

THE CENTRALIZED CONTROL OF AIRPOWER IN A COMMUNICATIONS BLACK HOLE

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fulfillment of the requirements for the
degree

MASTER OF MILITARY ART AND SCIENCE
Art of War Scholars

by

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

ABSTRACT

THE CENTRALIZED CONTROL OF AIR POWER IN A COMMUNICATIONS
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Since 2001, the United States has been continually engaged in combat operations against an enemy that is elusive and tactically lethal but utterly incapable of affecting operational-level communications. The same cannot be said about China or Russia. In modern joint air operations doctrine, the ATO enables centralized control and connects the operational and tactical levels of war through ATO dissemination.

This study assesses whether the joint air operations team is prepared to mitigate the effects of operational-level communications degradation, disruption, or denial on the JFACC's ability to execute centralized control. This study utilizes the lessons from ATO dissemination challenges during the Persian Gulf War and Operation Allied Force, combined with a thorough assessment of three decades of air operations doctrine and training. This study concludes that while JAOCs likely have an ATO dissemination PACE plan, tactical units are neither aware of the plan, nor do they train to it. Furthermore, this lack of preparedness cannot be overcome through problem-solving and innovation against an enemy capable of contesting every domain. Regular and realistic training that connects the operational and tactical levels of war in a highly contested environment is required.

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ACRONYMS

ACC	Air Combat Command
ACE	Agile Combat Employment
AFB	Air Force Base
AFCC	Air Force Component Commander
AFDD	Air Force Doctrine Document
AFI	Air Force Instruction
AFM	Air Force Manual
AFTTP	Air Force Tactics, Techniques, and Procedures
AOC	Air Operations Center
AOD	Air Operations Directive
ATAF	Allied Tactical Air Force
ATO	Air Tasking Order
AUTODIN	Automatic Digital Network System
AWSIM	Air Warfare Simulation
BF	Blue Flag
C2	Command and Control
C4I	Command, Control, Communications, Computers, and Intelligence
CAFMS	Computer-Aided Force Management System
CAOC	Combined Air Operations Center
CBA	Conditions-Based Authorities
CCDE	Centralized Control, Decentralized Execution
CDO	Contested, Degraded, and Operationally Limited
CENTAF	Central Air Forces

CENTCOM	Central Command
CFACC	Combined Force Air Component Commander
COMAFFOR	Commander, Air Force Forces
COMPARS	Computer Processing and Routing System
CPD	Combat Plans Division
CSAR	Combat Search and Rescue
CTAPS	Contingency Theater Automated Planning System
CTS	Combat Training Squadron
CVBG	Carrier Battle Group
EA	Electronic Attack
EFS	Expeditionary Fighter Squadron
GWAPS	Gulf War Air Power Survey
HHQ	Higher Headquarters
ITO	Integrated Tasking Order
JAOC	Joint Air Operations Center
JCS	Joint Chiefs of Staff
JFACC	Joint Force Air Component Commander
JFC	Joint Force Commander
JP	Joint Publication
JTF	Joint Task Force
LL	Lessons Learned
LNO	Liaison Officer
LOCE	Limited Operational Capability for Europe
MADS	Mini-ATO Distribution System
MAGTF	Marine Air-Ground Task Force

MAJCOM	Major Command
MPC	Mission Planning Cell
MTO	Mission-Type Orders
NATO	North Atlantic Treaty Organization
NAVCENT	Naval Forces Central Command
NDS	National Defense Strategy
OAF	Operation Allied Force
OT&E	Operational Test and Evaluation
PACAF	Pacific Air Forces
PACE	Primary, Alternate, Contingency, and Emergency
SHF	Super High Frequency
SIPRNeT	Secure Internet Protocol Router Network
SPINS	Special Instructions
SRQ	Secondary Research Question
STU	Secure Telephone Unit
TAC	Tactical Air Command
TACC	Tactical Air Control Center
TACM	Tactical Air Command Manual
TACON	Tactical Control
TACS	Tactical Air Control System
TBMCS	Theater Battle Management Core System
UHF	Ultra High Frequency
USAFE	United States Air Forces in Europe
USCinCCENT	Commander-in-Chief United States Central Command
USS	United States Ship

WOC	Wing Operations Center
WWMCCS	Worldwide Military Command and Control System

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PROLOGUE

The year is 2021. The 4th Expeditionary Fighter Squadron (EFS), the “Fighting Fuujins,” is forward-deployed to an undisclosed forward operating base, approximately 100 nautical miles from Powidz AB, Poland. The 4th EFS—along with other joint and coalition tactical squadrons—deployed to the U.S. European Command’s area of responsibility after military forces from the Russian Federation seized critical lines of communication within Lithuania to complete a land bridge to Russia’s exclave, the Kaliningrad Oblast.

It is night three of the air campaign. Thus far, air efforts have been marginally successful at peeling back portions of Russia’s anti-access, area-denial defensive systems. The 4TH EFS Mission Planning Cell (MPC) Chief, Captain Henry Arnold, arrives at squadron operations at 1700L to take the night MPC shift. In the handover briefing, Capt Arnold’s predecessor, First Lieutenant James Doolittle, informed him that he had not heard from the 4th EFS liaison officer (LNO) at the Combined Air Operations Center (CAOC) in the last 11 hours. Well before 1700L, Lt Doolittle should have received the draft Air Tasking Order along with the draft Master Air Attack Plan; however, he had received nothing. After several attempts to e-mail and call the LNO failed, Lt Doolittle assumed their LNO was extremely busy. Since these products also arrived late the preceding day, Lt Doolittle decided not to elevate the issue to his operations supervisor, as he assumed the LNO would send them once they were ready.

After the handover was complete, Capt Arnold attempted to contact his squadron’s LNO himself, to no avail. The phone in the MPC would not connect to the LNOs phone number. Capt Arnold elevated his concern to the operations supervisor, who

tried to call several contacts within the CAOC. The results were the same, no answer. By this time, it was 1830L, and the ATO production team was due to publish the final ATO by 1800L. Capt Arnold logged on to his Secure Internet Protocol Router (SIPR) computer and clicked on his “CAOC Portal” button on his favorites bar and a page loaded that said, “This site can’t be reached. Server IP address could not be found.” Capt Arnold tried several other computers with identical results. He then thought to see if he could get the ATO from his Wing’s Operations Center (WOC) located at Powidz AB. He picked up his phone, dialed the number, and heard a busy signal. Multiple attempts on several different phone lines produced the same results. He and the operations supervisor were out of ideas.

Capt Arnold was a relatively new MPC chief but was not inexperienced as he had a United States Central Command (USCENTOM) deployment under his belt. In 2017 he deployed in the A-10C as a First Lieutenant with the 354th EFS, “Bulldogs,” to Incirlik AB, Turkey, in support of Operation Inherent Resolve. In his epic deployment with the Bulldogs, Arnold sat MPC and received the ATO countless times from the CAOC at Al Udeid, Qatar. Following his deployment and transition course from the A-10C to the F-35A, he had not received any training nor had any discussion with the previous MPC chief on different methods to obtain the ATO. He only knew the process of acquiring the ATO from the CAOC Portal or through secure e-mail from the LNO.

The operations supervisor sent a runner to bring in the Squadron Commander, Lieutenant Colonel William Mitchell, and he was at a loss as well. In his three CENTCOM deployments in the F-16, he sometimes received the ATO exceptionally late but never had to use an alternate method to obtain the ATO. While his operations

supervisor dug through the Special Instructions (SPINS) and Rules of Engagement looking for any procedure that would shed light on the situation, he read the last Air Operations Directive (AOD) and the Joint Air Operations Plan. Through the AOD and the Joint Air Operations Plan, Lt Col Mitchell was able to marginally ascertain the overall intent and broad plan for what would likely be on the ATO for their squadron.

