to OAF. Then this chapter will describe Joint STARS status at the initiation of the crisis and its deployment into theater. Then this chapter will conduct an analysis of Joint STARS performance during three distinct phases of the operation. The evaluation of Joint STARS performance will be depicted by the performance matrices described above. And finally, more statistically significant data that was collected from the survey of current Joint STARS crewmembers of the 93rd Air Control Wing will be addressed.

Kosovo Crisis

Conflict in the Balkans is nothing new. Wars have been fought in this region for centuries. In fact, the spark that lit the powder keg in Europe that led to World War I occurred in Sarajevo when a fanatical young man named Gavrilo Princip shot and killed Archduke Francis Ferdinand of Austria on 28 June 1941. The fact the this region is so unstable and has the potential to ignite world wars makes it of vital interest to the United States and its European Allies. It was this vital interest that led the United States to intervene in Bosnia for Operation Joint Endeavor and would ultimately lead to intervention again for OAF.

The genesis of the Kosovo crisis that eventually led to OAF began in 1989. It was at this time that Serbian President Slobodan Milosevic abolished the province of Kosovo's autonomous status. Legislation was passed that effectively denied Kosovo-Albanians the rights to own land or even to work. Tens of thousands of ethnic Albanians in Kosovo lost their jobs under the Serbian oppression. In response, the ethnic Albanian legislature in Kosovo declared itself a republic.[1]

In 1992 the Republic of Kosovo elects Ibrahim Rugova president of the self-defined republic in defiance of the Serbian authorities and began a campaign of nonviolent resistance to the oppressive rule from Belgrade. Sanctions on the former Republic of Yugoslavia (FRY) from the international community for their atrocities against their former republic aided the Kosovar-Albanian's plight. The problems in Kosovo gained even more attention during the Bosnian Peace Talks in 1995, when the atrocities became an issue that, "must be resolved" before the sanctions against FRY could be lifted.[2]

In 1996 the Kosovar-Albanians respond to the oppression by the Serbs with attacks of their own by retaliating against the Serbian police and state officials through the Kosovo Liberation Army (KLA).[3] No longer could the Serbian officials ignore the "mutinous" actions of the KLA against them. From 1996 to 1998, the fighting and destruction intensified. The actions and reactions by both sides escalated until the international community could no longer stand by. In March of 1998, the United Nation's Security Council adopted Resolution 1160. It condemned the excessive use of force by Serbian police against civilians in Kosovo and established an embargo on arms and materials against FRY.[4]

In September of 1998, NATO took its first step towards military intervention in Kosovo by approving two contingency operation plans for the crisis.[5] The remainder of 1998 and the beginning of 1999 saw the international leadership exerting diplomatic pressure on President Milosevic in an attempt to put an end to the mounting reports of human rights abuses and the systematic ethnic cleansing of the Kosovar-Albanians. The situation in Kosovo continued to deteriorate with no sign of relenting by President Milosevic. On 24 March 1999, NATO initiated an air campaign to bring an end to the Serbian atrocities in Kosovo.

For seventy-eight days, from 24 March to 10 June 1999, the United States and its NATO allies conducted air strikes against President Milosevic and his forces. It is worth noting that at no time during the air strikes did NATO have ground forces in contact or in Kosovo, which in some ways would differentiate Joint STARS mission during OAF from the missions they execute during Desert Storm or OJE. From the beginning of OAF, the United States and NATO had three primary interests at stake: Serb aggression in Kosovo directly threatened

peace throughout the Balkans and the stability of southeastern Europe; Belgrade's repression in Kosovo created a humanitarian crisis of staggering proportions; and Milosevic's conduct leading up to OAF directly challenged the credibility of NATO.[6] Considering these interests, the United States and NATO developed the following strategic objectives: demonstrate the seriousness of NATO's opposition to Belgrade's aggression in the Balkans; deter Milosevic from continuing and escalating his attacks on helpless civilians and create conditions to reverse his ethnic cleansing; and damage Serbia's capacity to wage war against Kosovo in the future or spread the war to neighbors by diminishing or degrading its ability to conduct military operations.[7]

As the largest combat operation in NATO's history, OAF accomplished all of its military objectives without a single combat fatality to NATO forces. In the end, Milosevic and his police and military forces were out of Kosovo, a NATO-led peacekeeping force was deployed there, and the refugees were able to return to their homeland.[8]

Joint STARS Deploys

The 93rd Air Control Wing (ACW) and the Joint STARS system had progressed exponentially since 1995 when it was called upon to support OJE. As stated earlier, Joint STARS only had one operational "C" model aircraft in the wing at that time. Furthermore, it was still not considered initially operationally capable. In 1997 Joint STARS and the 93rd ACW became initially operational capable, and by January 1999 the wing had four "C" model aircraft at its disposal at Robins Air Force Base in Warner Robins, Georgia.[9]

Although still growing, the 93rd ACW was relatively small in terms of personnel with approximately 1,200 in early 1999. Only 50 of these 1,200 personnel were Army.[10] A shortage of qualified personnel would prove to be a serious problem for the wing when called upon to support OAF. The 93rd ACW was able to meet its requirements to man the jets with qualified personnel, but they paid a large price by being forced to deploy its instructors from the training squadron to support the contingency. Minimal manning was left behind at the training squadron and, in effect, adequate training to consistently qualify crewmembers ceased. The fact that two jets eventually deployed, leaving only two at home station for the training and operational squadron to fly, compounded the challenge of qualifying crewmembers. This "drying up" of the pipeline for new, qualified crewmembers due to the contingency requirements put additional strain on the already small pool of qualified personnel. The effects of this deployment on training would be felt long after the contingency was over. In fact, it would take over nine months of intensive training flights to get the training squadron caught up on its time line for qualifying new crewmembers.