He had a thought to launch his F-35s on a similar timeline and to the general location that their targets were in on the previous day's ATO. Some problems with such a course of action, however, were that he did not know the plan for his required aerial refueling tankers, or know what other assets would be part of his force package, or know what specific targets he should attack, to name a few. Although, his main problem was that no one in his squadron had ever trained to such a scenario. Even so, he was confident in his squadron's ability to solve this problem through their collective experience and innovative skills. In the last three hours, he had already received several ideas from members of his squadron on how they could regain connectivity or continue flying. By this time, however, it was 0200L, and the ATO day would begin in only four hours. Reflecting on the magnitude of the situation, his squadron's lack of experience, and the level of risk he would assume in launching his pilots into an unknown threat environment, he decided to cancel the following day's flying. After announcing his decision to the squadron, his thoughts immediately turned to the other legacy assets that might have been relying on his squadron's suppression of enemy air defense capabilities. Though, unbeknownst to him, similar decisions were being made throughout Europe and in the Baltic Sea following Russia's highly coordinated multi-domain attack on U.S. operational-level communications infrastructure.

CHAPTER 1

INTRODUCTION

Aerospace power is a critical—and decisive—element in protecting our nation and deterring aggression. It will only remain so if we, as professional airmen, study, evaluate, and debate our capabilities and the environment of the future.

—General Michael E. Ryan, Air Force Chief of Staff, quoted in
Department of the Air Force, Air Force Doctrine Document 2

The prologue depicts a scenario in which the United States is in a large-scale combat operation with a highly capable Russian enemy. While one might debate the likelihood that Russia would launch such an overtly offensive action against a North Atlantic Treaty Organization (NATO) member, the depicted Russian capability and the lack of U.S. preparedness and training for such a scenario are genuine. Since 2001, the United States has been continually engaged in combat operations against an enemy that is adaptive, agile, elusive, and tactically lethal, but utterly incapable of affecting the operational level of war. Aside from the opening days of Operations Enduring Freedom and Iraqi Freedom, the United States (U.S.) has been stuck in a repetitive, uncontested joint air operations process that has inculcated the joint air operations team into a false sense of security.

Considering that “inter-state strategic competition, not terrorism, is now the primary concern in U.S. national security,” the U.S. military, in many respects, is ill-prepared to face the likes of China or Russia.¹ Since the Persian Gulf War, the U.S. has

¹ Office of the Secretary of Defense (SecDef), *Summary of the 2018 National Defense Strategy of the United States of America: Sharpening the American Military’s Competitive Edge* (NDS) (Washington, DC: U.S. Department of Defense, January 19,

effectively put the technology-dependent American Way of War on display, which has not gone unnoticed to China or Russia.² Instead, both adversaries have recognized the U.S. technological dependency and have designed systems and capabilities to exploit perceived U.S. critical vulnerabilities. One such perceived vulnerability is the U.S. operational-level communications network, which the joint force uses to connect the operational level to the tactical level of war.

In joint air operations, the mechanism that connects the operational level to the tactical level for tasking tactical units is the Air Tasking Order (ATO). It is the single source document in modern warfare that enables the Joint Force Air Component Commander (JFACC) to fulfill his responsibility to “task the joint air capabilities and forces made available” to him through centralized control, decentralized execution (CCDE).³ The ATO, however, cannot link the operational and tactical level without an operational-level communications medium to disseminate on. Thus, whichever medium the Joint Air Operations Center (JAOC) intends to disseminate the ATO on becomes a critical vulnerability. The logical approach one might take to protect such a vulnerability would be to establish redundant and alternate communications—such as a Primary,

2018), 1, accessed April 26, 2020, <https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf>.

² Colin S. Gray, “The American Way of War,” in *Rethinking the Principles of War*, by Anthony McIvor (Annapolis, MD: Naval Institute, 2005), 29-30.

³ Chairman of the Joint Chiefs of Staff (CJCS), Joint Publication (JP) 3-30, *Joint Air Operations* (Washington, DC: Office of the Chairman of the Joint Chiefs of Staff, July 25, 2019), II-3.

Alternate, Contingency, and Emergency (PACE) plan—and to prepare the joint air operations team in using it.

Thus, the purpose of this thesis is to assess the joint air operations team's preparedness to mitigate the effects of operational-level communications degradation, disruption, or denial on the JFACC's ability to centrally control taskings to tactical units. In fulfilling this purpose, this thesis seeks historical lessons from doctrine, training, and ATO dissemination challenges from the Persian Gulf War and Operation Allied Force (OAF). These past lessons, combined with an assessment of current doctrine and training, will serve as evidence in answering the primary research question and drawing associated conclusions and recommendations applicable to the existing joint air operations team.

Invariably, in writing such a thesis with analytical roots in current doctrine and training, one risks the entirety of the joint air operations team finding fault with the assessment, conclusions, or recommendations. Aside from the research purpose, this thesis intends to persuade senior leaders, staff officers, and tactical operators alike to question their confidence or renew their displeasure for the joint air operations team's lack of preparedness at linking the operational and tactical levels of war. To the extent that this thesis instills any further intellectual curiosity on the subject, it will have achieved its ends.

Terms – Definitions and Notes

Joint doctrine effectively defines most terms used throughout this thesis. Some terms, however, are introduced to bring clarity or fill a void in joint doctrine.

Joint air operations team: the team that directs, plans, executes, and assesses joint air operations. This team includes the JFACC, members of the JAOC, and members of tactical units.

Tactical unit: This term refers to any joint air operations unit that operates at the tactical level of war. The term includes, but is not limited to, fighter, bomber, attack, cyber, space, and intelligence units.

Operational-level communications: This term refers to communication systems that bridge the gap between the operational level JAOC and the tactical unit.

Degrade, Disrupt, and Deny: These three terms are used extensively in joint doctrine but are not defined in current joint doctrine. The 2006 version of *Joint Publication (JP) 3-13: Information Operations* defines these terms as:

Degrade: To reduce the effectiveness or efficiency of adversary command and control or communications systems, and information collection efforts or means.

Disrupt: To break or interrupt the flow of information.

Deny: To prevent the adversary from accessing and using critical information, systems, and services.⁴

Assumptions

1. The joint air operations team will continue to use the tenet of CCDE as the preferred approach to command and control (C2).
2. U.S. adversaries possess the capability and will to degrade, disrupt, or deny operational-level communications.

⁴ Chairman of the Joint Chiefs of Staff (CJCS), Joint Publication (JP) 3-13, *Information Operations* (Washington, DC: Office of the Chairman of the Joint Chiefs of Staff, February 13, 2006), I-9.

These assumptions, if proven false, would render this thesis invalid. An important distinction on the first assumption is in order. In modern joint air operations doctrine, the centralized control portion of CCDE utilizes the ATO to task tactical units. As will be discussed in Chapter 4, current efforts are underway that could introduce a non-ATO method of centrally controlling taskings to tactical units—a combination of commander’s intent, mission-type orders (MTO), and conditions-based authorities (CBA). Should the joint force adopt this method, either as a new method or emergency method, this thesis is still relevant as the focus is not on ATO dissemination but tasking tactical units using CCDE.

Limitations

The first limitation of the effectiveness of this thesis is classification. With the U.S.’ shift in focus to inter-state strategic competition in a Contested, Degraded, and Operationally Limited (CDO) environment, the joint force has focused its efforts on operating in such environments. The preponderance of these efforts is taking place on classified systems. Since this thesis is an unclassified product, the author has deliberately neglected researching classified information to avoid unintentional disclosure. While this limitation seems significant, there is ample unclassified literature to adequately assess the current doctrine and training related to the primary research question.

A second limitation of the effectiveness of this thesis is COVID-19 related impacts. This pandemic affected the second half of the research by limiting access to the Combined Arms Research Library and the Air University Library archivists.

Delimitations

To adequately scope the thesis, the author adopted several delimitations. First, of the seven elements of DOTMLP-F, this study will only consider two of them: doctrine and training. As discussed above, doctrine and training are unclassified topics that significantly contribute to answering the research question.

Second, the emerging highly contested and degraded operational environment will have significant effects on myriad aspects of airpower, including communications, advanced surface to air threats, non-kinetic effects, and electronic attack (EA) threats. This thesis, however, will only address the operational environment's effects on operational-level communications.

Research Methodology

This subsection describes the design of the study, from a broad interpretive framework to narrow research question. The purpose of this study is to assess the joint air operations team's preparedness to mitigate the effects of operational-level communications degradation, disruption, or denial on the JFACC's ability to centrally control taskings to tactical units. This research methodology supports that purpose.

This study is qualitative and uses social constructivism, which assumes that reality is constructed rather than discovered.⁵ This reality is formed "through historical and cultural norms that operate in individuals' lives."⁶ Said another way, an individual's

⁵ Sharan B. Merriam and Elizabeth J. Tisdell, *Qualitative Research: A Guide to Design and Implementation*, 4th ed. (San Francisco: Jossey-Bass, 2016), 293-299.

⁶ John W. Creswell, *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*, 3rd ed. (Los Angeles: SAGE Publications, 2013), 25.

perception of reality is influenced by interacting with others and their own inherent bias. Thus, this study's research utilizes multiple sources with varying points of view to answer the primary research question as thoroughly as possible.

Primary Research Question

How prepared is the joint air operations team in mitigating the effects of operational-level communications degradation, disruption, or denial on the JFACC's ability to centrally control taskings to tactical units?

The primary research question has five key components: (1) the joint air operations team; (2) operational-level communications; (3) degrade, disrupt, or deny; (4) centralized control; and (5) taskings to tactical units. While most of these terms were defined previously, each component warrants further discussion to describe which aspects of joint air operations are, and are not part of this research.

First, the entirety of the joint air operations team—from the JFACC at the operational level to the MPC chief at the tactical level—is included in this research. Second, the only type of communications discussed in this thesis is operational-level communications. This study does not address tactical-level communications. Third, “degrade, disrupt, and deny” are not the same; they each mean something specific (see the Terms subsection, page 7), and the distinctions between the terms will be important in Chapter 5. Additionally, the source or cause of communications degradation, disruption, or denial is not pertinent; only the result is. Thus, this study treats interoperability issues and enemy actions, that have an identical effect, the same. Fourth, the words “centrally control” in the primary research questions refer to the JFACC's preferred philosophy for command and control, embodied in the keystone airpower tenet: CCDE. Finally, the

“taskings to tactical units” portion of the primary research question is a paraphrased JFACC responsibility from *JP 3-30: Joint Air Operations*. “Allocate and task the joint air capabilities and forces made available by the Service components based on the Joint Force Commander (JFCs) air apportionment decision.”⁷

Secondary Research Questions (SRQ)

This subsection discusses the four SRQ, which will form the evidential basis to answer the primary research question. The ‘preparedness of the joint air operations team’ referenced in the primary research question is divided into two sections—doctrine and training—covered by the first two SRQs. These two SRQs apply to each case. The last two SRQs concern the historical ATO challenges and, therefore, only apply to the historical cases.

SRQ #1

How has doctrine prepared the joint air operations team to mitigate the effects of operational-level communications degradation, disruption, or denial on the JFACC’s ability to centrally control taskings to tactical units?

Doctrine can be categorized in many ways. The Air Force, in *Volume I: Basic Doctrine*, recognizes three types of doctrine: service, joint, and multinational. Additionally, the Air Force acknowledges three levels of doctrine: basic, operational, and tactical. Within each level, broad topics further divide doctrine. To scope the vast amounts of available doctrine, this study will primarily focus on joint and Air Force

⁷ CJCS, JP 3-30 (2019), II-3.

doctrine written about command and control of joint air operations at the operational level. For historical cases, this study will assess the “current” doctrine from the period.

Doctrinal Research Questions

In analyzing the first SRQ, this study utilizes three doctrinal research questions to aid the author’s subjective analysis. First, who does doctrine make responsible for the command and control of joint air operations? Second, is a primary ATO dissemination method, and associated communications requirements, adequately addressed in doctrine? Third, does doctrine adequately establish the requirement to have alternate, contingency, or emergency ATO dissemination methods?

SRQ #2

How has training prepared the joint air operations team to mitigate the effects of operational-level communications degradation, disruption, or denial on the JFACC’s ability to centrally control taskings to tactical units?

In analyzing the second SRQ, this study will focus on training conducted by the entire joint air operations team within the operational level, tactical level, and training that connects the seam between the two. For the historical cases, this study will assess the training conducted within five years of the start of combat operations.

SRQ #3

What attempts were made to mitigate the effects of communications degradation, disruption, or denial on the JFACC’s ability to centrally control taskings to tactical units?

SRQ #4

Were the attempts made to mitigate the effects of communications degradation, disruption, or denial on the JFACC's ability to centrally control taskings to tactical units effective?

This subsection now turns to the research design by discussing the theoretical and methodological frameworks.

Research Design

This study will use the theoretical framework of Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities, and Policy. Doctrine, training, and materiel are the three components most pertinent to the primary research question. However, to further narrow the theoretical framework, this study will only look through the lens of doctrine and training. Materiel certainly pertains to the joint air operations team's "preparedness" but is excluded due to classification challenges and materiel's highly technical nature. In some cases, a discussion on materiel will be necessary for context, but the analysis will not cover materiel.

For the methodological framework, this study utilizes a multiple case study analysis that includes the present-day case and at least one historical case.⁸ Each historical case was chosen purposely based on two criteria. First, the historical case must consist of operational-level communications degradation, disruption, or denial that challenged the JFACC's ability to centrally control taskings to tactical units. Second, the

⁸ Robert K. Yin, *Case Study Research: Design and Methods*, 5th ed. (Los Angeles: SAGE, 2014); Merriam and Tisdell, *Qualitative Research*.

historical case must include attempts—either successful or unsuccessful—to mitigate such challenges. With these criteria in mind, two historical cases stand out: the Persian Gulf War and OAF. In each of these historical cases, the joint air operations team was challenged by various levels of operational-level communications degradation, disruption, or denial caused by a lack of interoperability and made several attempts to remedy such challenges. This subsection now turns to this study’s methods for collection.

Collection Methods

This study utilizes two methods of collection: document analysis and interviews. In document analysis, this study relies on both primary and secondary source documents that address doctrine, training, or historical accounts of the ATO dissemination challenges in the two historical cases. While the author found publications that address most of these topics, specific gaps in literature exist. One such gap is in training conducted before OAF. Another such gap is in literature that describes the ATO dissemination challenges during OAF in specific detail. The final gap is in any information, except for doctrine, on the present-day case. Thus, when possible, this study incorporates interviews to fill these literature gaps.