Prior to the call up for OAF, the 93rd ACW was making tremendous strides in achieving the potential of the Joint STARS system. The TTPs were being developed and documented as standard operating procedures on a daily basis. The vision of many of the wing's original members, as well as the requirements initially documented by the Air Force in terms of its capability to be a command and control platform were being realized. Joint STARS support to ground and air commander's training exercises was at an all time high. Joint STARS was supporting the National Training Center, Air Warrior, and many other Army, Air Force,

and joint training exercises on a regular schedule. Requests for Joint STARS support were coming in from numerous brigade, division, and wing commanders on a consistent basis. Joint STARS was eager to support all of these requests in an attempt to exercise the Joint STARS system and its personnel and to educate and familiarize supported units with Joint STARS capabilities. All of this exercise training and support was geared towards the 93rd ACW's vision for Joint STARS. The wing believed only a fraction of the system's capabilities were being fully utilized and that Joint STARS could play a much larger role in the theater architecture. In fact, it saw itself as the centerpiece of a triad that made up the theater ISR team. In coordination with the Airborne Warning and Control System (AWACS) and the Rivet Joint (RJ) systems, Joint STARS felt it could provide a synchronized and unparalleled view of the battlefield. This common view of the battlefield would be shared via satellite, data link, and voice to other theater participants, such as ABCCC, Army Apache helicopters, direct attack aircraft, CGSs, and joint service workstations (JSWS).[11] Little did the 93rd ACW know they would have an opportunity to execute this vision during a real-world contingency so soon.

On 23 February 1999 the 93rd ACW deployed one crew and one Joint STARS aircraft to Rhein Main Air Force Base in Germany to support OAF. The 93rd ACW's ability to rapidly deploy had never been tested to this extent. Within only thirty-six hours of notification the first aircraft and crew were airborne and enroute to Germany. Within twenty-four hours of their arrival in theater, Joint STARS was prepared to fly its first mission. Over the next thirty days a second aircraft and additional crews would join the initial deployment package. Over the 120-day deployment, Joint STARS flew daily missions with only one mission cancellation,

which was due to a weather abort. This tremendous achievement is a testament to the outstanding maintenance personnel of the 93rd ACW and its crewmembers. But Joint STARS would be challenged during this deployment to execute not only the missions it had trained for at home station, but also one that would be altogether new to Joint STARS and its crewmembers.

Joint STARS Mission Phase I

Challenges: As with the deployment of Joint STARS in support of OJE, there was some skepticism about how useful Joint STARS would be in this contingency and environment. After all, a lot of the same problems Joint STARS faced during OJE would be potential problems during OAF. Two of the most obvious challenges that remained the same for Joint STARS were: geography, and airspace and orbit restrictions.

The geography of Kosovo was one of the problems that Joint STARS would have to overcome. As was the case in Bosnia, the mountainous terrain of Kosovo created "radar-shadowing" of the area of operation. Unfortunately, mountains completely surround Kosovo. These mountains served to isolate the area of operation within the base of the surrounding mountains. The result of the geography of Kosovo was an abundance of radar-shadowing that made the task of conducting continuous surveillance of the area extremely difficult.

To make matters worse, the airspace surrounding the area of operation was at a premium. Two-hundred and seventy-seven allied aircraft flew over 38,000 combat sorties in a 78-day period.[12] Due to this massive number of allied air assets, Joint STARS was unable to secure an ideal orbit location that would optimize the radar's capabilities and minimize its limitations. The less-than-ideal orbits not only worsened the radar-shadowing problem, but also

contributed to the inconsistent data link and voice communications with the supported ground unit in Tirana.

Support Plan: In the initial phase of the Joint STARS mission, the crewmembers were completely focused on support to their tasking authority, the CAOC. The ATO and all of Joint STARS mission taskings came directly from them. The connectivity between the Joint STARS aircraft and the CAOC was primarily through a satellite feed to the Joint Service Workstation (JSWS) at the CAOC. The JSWS is a portable workstation that was conceived by the need to put Joint STARS information into fixed facilities during OJE. The JSWS can be boxed up, shipped and setup in any location. The JSWS gives the user access to Joint STARS data and the ability to communicate with the aircraft while airborne via satellite. The JSWS is similar in functionality to that of the Army ground station systems. Eight JSWSs were deployed to commands throughout the theater. The four primary recipients of Joint STARS data through JSWSs were: Molesworth, England, with the Joint Analysis Center; Rhein Main Air Force Base, Germany, with the 93rd ACW; Tirana, Albania, with Task Force Hawk; and Vicenza, Italy, with the CAOC.[13] The only "active" link was with the CAOC. In other words, all the other JSWSs were only in the receive mode. Only the CAOC transmitted requests or taskings to Joint STARS.

Mission: Phase I of Joint STARS deployment began on 23 February 1999, the day Joint STARS deployed into theater. Joint STARS mission was very straightforward during Phase I of the deployment. Joint STARS was strictly an ISR platform. On a daily basis, the CAOC provided targets, lines of communication, and named areas of interest for Joint STARS

to conduct surveillance and report. Missions normally averaged 13 hours with one air-to-air refueling per mission. Since this phase was prior to any hostilities, one of the priorities the crew focused on was developing traffic patterns in and around the cities of Kosovo and the military facilities. The crew also conducted change detection through SAR analysis of military facilities and airfields. Convoys of military like traffic were tracked by Joint STARS and reported via the satellite link to the CAOC in real time. Any anomalies in the analysis of the change detection missions were also reported real time to the CAOC. Each mission was debriefed to the ground intelligence section of the 93rd ACW and was cross-referenced with past missions to determine patterns or anomalies. The Joint STARS crews were able to detect and report on a myriad of potential enemy convoys and on changes in the military facility traffic. Joint STARS also reported changes in airfield aircraft status and detected up-to-then-unknown radar sites. The crews were lauded by the CAOC for providing them a real-time view of the area of operation and for their traffic analysis reporting.