The author conducted over fifteen semi-structured interviews, either in-person, telephonically, or through e-mail. For the oral history interviews, the author sought to ascertain the facts that had transpired and, in some cases, asked the interviewee to provide his professional analysis on former doctrine and training and how it could be applied to present-day. The present-day case interviews combined both facts and personal assessments. In an interview that includes an educated personal opinion, certain ethical assurances are in order.

The author gave each interviewee an informed consent form that explained the purpose of the interview, the interviewee's rights, and ethical assurances from the author. The author offered each interviewee anonymity in their assessments. If the interviewee chose to remain anonymous, the author did not disclose the source of the data nor the interviewee's associated unit or location in the thesis. Additionally, if the interviewee requested to remain anonymous, the author attributed their quote to an individual using a pseudonym which did not include rank. Furthermore, the author altered or omitted specific contextual details revealed in the interview to prevent deductive disclosure. In confidential interviews, the author recorded each interview using two digital recording devices, for redundancy, then transcribed the interviews. Once the author transcribed the interview and had the interviewee validate the transcription, the author destroyed the original recordings. Finally, the author stored the interview transcriptions on a password-protected digital storage drive. Considering the steps taken by the author to protect the identity of those that requested anonymity, the author assesses the overall risk to the subjects, the author, and the Command and General Staff College at a LOW rating.

Analytical Methodology and Mitigating Bias

The purpose of the study is fulfilled when the primary research question is answered for the present-day case. This study will also answer the primary research question for both historical cases. While not the primary purpose of this study, assessing the historical cases in this way will provide context and establish a trend, starting in 1990 and ending thirty years later in 2020. In the analysis, the author will strive to remove any personal bias, first by recognizing such bias.

The author is a member of the joint air operations team that has extensive operational experience with receiving the Air Tasking Order from the CAOC. Additionally, the author has served in the CAOC as a tactical unit LNO. Thus, the author has experience at the operational level, but his bias favors the tactical level. To mitigate this bias, the author will utilize the four SRQs, three doctrinal research questions, and three training focus areas to objectively inform the author's subjective analysis.

Chapter Conclusion

This thesis is designed to assess the preparedness of the joint air operations team in mitigating the effects of operational-level communications degradation, disruption, or denial on the JFACC's ability to centrally control taskings to tactical units. Chapters two and three answers the primary research question for the two historical cases—the Persian Gulf War and OAF—by assessing the four SRQs. Additionally, chapter four answers the primary research question, for the present-day joint air operations team by assessing the first two SRQs. Finally, Chapter 5 presents several conclusions and recommendations based on the analysis of this study's three cases. The Persian Gulf War is assessed first.

CHAPTER 2

CASE STUDY 1: PERSIAN GULF WAR

Arguably the most important task facing the quickly developing communications system in the theater was its ability to support the Tactical Air Control Center in transmitting the Air Tasking Order to the deployed units.

—Eliot A. Cohen, *Gulf War Air Power Survey*

Introduction

President Ronald Reagan signed the Goldwater-Nichols Department of Defense (DoD) Reorganization Act into law on October 1st, 1986.⁹ This landmark legislation gave combatant commanders, among other things, increased authority in “prescribing the chain of command to the commands and forces within the command” and “organizing commands and forces within that command as he considers necessary to carry out missions assigned to the command.”¹⁰ General George B. Crist, USMC, Commander-in-Chief United States Central Command (USCinCCENT), exercised this expanded authority in 1989, giving the commander of Central Air Forces (CENTAF) operational control over all air forces assigned to USCinCCENT.¹¹ This regulation effectively made Lt. Gen. Charles A. “Chuck” Horner, USAF, what would become the first operational JFACC.

⁹ Goldwater-Nichols, Department of Defense Reorganization Act of 1986, Public Law 99-433 [H.R. 3622], 1986, 100 Stat. 992.

¹⁰ Ibid., 100 Stat. 1014.

¹¹ Diane T. Putney, *Airpower Advantage: Planning the Gulf War Air Campaign 1989-1991* (Washington, DC: Air Force History and Museums Program, 2004), 2.

Following Saddam Hussein's invasion of Kuwait in August of 1990, General Horner went on to lead a successful 43-day air campaign, launched on January 16, 1991, comprised of all four services and numerous coalition partners. In the almost thirty years since the ceasefire, declared by President George H. W. Bush on February 28, 1991, the Persian Gulf War has served as an example to the Department of Defense, American people, coalition partners, and potential adversaries as the modern American Way of War—specifically, the conduct of the air campaign. Lessons from the inaugural JFACC air campaign are well documented and have served to inform doctrine, training, and materiel procurement for the U.S., coalition partners, and potential adversaries alike. With all the significant lessons gathered during the Persian Gulf War, the minor lessons received minimal attention in literature. Such was the case with lessons from the ATO dissemination challenges during the Persian Gulf War. With the advent of stealth technology, precision strike weapons, and settling the pre-war debates over the efficacy of the JFACC concept, the ATO dissemination challenges received little attention in literature.

This chapter focuses on doctrine, training, and the ATO dissemination challenges during the Persian Gulf War. It is the first of three case studies designed to inform the answer to the primary research question. Specifically, this chapter answers the first two SRQs by assessing the doctrine and training conducted before the Persian Gulf War. Additionally, in answering the last two SRQs, this chapter highlights the ATO dissemination challenges and analyzes the joint air operations team's efforts to overcome those challenges. Doctrine is assessed first.

Doctrine

We don't use the "D" word [doctrine] around here.

—Lieutenant General Charles "Chuck" Horner, quoted in
P. M. Carpenter, "Joint Operations in the Gulf War: An Allison Analysis"

Introduction

Prior to the Persian Gulf War, the established command and control philosophy for joint air operations was effectively decentralized control. Throughout the Korean and Vietnam Wars, the Air Force consistently advocated for unity of command and unity of effort for air forces.¹² They achieved varying levels of success in the Korean War with a concept called "coordination control," and "mission direction" in the Vietnam War. However, service components still retained control of their air forces and services operated in "route packages" to deconflict operations.¹³ Nonetheless, following the Vietnam War, the momentum favored advocates for the unity of command for air forces. Thus, revolutionary joint air operations doctrine emerged.

This subsection assesses joint and Air Force doctrine publications that were current at the start of the Persian Gulf War. The analysis in the subsection answers the first SRQ: how did doctrine prepare the joint air operations team to mitigate the effects of operational-level communications degradation, disruption, or denial on the JFACC's ability to centrally control taskings to tactical units?

¹² James A. Winnefeld and Dana J. Johnson, *Command and Control of Joint Air Operations: Some Lessons Learned from Four Case Studies of an Enduring Issue* (Santa Monica, CA: RAND, 1991), viii.

¹³ Ibid.

Tactical Air Command Manual 2-1: Aerospace Operational Doctrine – Tactical Air Operations

Tactical Air Command Manual (TACM) 2-1 was published in 1978. In his foreword to the manual, General Robert J. Dixon, the Tactical Air Command (TAC) commander, clearly articulates the changing nature of airpower and its effect on doctrine, “There is no magic in these pages—they say, in brief, what we believe—and what is—**as of now**. This is not ‘the last word’—this is the way it is now—**YOU** must make it better”¹⁴ Thus, their beliefs are summed up in this 175-page manual that “provides a single source document delineating the missions/functions/activities of all tactical air missions and supporting activities and shows how they interrelate in tactical air operations.”¹⁵ The answers to the three doctrinal research questions are found in the discussion of these operational-level considerations.