With the crew singularly focused on the ISR mission, all of the crew's energy and talent was directed towards the goal of providing maximum situational awareness to the CAOC in real time. From mission planning to mission execution the entire crew maintained that singular focus. Activity reporting was accurate, timely, and continuous. During no other phase of the Joint STARS deployment was the volume of reports transmitted to the CAOC higher than during Phase I.

Table 5 is a performance matrix for Joint STARS during Phase I of its deployment during OAF.

Table 5. Operation Allied Force Phase I Performance Matrix

Mission	Mission Priority	Support Rating	Performance Rating
ISR	Primary	Excellent	Excellent

Matrix Summary: The support and performance rating should not be a surprise. Even though Joint STARS had challenges to overcome during this phase, its singular focus and mission allowed the crew to provide dedicated support to the CAOC and its requests. Table 1 in chapter 3 showed that to accomplish the ISR mission it required a "high" radar time line, "medium" personnel, and a "low" level of focus relative to the attack support and limited ABCCC missions. Given those findings, it is clear to see that by utilizing more personnel and dedicating more focus than required, the crew could easily provide excellent support and yield an excellent performance.

Joint STARS Mission Phase II

Mission: Phase II of Joint STARS deployment began on 24 March 1999, the day the air strikes began and their mission expanded and evolved. During Phase II, Joint STARS mission was not as straightforward as it was in Phase I of the deployment. Joint STARS was still responsible for its ISR mission and still received target taskings from the CAOC on a daily basis. However, once the air strikes began Joint STARS began to play a much larger part in the air campaign.

In Phase II, in accordance with the air tasking order, Joint STARS was given attack aircraft to control. This was the first time in Joint STARS history that the crew would have direct attack aircraft, with live ammunition, in an air campaign under their control. The operations section of the crew trained extensively at home station on controlling aircraft in an attack support mission. Almost every training sortie Joint STARS flew out of Robins Air Force Base prior to the deployment included training on controlling and directing live attack aircraft onto fixed and moving targets. In fact, the ability to proficiently direct attack aircraft onto potential targets in an attack support mission is part of the syllabus requirements for the Senior and Weapon Director crewmember positions. Furthermore, currency requirements for those crewmember positions require them to maintain their proficiency in this mission through periodic training events and evaluations. If a crewmember fails an evaluation or does not maintain their currency requirements, the crewmember becomes unqualified in their duty position and unable to conduct attack support training without an instructor present. The stringent training requirements associated with the attack support mission ensures that only the highest qualified crewmembers are permitted to conduct this extremely difficult and demanding mission.

As stated, when the air campaign began, Joint STARS was given the authority to control direct attack assets in an attack support mission. However, there was never any directive relayed from the CAOC to Joint STARS clearly defining the priority of mission support between the existing ISR mission and the new attack support mission. Therefore, the crew had an additional mission without any clear guidance on which mission should get priority of effort from the crew. Since the CAOC was Joint STARS primary tasking authority and the

CAOC was asking Joint STARS to execute both missions, that is what Joint STARS tried to do.

It was at this time that there was a clear shift in focus by the crewmembers. The ISR mission no longer had all the resources on the jet supporting it. Specifically, the operations section priority seemed to be focused on executing the attack support mission. Not to say that the operations section no longer supported the ISR mission--they did. However, this was a golden opportunity for Joint STARS to prove that it could serve as a controlling aircraft in an attack support mission. Remember that the ability to execute an attack support mission was part of the Air Force's initial operational requirement document (ORD). Up until now the 93rd ACW had not had the chance to validate this requirement. Beyond the ORD's requirement, Joint STARS also had Motorola, the contractors for Joint STARS, and the 93rd ACW very interested in seeing Joint STARS succeed in this mission. Success in the attack support mission meant validation of past budget expenses and also legitimacy for the future of Joint STARS in an increasing role in the airspace architecture.

The ISR mission remained relatively the same with adjustments by the CAOC on the daily targets. The attack support mission was in support of Kosovo engagement zone (KEZ) operations. In KEZ operations, Kosovo was divided into a western and eastern sector. Joint STARS supported both sectors. One weapons director would be assigned to each sector and was responsible for conducting attack support operations within it. The SD oversaw both sectors and was the final approval authority for transmitting potential targets to the direct attack aircraft. If the SD approved a potential target for the attack aircraft to identify, the WD would

then direct the aircraft onto the potential target. If the attack aircraft could positively identify the potential target as hostile the attack aircraft was cleared, in accordance with the rules of engagement, to drop munitions on the target. Joint STARS at no time cleared the dropping of any munitions. Joint STARS has no identification ability. It was ultimately the responsibility of the attack aircraft to make the final determination on dropping munitions.

On 6 April 1999 after two weeks of the air campaign, Joint STARS confirmed its first two attack support kills. On the same mission, Joint STARS registered the first fixed and the first moving target destroyed by attack aircraft under its control. In the eyes of many, Joint STARS had validated itself as a command and control platform. It was clearly a time to celebrate the successes of Joint STARS. The excitement of the confirmed kills further shifted the crewmembers focus off of ISR and towards attack support. The more kills Joint STARS got, the more kills it wanted. As a result, the ISR mission support suffered and Joint STARS activity reporting dropped off significantly in comparison to Phase I. Even though the attack support mission was not the only reason ISR reporting declined during Phase II, it is accurate to say it was the primary reason.

The Task Force Hawk Factor

Although it was never a directive from the CAOC to support Task Force (TF) Hawk, Joint STARS did everything in its power to support TF Hawk to the fullest extent. As stated earlier, the CAOC was Joint STARS primary tasking authority. Joint STARS never fell under TF Hawk for any type of support relationship. The support TF Hawk received from Joint

STARS was simply the product of the Joint STARS leadership's desire to work with and help the Army commander in theater.

Coordinating support for TF Hawk had its challenges. The support for TF Hawk was worked primarily through direct coordination between the Army representatives of Joint STARS and the Task Force Operations personnel. The TF Hawk operational plans were passed to Joint STARS prior to execution. The Joint STARS personnel then worked with the CAOC to synchronize Joint STARS on station time with TF Hawk's operations. The other piece that required CAOC coordination to support TF Hawk operations was Joint STARS orbit. The Joint STARS standard orbit did not fully support the operations TF Hawk was conducting. Therefore, every time Joint STARS supported a TF Hawk operation, coordination for an extension of the standard Joint STARS orbit had to be coordinated through the CAOC. This was not an easy thing to do considering the limited airspace and the requirement for Joint STARS to have combat air patrols reposition to support the orbit extension. Another challenge in supporting TF Hawk was establishing a consistent data link with the ground station in Tirana, Albania. Due to the terrain, Joint STARS could only maintain a data link with the ground station while in the western part of its orbit. Therefore, every time Joint STARS flew to the eastern portion of its orbit the aircraft lost the data link with the ground station. TF Hawk employed a JSWS at their location as an alternate means of receiving Joint STARS data via the satellite feed.

The Joint STARS support to TF Hawk ended on 5 May 1999, when two Army Apache pilots were killed when their aircraft crashed on a training mission in Albania. Their

deaths were the first allied casualties in the NATO actions against the FRY.[14] The interaction with TF Hawk was brief, but many lessons learned were taken away from this interaction during OAF that were incorporated into Joint STARS training plans for future operations. Even though the impact of the operations with TF Hawk were minimal, the addition of the unofficial mission to support them did further divide the focus of the crew and put a strain on the already personnel intensive missions Joint STARS was already conducting.

Table 6 is a performance matrix for Joint STARS during Phase II of its deployment during OAF.

Table 6. Operation Allied Force Phase II Performance Matrix

Mission	Mission Priority	Support Rating	Performance Rating
ISR	Secondary	Good	Good
Attack Support	Primary	Excellent	Good

Matrix Summary: As shown in table 6, attack support is the primary mission and ISR is the secondary mission. This was not a directed mission priority shift by the CAOC, but one that was clearly evident by the shift in the focus of the crewmembers. Listing the missions with those priorities captures the primary focus of the crewmembers during this phase of the deployment. The shift in priority by the crewmembers led not only to the "good" support rating for the ISR mission and the "excellent" support rating for the attack support mission, but it also contributed to the "good" performance ratings.

Attack Support Impact: Table 1 in chapter 3 showed that to accomplish the attack support mission it required "medium" personnel, "medium" radar time line and "medium" level of focus relative to the ISR and limited ABCCC missions. Those results will now be matched with the resource requirements identified for the ongoing ISR mission.

Radar Time Line: Even though the ISR mission requirement for the radar time line was "high," there is no indication that the addition of the "medium" radar time line requirement of the attack support mission led to degradation in the performance of either of the missions. From the authors experience as a crewmember during OAF there were no conflicts with radar time line during this phase.

Level of Focus: In terms of level of focus, ISR rated "low" and attack support rated "medium" on table 1 in chapter 3. Therefore, the crew should have been able to execute both missions without any degradation in performance. However, with the crewmembers attention shifting primarily to attack support and the addition of the TF Hawk support, both the ISR and attack support missions may have suffered due to the split focus of the crew.

Personnel: The data indicates that the additional drain of the personnel resources by the attack support mission was the primary reason for the "good" performance ratings for both missions. From the personnel perspective, both missions required "medium" resources to accomplish. Referring back to chapter 3, the "medium" amount of personnel required equals seven-to-eight personnel to execute the mission. Based on the fact that there are only twelve operators available, it appears that one or both missions would not get the optimal number of personnel solely dedicated in support of it.

Joint STARS Mission Phase III

Mission: Phase III of Joint STARS deployment began in early May 1999. Concern over collateral damage had been building over time. On 14 April 1999, NATO airstrikes inadvertently hit a civilian convoy in Kosovo, killing 64.[15] Greater caution was stressed to all Air Force crews, and Joint STARS attack support procedures were more tightly controlled. On 7 May 1999, NATO airstrikes inadvertently hit the Chinese Embassy in Belgrade.[16] The NATO leadership became hesitant. NATO could not afford another mistake in the eyes of the international community. Although Joint STARS was not involved with either of the inadvertent airstrikes, the incidents would have an impact on Joint STARS and its future missions during OAF. The attack support mission priority would decrease, the ISR mission priority would increase, and Joint STARS would be asked to execute a new mission--limited ABCCC.

The Joint STARS crew no longer directly controlled attack aircraft in an attack support mission as they had in Phase II of the operation. As a reaction to the mishaps and collateral damage of the bombing campaign, the NATO leadership restricted the controlling of an attack aircraft to the ABCCC platform. From that point on, Joint STARS interaction with the attack aircraft went through ABCCC. In other words, Joint STARS would still identify and track potential targets, but would no longer pass them directly to the attack aircraft for possible targeting. Instead, Joint STARS would pass its report to ABCCC who would cross-cue their report with other surveillance and intelligence platforms and determine which potential targets the attack aircraft would pursue. This was disappointing for the crew and a perceived setback for Joint STARS and its endeavor to establish itself as a viable command and control platform.

Joint STARS inheritance of the limited ABCCC mission was a direct fallout from the NATO decision to route all attack support operations through the ABCCC. The ABCCC, like Joint STARS, is a limited resource in the Air Force inventory. The added burden of providing its support to all the attack support operations became a heavy burden for the ABCCC. The decision was made to attempt to lighten the ABCCC load by taking a piece of their mission and turning it over to Joint STARS. The function Joint STARS would take over from ABCCC was relatively small. The limited ABCCC mission called for Joint STARS to conduct fighter flow management. In layman's terms, this means Joint STARS was responsible for making initial communications contact with attack aircraft on a designated frequency, establishing them in an orbit at a predetermined altitude, and then passing them off to an airborne forward air controller. Although this was a relatively small mission, it was one that Joint STARS had no formalized training for at home station. The crewmembers were neither currently trained nor qualified for this mission. Fortunately, Joint STARS had highly skilled crewmembers with previous experience working onboard or with ABCCC that were able draw on that experience and execute the limited ABCCC mission.