The first doctrinal research question—concerning whom doctrine makes responsible for the command and control of joint air operations—is answered along service lines. The manual states that, “The Air Force Component Commander (AFCC) exercises operational control of assigned forces through the Tactical Air Control System (TACS).”¹⁶ Additionally, it describes the common functions of the senior element of the

¹⁴ Tactical Air Command, Tactical Air Command Manual (TACM) 2-1, *Aerospace Doctrine: Tactical Air Operations* (Langley AFB, VA: Tactical Air Command, April 15, 1978), Foreword.

¹⁵ *Ibid.*, i.

¹⁶ Department of the Air Force, Air Force Manual (AFM) 2-1, *Aerospace Doctrine: Tactical Air Operations--Counter Air, Close Air Support and Air Interdiction* (Washington, DC: Department of the Air Force, May 2, 1969), 1-1; Tactical Air Command, TACM 2-1, 3-1.

TACS—the Tactical Air Control Center (TACC).¹⁷ The first common function of the TACC is to “generate the daily air tasking order.”¹⁸ This previous statement is the first doctrinal reference to the ATO as it emerged as an Air Force solution to meet the Army’s AirLand Battle doctrine requirements.¹⁹

The second doctrinal research question—concerning whether a primary ATO dissemination method and associated communications requirements are adequately addressed in doctrine—is not fully addressed in TACM 2-1. The manual discusses the need for ATO dissemination and includes associated communications requirements, but does not establish a specific system for ATO dissemination. Within the TACC, “operational planners . . . develop the air tasking order which is transmitted to the Tactical Unit Operations Center . . .”²⁰ Without naming a specific system, the manual discusses the necessary elements for a C2 system, which includes “information gathering elements, facilities from which to operate, and a communications network which ties the whole thing together.”²¹ The last element of the system—the communications network—is of interest to this study. The manual states that “this system cannot be rigidly structured or completely predetermined, but is tailored to the specific needs of the operation to be

¹⁷ Tactical Air Command, TACM 2-1, 3-7.

¹⁸ Ibid., 3-8.

¹⁹ Robert P. Winkler, “The Evolution of the Joint ATO Cycle” (Paper, Joint Forces Staff College, Joint Advanced Warfighting School, Norfolk, VA, 2006), 18-19.

²⁰ Tactical Air Command, TACM 2-1, 3-9.

²¹ Ibid., 3-5.

supported. The actual size is dependent on numerous variables.”²² Among the variables are “expected activity level, *sortie rates*, type of mission anticipated, *other component services, involvement* [emphasis added] . . . “²³ These variables are of particular interest to this case study and will be discussed later in the chapter.

Finally, while TACM 2-1 establishes the need to disseminate the ATO to tactical units, it does not address the third doctrinal research question, concerning whether doctrine adequately establishes the requirement to have alternate, contingency, or emergency ATO dissemination methods. There is a lengthy discussion on joint and service elements that are responsible for certain aspects of the communications network, but the discussion does not include backup systems. However, there is one statement in the manual that speaks to the requirement for redundant communications networks, “The degree of redundancy required must be assessed along with the need for secure communications.”²⁴ So, like the variables considered when determining the size of the communications network, the degree of redundancy must be considered as well.

JP 3-01.2, Joint Doctrine for Theater Counterair Operations

JP 3-01.2 was published in April of 1986 as Joint Chiefs of Staff (JCS) Pub 26 and was subsequently renamed to JP 3-01.2 in 1988. This publication’s aim “is to issue joint doctrine for the planning and employment of joint forces in theater counterair operations” and “addresses the integration and employment of all assets that can be used

²² Tactical Air Command, TACM 2-1, 3-5.

²³ Ibid.

²⁴ Ibid., 3-7.

by the joint force commander in conducting counterair operations.”²⁵ Although JP 3-01.2 primarily discusses counter-air operations, the C2 portions of JP 3-01.2 represent the most significant leap towards what we now know as joint air operations doctrine. This leap is most evident in the first doctrinal research question, but this publication also adequately addresses doctrinal research questions two and three.

In answering the first doctrinal research question—concerning whom doctrine makes responsible for the command and control of joint air operations—JP 3-01.2 is the first doctrinal publication to introduce the term JFACC.

The joint force commander will normally designate a joint force air component commander. The joint force air component commander’s responsibilities will be assigned by the joint force commander (normally these would include, but not be limited to, planning, coordination, allocation and tasking based on the joint force commander’s apportionment decision).²⁶

While this established a *functional* component commander for air operations, there are some caveats. One, for example, is the Marine Air-Ground Task Force (MAGTF) air assets. JCS Pub 3-01.2 quotes the 1986 Omnibus Agreement—between the Marine Corps and Air Force—in its entirety. It states that “MAGTF air assets will normally be in support of the MAGTF mission” except when the MAGTF commander makes sorties above his direct support requirements available to the JFC, to be tasked by the JFACC.²⁷ So, while the JFACC concept creates a functional component commander for air

²⁵ Chairman of the Joint Chiefs of Staff (CJCS), Joint Publication (JP) 3-01.2, *Joint Doctrine for Theater Counterair Operations* (Washington, DC: Office of the Chairman of the Joint Chiefs of Staff, April 1, 1986), I-1.

²⁶ Ibid., III-4.

²⁷ Ibid.

operations, not all air assets will fall under the JFACC for tasking. These retained organic assets from the MAGTF, and presumably from the Navy, must still be deconflicted from other air assets in the theater, which is a function of the ATO.

The discussion in JP 3-01.2 on the second doctrinal research question—concerning whether a primary ATO dissemination method and associated communications requirements are adequately addressed in doctrine—is not as clear. While JCS Pub 3-01.2 establishes the point that the JFACC requires an increased capability to communicate to the joint force, it makes the point specifically to counterair operations and does not explicitly discuss disseminating the ATO. It does, however, broadly emphasize the importance of communications at the operational-level. For example, “communications systems . . . must be capable of providing secure near-real-time exchange of essential information between the joint force commander and subordinate commanders and forces.”²⁸ This emphasis on the importance of communications also extends to the need for backup communications systems.

In the final doctrinal research question—concerning whether doctrine adequately establishes the requirement to have alternate, contingency, or emergency ATO dissemination methods—JCS Pub 3-01.2 improves the discussion by adding specificity. First, this publication emphasizes that C2 communications systems must be engineered with intended capacity in mind, a factor that would plague backup communications systems in the Persian Gulf War.²⁹ Additionally emphasized is the importance of creating

²⁸ CJCS, JP 3-01.2, III-6.

²⁹ Ibid.

survivable communications systems where echelons of command can exchange information even “when an intermediate level has been disabled.”³⁰ Should these survivable communications systems fail, JCS Pub 3-01.2 also emphasizes that communications systems—particularly ones that utilize automatic data processing— “must have a backup capability and procedures to maintain continuity of operations.”³¹

Conclusion

The period between Vietnam and the Persian Gulf War was marked with change, specifically for airpower development. After U.S. involvement in Vietnam concluded in January of 1973, each of the services took different lessons from the conduct of the piecemeal air campaign. Nine months later, in another area of operations, airpower was on display in the Arab-Israeli War of 1973. The lessons from that war served as a wakeup call to the United States Army, who developed their AirLand Battle doctrine, which called for combined arms—including airpower—to affect the enemy several echelons deep. In 1986, President Reagan signed the Goldwater-Nichols DoD Reorganization Act into law, which gave combatant commanders new authorities and emphasized joint operations. Finally, throughout this period, a new generation of aircraft came on-line, precision weapons were significantly improved, new airborne command and control platforms were introduced, and stealth technology debuted. These lessons from wars, operating concepts, and changes in technology gave service and joint doctrine writers the task of “keeping up with the times.” Arguably, based on service disagreements, no

³⁰ CJCS, JP 3-01.2, III-6.

³¹ Ibid., III-7.

concept was more challenging to doctrine writers than the development of the JFACC concept.

Joint and Air Force doctrine publications available before the onset of the Persian Gulf War contained two conflicting constructs for command and control of air operations: the AFCC and the JFACC. The AFCC—discussed in the Air Force’s operational doctrine—is responsible for command and control of assigned tactical air forces, specifically “USAF tactical air forces.”³² The JFC may also give the AFCC, or other service component commanders, the responsibility to coordinate air operations, but coordination is the extent of service cooperation in this construct.³³ The JFACC concept—discussed for the first time in the 1986 joint doctrine for counterair operations—on the other hand, is a shift from a *service* component commander to a *functional* component commander. The JFC gives the JFACC the roles of planning, coordination, allocation, and tasking based on the JFC’s apportionment decision.³⁴ However, this arrangement is only discussed in the context of counterair operations.

Contained within the doctrinal shift from the AFCC to the JFACC is a shift from centralized control of USAF air operations to centralized control of joint operations for the counterair mission. With varying levels of specificity, both joint and Air Force doctrine publications stressed the importance of communications enabling centralized

³² Department of the Air Force, AFM 2-1, 2–3.

³³ Chairman of the Joint Chiefs of Staff (CJCS), Joint Publication (JP) 3-56, *Tactical Command and Control Planning Guidance and Procedures for Joint Operations (Information Exchange Planning Guidance)* (Washington, DC: Office of the Chairman of the Joint Chiefs of Staff, April 1, 1974), 29.

³⁴ CJCS, JP 3-01.2, III-4.

control. Taken as a collective body of work, the doctrine available at the onset of the Persian Gulf War describes three essential ideas about communications. First, the operational-level command and control entity—in enabling centralized control for the AFCC or JFACC—must have a direct communications link with tactical units to, among other things, disseminate orders. Second, the communications link must be secure, survivable, and appropriately sized—considering variables such as sortie rates, type of mission anticipated, and other service involvement. Third, the communications link must have dedicated backups, especially for automated systems.

As a collective body, doctrine addressed the essential information pertinent to the three doctrinal research questions, which, when combined, form the following statement:

The JFACC executes centralized control through his operational-level command and control center—the TACC for the Air Force—by planning and disseminating the ATO to tactical units using an adequately sized, interoperable, survivable communications system that has dedicated backups.

This statement would offer sage advice for a JFACC and his staff. Nonetheless, in answering the first SRQ, doctrine did not adequately prepare the joint air operations team to mitigate the effects of operational-level communications degradation, disruption, or denial on the JFACC’s ability to centrally control taskings to tactical units for two reasons.

First, while some publications describe requirements for command and control systems, no publication names a specific primary ATO dissemination system that each service should acquire to ensure interoperability. Establishing such a joint standard in 1986 could have provided the impetus for interoperable operational-level communications during the Persian Gulf War.

Second, the ideas contained in the previous combined statement were not consolidated; they were scattered within individual publications and spread out between joint and Air Force doctrine. While one might argue that the ideas were contained in doctrine nonetheless, extracting the essential ideas amongst the disparate, conflicting ideas to form the concise statement relied heavily upon hindsight of the Persian Gulf War—a luxury the JFACC and his staff did not have in 1990.

Therefore, from the doctrine perspective, the joint air operations team was not adequately prepared to mitigate the effects of operational-level communications degradation, disruption, or denial on the JFACC's ability to centrally control taskings to tactical units. Doctrine, however, is not the only factor that determines overall preparedness—one must consider training as well.

Training

It appears that what joint, high-level staff training was conducted did not force the Services to resolve such inter-service issues as the Fire Support Coordination Line and the Air Tasking Order.

—Stanley Horowitz et al., *Unit Training in the Gulf War*

Introduction

Training prior to the Persian Gulf War can be split into two distinct periods: pre-deployment training and training conducted during Operation Desert Shield. Additionally, training can also be divided amongst three groups: Air Force, Navy, and operational-level staff. Within each period and for each group, this study will assess the training at the operational level, tactical level, and training that connects the seam between the two, as it relates to the second SRQ. Before transitioning to the analysis, it is important to discuss a few notes on the sources and information available to this study.

The seminal work on the Persian Gulf War air campaign is the *Gulf War Air Power Survey* (GWAPS), which is divided into five volumes and a summary report. *GWAPS Volume IV, Part I: Weapons, Tactics, and Training* is of particular use to this section. Another important work, focused entirely on training, is *Unit Training in the Gulf War*. These two sources, combined with a few other primary and secondary sources, formed the evidential basis for this subsection's analysis. Pre-deployment training for the joint air operations team will be considered first.

Pre-Deployment Training

This subsection assesses the pre-deployment training for the Air Force, Navy, and operational-level staff within five years of the start of Operation Desert Shield. It is important to note that the JFACC concept debuted in doctrine only four years prior to the start of Operation Desert Shield with the publication of *JCS Pub 3-01.2: Joint Doctrine for Counterair Operations*.³⁵ Air Force pre-deployment training is considered first.

Air Force

Two Air Force pre-deployment training exercises are pertinent to this study: Exercise Blue Flag and Exercise Red Flag. Red Flag and squadron training are discussed in both GWAPS and *Unit Training in the Gulf War*. Blue Flag, however, is alluded to only once in GWAPS; thus, the subsection on Blue Flag relies heavily upon interviews. Additionally, while all Air Force tactical units conducted individual unit training, this

³⁵ CJCS, JP 3-01.2, III-4.

training was primarily focused on tactics and is therefore not applicable nor discussed in this study.

Blue Flag

Blue Flag is an operational-level command and control exercise designed to ensure that battle managers sent to theater commands have the experience needed to perform their command and control duties as soon as they arrive.³⁶ Blue Flag's emphasis is "on the battle staff's ability to gather and use intelligence information as they direct reconnaissance, fighter, and ground strike forces against the enemy air defense."³⁷ Prior to the Persian Gulf War, all Blue Flags were conducted at Hurlburt Field, FL.³⁸ Three to four times each year, approximately 2,300 personnel—primarily from the Air Force but with ample participation from other services and coalition partners—gained valuable command and control experience.³⁹

Blue Flag is focused on training at the operational-level; however, the operational and tactical levels must be linked for the command and control personnel to receive valuable training. The linkage between the two levels is constructive, enabled by the Air Warfare Simulation (AWSIM) and several exercise controllers that roleplay tactical units. This linkage, however, benefits the personnel who monitor the execution of the daily ATO rather than the personnel responsible for ATO production and dissemination. Mr.

³⁶ Tactical Air Command, TACM 2-1, 10-8.

³⁷ Ibid.

³⁸ John W. Drain, e-mail interview by author, April 20, 2020.

³⁹ Tactical Air Command, TACM 2-1, 10-9; Drain interview.

John Drain, a current Blue Flag Senior Controller and 29-year veteran of Blue Flag, stated that prior to the Persian Gulf War, “ATO dissemination was not even considered to be an issue since there weren’t many adversaries with any capability to prevent dissemination . . . since all the Blue Flags were home games, conducted at Hurlburt Field, the ATO Production team simply passed us a disc with the ATO, and we loaded it into AWSIM.”⁴⁰ Thus, while Blue Flag provided command and control personnel valuable training and experience, it did not bridge the gap between the operational and tactical levels through ATO dissemination.