The ISR mission once again became the primary mission for Joint STARS. There was a refocusing of the crew, based on the ongoing events within the contingency. The CAOC continued to provide daily target taskings, but during this last phase of the mission, Joint STARS purpose changed. On 9 June 1999, NATO and FRY officials signed a military technical agreement (MTA), which would effectively put an end to the hostilities assuming the Serbian forces upheld the terms of the withdraw. Instead of tracking enemy movement for potential

targeting, Joint STARS was now assisting in the verification of the MTA's requirements. On 10 June 1999, after receiving verification that the Serb forces were withdrawing from northern Kosovo, NATO suspended airstrikes.[17] The Joint STARS reporting was instrumental in identifying military convoys withdrawing from Kosovo and in verifying the Serbian force's compliance with the MTA. Soon after the compliance with the MTA was verified, Joint STARS redeployed to Robins Air Force Base to begin the arduous task of rebuilding the 93rd Air Control Wing caused by the enormous strain the contingency place on the still-developing unit.

Table 7 is a performance matrix for Joint STARS during Phase III of its deployment during OAF.

Table 7. Operation Allied Force Phase III Performance Matrix

Mission	Mission Priority	Support Rating	Performance Rating
ISR	Primary	Excellent	Excellent
Attack Support	Secondary	Good	Good
Limited ABCCC	Tertiary	Good	Good

Matrix Summary: As table 7 shows, ISR has again become the primary mission and the attack support mission has become the secondary mission. The limited ABCCC mission was very small in scope and rated tertiary in priority. Like Phase II, these priority changes were not directed mission priority shifts by the CAOC, but ones that were evident by the shift in the focus and efforts of the crewmembers. Once again, the shifting of priorities and the refocusing by the crewmembers directly impacted the performance ratings. While supporting the CAOC in Phase III, the ISR mission rated "excellent" and the attack support mission rated "good." This was due to the de-emphasis of the attack support mission and the redistribution of personnel in support of the ISR mission. The limited ABCCC mission rated "good" in performance. Joint STARS performed well in the limited ABCCC mission despite the fact that the crewmembers had no formal training in executing this mission from the Joint STARS platform.

Limited ABCCC Impact: Table 1 in chapter 3 showed that to accomplish the limited ABCCC mission it required a "high" personnel, "low" radar time line, and a "high" level of focus relative to the ISR and attack support missions. However, those ratings were based on the proposed limited ABCCC mission, not the one that Joint STARS performed during OAF. The ratings determined by the proposed limited ABCCC mission are important and will be discussed in more depth in chapter 5. For the purpose of the analysis in this chapter, the personnel rating for the limited ABCCC mission performed by Joint STARS has been adjusted. The other two ratings remain the same. The adjusted rating for personnel is based on my experience and feedback from other Joint STARS crewmembers familiar with the requirements

associated with the limited ABCCC mission performed by Joint STARS during OAF. The limited ABCCC mission resource requirements are now matched with the resource requirements identified for the ongoing ISR and attack support missions.

Radar Time Line: In Phase II, it was determined that the "high" radar time line requirements of the ISR mission and the "medium" radar time line requirement of the attack support mission did not lead to degradation in the performance of either of the missions. For similar reasons, it does not appear that the addition of the "low" radar time line requirement of the limited ABCCC mission resulted in any degradation in any of the missions. The actual ABCCC platform does not even have an air-to-ground radar, so it stands to reason that Joint STARS could execute a limited portion of their mission with minimal impact on the radar time line.

Level of Focus: As shown in Phase II, the ISR mission rated "low" and the attack support mission rated "medium" in terms of level of focus. The limited ABCCC mission rated "high". This would seem to indicate that the addition of this mission's level of focus requirement would greatly degrade other missions. However, it appears that the addition of the limited ABCCC mission had only a small impact on the overall performance rating, contrary to what the "high" rating may indicate. The limited ABCCC mission performed by Joint STARS during OAF only required one person to execute. What that means is, one person was entirely focused on nothing other than the limited ABCCC mission. But two other crewmembers were monitoring the mission, although those two crewmembers were not required to maintain the same level of situational awareness as the crewmember actually performing the mission.

Therefore, the "high" level of focus requirement greatly affected that one crewmember responsible for the limited ABCCC mission and marginally affected the others required to maintain situational awareness over the mission. But the addition of another mission on top of the two existing missions and the fact that it did require an additional amount of focus for two other crewmembers led to the determination that it slightly degraded the performance rating.

Personnel: In Phase II, the addition of the attack support mission to the ISR mission led to degradation in the performance rating of both missions. With the shift in mission priority back to the ISR mission, more personnel supported the ISR mission, and the result was that its rating returned to "excellent." Although the limited ABCCC mission did not require a large number of personnel, it did take one valuable crewmember completely away from supporting any other mission. Furthermore, as stated earlier, it required two others to monitor and maintain situational awareness of the mission activity. Even though this is not a large expenditure of personnel, when the crew is already being completely utilized with two missions and a third mission is added, the performance is likely to suffer as it appears it did here.

Summary

The intent of this chapter was to analyze Joint STARS performance throughout the three phases of its deployment in support of OAF. As the operation evolved Joint STARS was asked to execute additional missions. With the addition of these supplementary missions, Joint STARS was required to allocate its limited resources to satisfy the requirements of each mission. In some cases, it appeared Joint STARS was able to adequately divide its resources without degrading its performance in support of any of its assigned missions. However, in other

cases, it appeared that Joint STARS may have been unable to adequately support all of its assigned missions without some degradation in its performance. In chapter 5 final conclusions will be drawn based on the results of the methodology and analysis chapters. But before moving on to chapter 5, more specific details concerning the survey results will be addressed.