Red Flag

Unlike the operational-level Blue Flag, Red Flag is a tactical-level exercise. Red Flag was created in 1975 by General Robert J. Dixon, TAC Commander, “to provide a safe, simulated combat environment that allows participants to employ composite force tactics against strategic and tactical targets defended by a challenging, integrated air defense system.”⁴¹ The primary training audience is U.S.—including increasing participation from the Navy and Marine Corps—and coalition aircrew from multiple airframes.⁴² These aircrew plan, fly, and debrief ten sorties throughout the exercise

⁴⁰ Drain interview.

⁴¹ Eliot A. Cohen, *Gulf War Air Power Survey*, vol. 4, pt. 1, *Weapons, Tactics, & Training* (Washington, DC: Office of the Secretary of the Air Force, 1993), 421.

⁴² *Ibid.*, 426.

focused on “large scale conventional strike versus a low EA, Soviet high-threat environment.”⁴³

Their mission planning—as in combat—starts with their tasking on the ATO, representing the only linkage Red Flag has to operational-level command and control. However, the ATO is given to the aircrew, rather than receiving it from the TACC via a Computer-Aided Force Management System (CAFMS) terminal.⁴⁴ Thus, while Red Flag gives “Blue 4 and new mission commanders” valuable training, it does not bridge the gap between the operational and tactical levels.⁴⁵ In the context of this study, this represents a lost opportunity to train aircrew to quickly and effectively use CAFMS as well as to highlight potential downfalls with the system and discuss alternate options to receive the ATO. Yet, in the context of Red Flag’s purpose, as described above, this omission is by design, to keep the focus of the exercise at the tactical level.⁴⁶

Navy

Six Navy aircraft carriers deployed in support of the Persian Gulf War. Each of these six aircraft carriers had a unique pre-deployment training experience based on when they deployed, what threat scenario they focused on before Saddam invaded Kuwait, and their experience with JFACC operations. Additionally, in the years leading up to the

⁴³ Colonel William A. Reese and Steven D. Imonti, e-mail interview by author, April 21, 2020.

⁴⁴ Cohen, *Weapons, Tactics, & Training*, 428, 431.

⁴⁵ Reese and Imonti interview.

⁴⁶ Ibid.

Persian Gulf War, two joint exercises were conducted focusing on objectives pertinent to this study. This section discusses these exercises and the six aircraft carrier's pre-deployment training. It is organized into three subsections: Operation Solid Shield '87 and '89, early deployer carrier training, and late deployer carrier training.

Operation Solid Shield '87 and '89

Operation Solid Shield was a Commander-in-Chief, Atlantic Command joint exercise designed, among other things, to test and practice JFACC operations with Marine, Navy, and Air Force tactical units.⁴⁷ Communications between the JFACC and associated other service components were emphasized in the 1987 and 1989 iterations of the exercise. In Solid Shield '87, the Air Force held the JFACC role, and communications between the JFACC and the Navy were assessed "marginal at best."⁴⁸ The primary means of communication between the two was the Automatic Digital Network System (AUTODIN). A significant lesson that came out of Solid Shield '87 was that narrative message traffic via AUTODIN took longer than expected and resulted in planning difficulties.⁴⁹ These lessons would be carried forward to Solid Shield '89.

In the next iteration of the exercise, Commander-in-Chief, Atlantic Command, assigned the JFACC role to the Navy, which assembled onboard the United States Ship

⁴⁷ Gary E. Washburn, "Improving JFACC: Doctrine and Communications" (Thesis, Naval War College, Newport, RI, May 18, 1992), 9.

⁴⁸ Ibid.

⁴⁹ Ibid.

(USS) Mount Whitney (Blue Ridge-class amphibious command ship).⁵⁰ Primary communications onboard the Mount Whitney were enabled by a unique Super High Frequency (SHF) radio—the WSC-6—and utilized the Worldwide Military Command and Control System (WWMCCS) as the primary means of communication for the JFACC.⁵¹ The Mount Whitney already possessed this radio; however, the other participating Navy and Marine ships did not have this radio, nor did most of the Navy fleet.⁵² Despite initial complications with the Marine Component, the WWMCCS communications method was considered a success. Not because of the WWMCCS equipment, but because, with one exception, all component participants were connected with a high capacity communications link enabled by the SHF radio.⁵³

On the margins, the Air Force and Navy components conducted an additional test during Solid Shield '89, which further demonstrated the importance of the SHF radio. The Navy installed an Air Force CAFMS terminal onboard the Mount Whitney, supported by the pre-existing WSC-6 SHF radio. The test sent a 1,000 sortie ATO and more than 100 messages via the high capacity communications link established from the Mount Whitney, through the Norfolk Naval Ground Station, and to the 507 TACCS at

⁵⁰ Washburn, “Improving JFACC,” 10.

⁵¹ Ibid.

⁵² Ibid.

⁵³ Ibid., 12.

Shaw Air Force Base (AFB), SC.⁵⁴ This successful test effectively solved the Solid Shield '87 problem of slow narrative message traffic, causing difficulties in planning.

Operation Solid Shield '87 and '89 produced two key findings. First, transmitting narrative messages over AUTODIN was prohibitively slow for joint air operations. Second, a high capacity SHF radio link dramatically improves the JFACC's ability to centrally control taskings to tactical units. While Operation Solid Shield '87 and '89 were certainly successful in producing these two key findings, the Navy did not sufficiently prioritize the acquisition of the recommended radios, resulting in their absence during the war.⁵⁵

Carrier Pre-Deployment Training

The "Desert Storm Six"—the USS Saratoga, USS Kennedy, USS Midway, USS Ranger, USS America, and USS Roosevelt—fall into two groups: "early deployers" and "late deployers."⁵⁶ The early deployers were those Carrier Battle Groups (CVBG) that arrived during Operation Desert Shield, whereas the late deployers arrived only weeks before Operation Desert Storm. This section will examine the pre-deployment training and discuss the inherent training advantages and disadvantages for each of these groups.

⁵⁴ Cohen, *Weapons, Tactics, & Training*, 154.

⁵⁵ Washburn, "Improving JFACC," 11, 16; Eliot A. Cohen, *Gulf War Air Power Survey*, vol. 5, pt. 1, *A Statistical Compendium* (Washington, DC: Office of the Secretary of the Air Force, 1993), 234.

⁵⁶ Stanley Horowitz, Jesse Orlansky, John C.F. Tillson, Theonphilos C. Gemelas, Harry J. Gilman, Colin Hammon, and H. Marshall Hoyler, *Unit Training in the Gulf War* (Alexandria, VA: Institute for Defense Analyses, December 1995), IV-1, IV-5 - IV-6.

The early deployers—USS Saratoga, USS Kennedy, and USS Midway—suffered the most in terms of pre-deployment training due to unfamiliarity with ATO scheduling procedures. As part of focusing on a different theater, these carriers were accustomed to entirely different strike scheduling procedures and “had not incorporated ATO scheduling procedures into their pre-deployment training plans.”⁵⁷

By contrast, the late deployers—USS Ranger, USS America, and USS Roosevelt—were advantaged in terms of pre-deployment training due to their access to early deployer exercise objectives and ATO familiarity. First, as the early deployers participated in exercises during Desert Shield, the Commander of Naval Forces Central Command (NAVCENT) and his subordinate commanders published their training objectives, allowing the late deployers to adjust their training to focus on similar problems.⁵⁸ Second, the early deployers presumably passed along their challenges in adhering to the ATO scheduling process during Desert Shield to the late deployers. As a result, “the *Ranger*’s Fleet Exercise emphasized scheduling sorties so that, when the time came, Navy air would conform to CENTAF’s ATO.”⁵⁹

Desert Shield Training

On 12 August 1990, the first daily ATO was published by CENTAF staff, which included ground and airborne alert sorties, air refueling sorties, and airlift within the

⁵⁷ Horowitz et al., *Unit Training in the Gulf War*, IV-6 - IV-7.