More Analysis of the Survey Results

As stated earlier, the answers from each question on the survey were individually summed up and the totals of like questions were compared. In chapter 3 the data showed that there are some significant differences in the way the Army and the Air Force view this system and its capabilities. These differences in opinion were identified through an analysis of the survey data. However, there is an issue that the Army and Air Force completely agree upon. This similarity in opinion was identified through the analysis of the survey data.

Table 8 and figure 6 show that the Army and Air Force agree that the effectiveness of Joint STARS with the addition of a third mission diminishes. The survey results were inconclusive in determining whether the crewmembers felt Joint STARS was most effective given one mission or two. However, the survey results clearly and conclusively showed that the crewmembers felt that the addition of a third mission would degrade their effectiveness.

Table 8. Statistical Data--Joint STARS Effectiveness

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Q10 Crew most effective with only one mission	Between Groups	1.384	1	1.384	.755	.389
	Within Groups	87.996	48	1.833		
	Total	89.380	49			
Q11 Crew just as effective with two missions as one mission	Between Groups	.190	1	.190	.148	.702
	Within Groups	61.590	48	1.283		
	Total	61.780	49			
Q12 Crew just as	Between Groups	.000	1	.000	.000	1.000

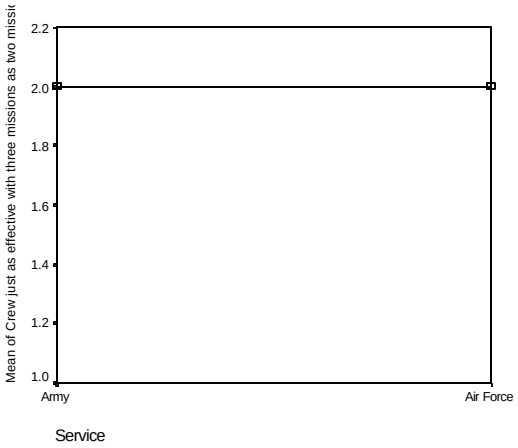


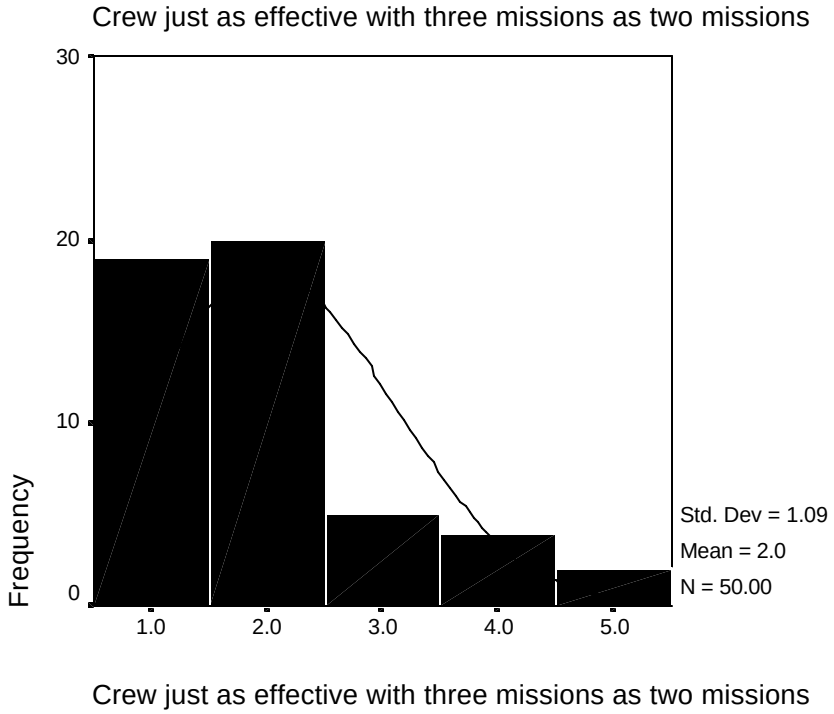
Figure 6. Statistical Data--Joint STARS Effectiveness

Table 9 and figure 7 further show that the Army and Air Force clearly agree there is degradation in Joint STARS effectiveness with three missions. In fact, 78 percent of the respondents answered either "strongly disagree" or "disagree," when presented with the statement, I think the crew would be just as effective executing three missions as it would be executing two.

Table 9. Statistical Data--Joint STARS Effectiveness

Q12 Crew just as effective with three missions as two missions

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00 Strongly Disagree	19	38.0	38.0	38.0
	2.00 Disagree	20	40.0	40.0	78.0
	3.00 Not Sure	5	10.0	10.0	88.0
	4.00 Agree	4	8.0	8.0	96.0
	5.00 Strongly Agree	2	4.0	4.0	100.0
	Total	50	100.0	100.0	



Summary of the Statistically Significant Results

Figure 7. Statistical Data--Joint STARS Effectiveness

Summary

This chapter and the results from the analysis of the survey have presented an interesting perspective on how the Joint STARS crewmembers view the system resources and the effectiveness of the crew when given supplementary missions. These results will be further discussed and referenced in chapter 5 with the final conclusions and recommendations of this thesis.

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[1]Department of State, "Kosovo Chronology" (Washington, DC, 21 May 1999) [article on line]; available from http://www.state.gov/www/regions/eur/kosovo_hp. html; Internet.

[2]Ibid.

[3]Ibid.

[4]Ibid.

[5]Ibid.

[6]Department of Defense, "Kosovo/Operation Allied Force After Action Report" [report on-line] (Washington, DC: DOD, 31 January 2000), p. 3; available from http://www. defenselink.mil/specials/kosovo; Internet.

[7]Ibid., 7.

[8]Ibid., xiii.

[9]93rd Air Control Wing, United States Air Force, "93rd Air Control Wing Command Brief" (Briefing, 93d Air Control Wing, Robins Air Force Base, 1999).

[10]Ibid.

[11]Ibid.

[12]Office of Assistant Secretary of Defense, "Joint Statement on the Kosovo After Action Review" (Washington, DC, 14 October, 1999) [report on-line]; available from http://www.defenselink.mil/news/oct1999/b10141999_bt478-99.html; Internet.

[13]Joint STARS TSM/ PM, "Joint Station Workstation," 7 February 2000.

[14]Department of State, "Kosovo Chronology."

[15]Ibid.

[16]Ibid.

[17]Ibid.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

Chapters 1 through 4 have provided the answers to the questions required to establish a foundation for chapter 5. From that foundation comes the objective conclusion of the primary question. As you recall, the primary question is, Does the quality of Joint STARS performance diminish with the addition of supplementary missions?

Conclusion: Based on the analysis of Operation Allied Force and the data provided by the 93rd Air Control Wing crewmembers, this thesis concludes that Joint STARS performance does diminish with the addition of supplementary missions. However, the answer to the primary question is not actually that simple. The logical questions that arise from the conclusions are, What resource is the cause of the degradation and at what point does the degradation begin?

This thesis focused on the limited resources of the Joint STARS system and how stretching them between missions would degrade the overall mission performance. From the analysis and the survey results, it appears that the primary reason for degradation in performance is a function of the human factor and not one of radar system capability shortcomings. In other words, the resource requirements placed on the radar system to execute all three of the proposed Joint STARS missions did not overload the system and are not, therefore, a cause of any degradation in performance. However, the survey results do point to the limitation in the number of personnel available as operators and their inability to execute multiple missions simultaneously as the primary reason for degradation in performance. A

review of chapter 4, that covers the affects of personnel and level of focus requirements when supplementary missions are added, supports this conclusion.

The analysis of Operation Allied Force and the survey focused on an incremental addition of missions to Joint STARS primary mission. In chapter 4, the addition of supplementary missions during Operation Allied Force was analyzed and the performance was rated. Furthermore, crewmembers responses to the survey questions regarding their ability to simultaneously execute one, two or three missions effectively was analyzed. The results from both the analysis of Operation Allied Force and the crewmembers responses to the survey questions indicate that the point Joint STARS performance begins to seriously degrade is when Joint STARS is asked to perform a third mission. Furthermore, the analysis indicates crewmembers feel confident in their ability to conduct attack support and ISR simultaneously without any degradation in performance. However, additional feedback from Joint STARS crewmembers indicate that the addition of just the proposed limited ABCCC mission to a primary mission would be enough to seriously degrade their performance. In fact, some crewmembers simply feel the proposed limited ABCCC mission cannot be performed by Joint STARS at all without major organizational and aircraft modifications. Although the survey specifically addresses the limited ABCCC mission as the third mission, it is presumed that any additional mission beyond two would cause at least some degradation in Joint STARS performance.

Recommendations: The following are recommendations for the future employment and operations of Joint STARS to maximize the enormous potential of this combat multiplier system.

1. Discontinue efforts to include the proposed limited ABCCC mission to the current Joint STARS mission requirements.

The addition of the proposed limited ABCCC mission appears to be coming about for all the wrong reasons. Joint STARS is not being considered for this mission because it is prepared for or equipped to execute the mission. It appears it is being considered for this mission because there is a push to remove the ABCCC system from the Air Force inventory and they need another platform to pick up the mission. Joint STARS, like any other system in the military inventory is fighting the budget battle for relevance and survival. It would be extremely difficult for the 93rd ACWs leadership to turn away the request for Joint STARS to incorporate the limited ABCCC mission. If the 93rd ACW accepts and incorporates this mission into Joint STARS, additional funds would flow into the program and additional reliance on the system would result. But the fact remains, Joint STARS is not trained or equipped to execute this mission as it is configured today.

If Joint STARS is forced to accept the proposed limited ABCCC mission, at a minimum, the following issues need to be resolved: communications system modifications, training and certification requirements, and personnel manning.

Major modifications in the communications systems would be required to even begin to prepare the Joint STARS platform for the limited ABCCC mission. Currently, Joint STARS maximizes the use of its communications subsystem while executing the ISR and attack support missions simultaneously. The addition of the limited ABCCC mission would seriously degrade any other ongoing mission in terms of communication capabilities and overall performance.

Beyond the major communication system modifications required lies an even bigger consideration for Joint STARS taking on the limited ABCCC mission – personnel. The Joint STARS crewmembers are simply not trained or organized for the limited ABCCC role. The training squadron within the 93rd ACW does not even have a syllabus to support the training of its crewmembers in this mission. If and when the 93rd ACW does initiate a training program for this mission, the issues of qualification and currency requirements would have to be worked out. Joint STARS currently struggles with maintaining currencies for its SDs and WDs in their requirement to work with live aircraft in an attack support role. In fact, the majority of not only these requirements but also initial qualifications for SDs and WDs are met through simulations versus directing live attack support aircraft. Similar difficulties would be encountered in qualifying and maintaining currencies for the limited ABCCC mission crewmember requirements. However, the problem of currency maintenance would be doubled due to the fact that the same crewmembers responsible for the attack support mission would incur the responsibility for the limited ABCCC mission. Therefore, the affect of the addition of the limited ABCCC mission would further exacerbate the problem with mission degradation due to the limiting human factors already present. The greater benefit would come from focusing Joint STARS on its initial ORD priorities--ISR and attack support.

2. Develop revised directives on establishing mission priorities for Joint STARS when operating in a contingency.

Mission priorities remain unclear when Joint STARS deploys in support of a contingency. Taskings and requirements are directed from higher, but no priority of execution is

established. It is normally left to the mission crew to interpret the higher commander's intent and execute the missions accordingly. This ambiguity of mission priority is most likely due to the ignorance of Joint STARS capabilities by higher headquarters and misrepresentation of its own capabilities by Joint STARS liaisons. This ignorance and misrepresentation can lead to problems like inheriting the limited ABCCC mission or unrealistic expectations from a supported unit.

Clarity of mission priorities by higher headquarters will improve overall mission performance. Mission priorities allow the mission crew to focus the majority of its resources towards the highest priority mission. When the crewmembers, higher headquarters and the supported units understand the mission priorities, everyone understands which mission will receive the most resources. This common understanding and adherence to priorities ensures Joint STARS meets higher headquarters intent and readily explains any lack of support from Joint STARS to a lower priority mission. As this thesis has contended, supplementary missions will degrade Joint STARS performance. If the degradation of Joint STARS performance with the addition of supplementary missions is understood by everyone, there will be a realistic expectation of Joint STARS performance when multi-tasked.

3. Task organize the crew based on the mission.

This recommendation will meet with some resistance from both the Air Force and Army Joint STARS representatives since each covets the positions they currently hold on the jet. However, with limited seats available for operators, it only makes sense to maximize

crewmember abilities by flight manifesting those crewmember positions that best support the mission taskings. In other words, if the mission is attack support and there are no ground forces in theater, the crew could replace the ATSSs with WDs. The addition of the WDs would add more expertise in the attack support mission requirements. Conversely, if there are no attack support mission requirements, but there is a corps sized ground force and fifteen common ground stations to support, the crew could include additional ATSSs and remove other crewmember positions less critical to the mission.

Final Thoughts

Joint STARS is an incredibly capable system and a combat multiplier that will serve the Armed Forces extremely well in the future. However, the military leadership cannot continue to over task the system and its personnel to the point that their performance diminishes. Budgetary constraints are a reality that every service has to deal with. Joint STARS is feeling the affects of these budgetary constraints. Joint STARS is not the platform for the ABCCC mission. But if this mission is forced on Joint STARS, the Department of Defense and the Air Force must adequately resource the required aircraft and organizational modifications before expecting the 93rd ACW to execute this mission.

If allowed to focus its training and resources towards the ISR and attack support missions, Joint STARS performance will improve exponentially over time. If over tasked with missions it is not prepared to execute, Joint STARS performance will decline into mediocrity and could potentially be susceptible to creating dangerous conditions for other airborne assets and supported ground units.

Education and understanding of Joint STARS capabilities, potential and limitations are fundamental to the proper employment of this system. Too often the limitations are overlooked in favor of the enormous capabilities and potential. If Joint STARS taskings are properly prioritized and clearly articulated to the mission crew and the supported units, expectations will be realistic and performance will exceed requirements.

APPENDIX

JSTARS SURVEY

(CGSC Control No. 001107)

*Please answer the following demographic questions:

1. What branch of service are you in? Air Force/Army
2. What is your rank?
3. What is your duty/position onboard JSTARS?
4. How many operational deployments (Desert Storm/OJE/Allied Force) have you deployed on with JSTARS?
5. Approximately how many flight hours do you have onboard JSTARS?

*Please answer the following questions based on the scenario below:

General situation: Kosovo type scenario; air campaign ongoing; Milosevic refuses to pull Serb ground forces out of Kosovo; U.S. has decided to use ground forces to forcibly defeat and drive Serb forces out of Kosovo.

JSTARS mission(s): The Joint Forces Commander has directed that you will support KEZ (Kosovo engagement zone) attack support operations which will continue throughout the ground offensive; he also directs you to support the ground forces as they execute their attack (3 CGSs are supporting the ground forces); he also directs that you perform a limited ABCCC function. No clear priority between missions has been established by the JFC.

Current situation: The crew must begin mission planning for the next days mission which will require that they execute all of these missions simultaneously to the best of their ability.

Note: You are not on a Crews 2000 jet.

*Based on your experience as a crewmember aboard JSTARS, please assign values to the following questions based on the scale provided. Please put the number on the answer line. (For questions 1-3, only consider Ops, Army, MCC, & AIO - not Techs/Flt Deck/Nav)

1. The limited ABCCC mission will require the most crewmembers to execute._____

1	2	3	4	5
strongly disagree	disagree	not sure	agree	strongly agree

2. The ISR mission will require the most crewmembers to execute._____

1	2	3	4	5
strongly disagree	disagree	not sure	agree	strongly agree

3. The attack support mission will require the most crewmembers to execute_____

1	2	3	4	5
strongly disagree	disagree	not sure	agree	strongly agree

4. The limited ABCCC mission will require the most radar time line to execute._____

1	2	3	4	5
strongly disagree	disagree	not sure	agree	strongly agree

5. The ISR mission will require the most radar time line to execute._____

1	2	3	4	5
strongly disagree	disagree	not sure	agree	strongly agree

6. The attack support mission will require the most radar time line to execute._____

1	2	3	4	5
strongly disagree	disagree	not sure	agree	strongly agree

7. Assume your primary mission assigned during mission planning was the limited ABCCC mission – I feel I will be able to easily support other missions while executing my ABCCC function._____

1	2	3	4	5
strongly disagree	disagree	not sure	agree	strongly agree

8. Assume your primary mission assigned during mission planning was the ISR mission – I feel I will be able to easily support other missions while executing my ISR function._____

1	2	3	4	5
strongly disagree	disagree	not sure	agree	strongly agree

9. Assume your primary mission assigned during mission planning was the attack support mission – I feel I will be able to easily support other missions while executing my attack support function._____

1	2	3	4	5
strongly disagree	disagree	not sure	agree	strongly agree

10. I feel the crew would be most effective if we only had one mission assigned._____

1	2	3	4	5
strongly disagree	disagree	not sure	agree	strongly agree

11. I think the crew would be just as effective executing any two of the missions as it would be executing one._____

1	2	3	4	5
strongly disagree	disagree	not sure	agree	strongly agree

12. I think the crew would be just as effective executing all three of the missions as it would be executing two._____

1	2	3	4	5
strongly disagree	disagree	not sure	agree	strongly agree

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