⁵⁸ Cohen, *Weapons, Tactics, & Training*, 451.

⁵⁹ Horowitz et al., *Unit Training in the Gulf War*, IV-8.

theater.⁶⁰ Training, while a secondary priority to alert sorties, became more important as aircrew skills began to wane. Many commanders and staffs recognized this, and in response, CENTAF stood up a staff to establish theater training priorities and arrange host nation training facilities, airspace, and bombing ranges.⁶¹ By late August, these training sorties were added to the daily ATO, and it progressively grew in size due to the increase in theater-wide exercises and unit training.⁶² This section will specifically examine theater-wide, recurring and unique training exercises, high-level joint and component staff training, as well as Navy training in the Red Sea CVBG and the Persian Gulf Carrier Battle Force.⁶³

Theater-wide Training (Marines/Navy/AF)

CENTCOM and CENTAF directed, planned, and executed training exercises during Desert Shield to maintain combat readiness and practice specific ATO missions by conducting “mirror image” strikes.⁶⁴ Participation in these exercises varied based on their objectives but was mostly inclusive. These exercises can be divided into two groups:

⁶⁰ Eliot A. Cohen, *Gulf War Air Power Survey*, vol. 1, pt. 2, *Command and Control Report* (Washington, DC: Office of the Secretary of the Air Force, 1993), 148.

⁶¹ Cohen, *Weapons, Tactics, & Training*, 351.

⁶² Cohen, *Command and Control Report*, 148.

⁶³ While the Air Force and Marine tactical units conducted training in theater as well, their data is either unavailable or the objectives and outcome of their training was not relevant to this study.

⁶⁴ Cohen, *Weapons, Tactics, & Training*, xv, 449.

recurring training exercises and unique training exercises. See Figure 1 below for a graphical depiction of the Desert Shield exercises.

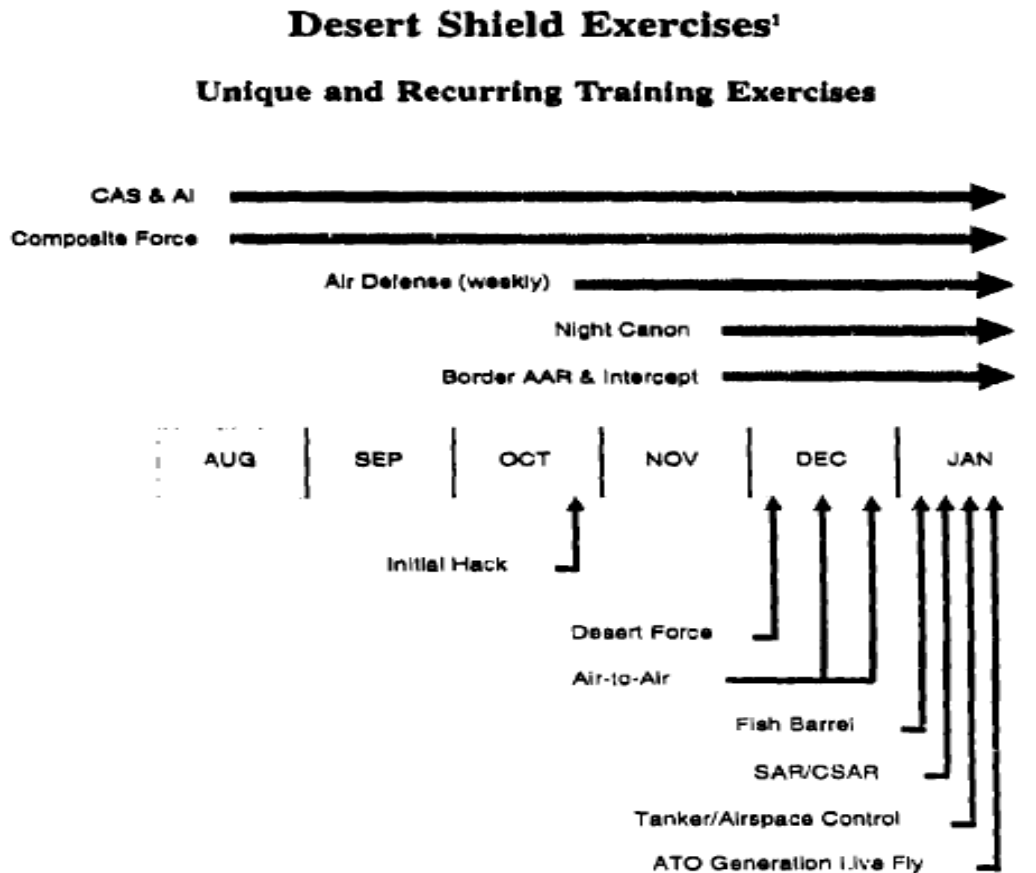


Figure 1. Desert Shield Exercises

Source: Eliot A. Cohen, *Gulf War Air Power Survey*, vol. 4, pt. 1, *Weapons, Tactics, & Training* (Washington, DC: Office of the Secretary of the Air Force, 1993), 409.

Recurring and training exercises varied in their objectives, duration, and frequency. Exercise Desert Force, for example, ran from 5 to 7 December 1990 and was

designed to “fly a dress rehearsal of actual D-Day.”⁶⁵ The remaining recurring and unique training exercises all had one significant secondary effect: exercising the ATO process. Each training exercise sortie, along with individual unit training, required entry into the ATO by the TACC and then disseminated through CAFMS. This provided the joint force some much-needed familiarity with the relatively new ATO process. This also highlighted issues with disseminating the ATO to the Navy and provided a testbed for finding solutions to the dissemination problems. While each of these training exercises was focused at the tactical level and mostly had tactical objectives, one exercise was designed at the operational level.

Joint and Component Staff Training

The Defense Institute of Analysis, in their *Unit Training in the Gulf War* report to the Office of the Under Secretary of Defense (Personnel and Readiness), found that while high-level component and joint staffs worked very hard, they conducted little actual training.⁶⁶ The one exception to this was the ATO Generation Exercise. This “paper exercise” was conducted on 12 and 16 January 1991 and designed to exercise the full ATO cycle from “initial planning and target nomination in the Guidance, Apportionment, and Targeting (GAT) cell to the production and distribution of the D+2 ATO in the ATO Division.”⁶⁷ One pertinent finding for this study was the difficulties the staff experienced

⁶⁵ Cohen, *Weapons, Tactics, & Training*, 412-413.

⁶⁶ Horowitz et al., *Unit Training in the Gulf War*, VI-1.

⁶⁷ Cohen, *Weapons, Tactics, & Training*, 416-417.

in entering the ATO into CAFMS.⁶⁸ Although, it is interesting to note the dates of this exercise, 12 and 16 January. Five days and one day before D-Day. While the results from this exercise were relevant in understanding the difficulties with entering a 2,899-sortie schedule into CAFMS, the exercise was conducted too late to have a significant effect on operations in Desert Storm.

Navy Specific Training

During Desert Shield, the “Desert Storm Six” were split between two battle forces: Battle Force Zulu (or Persian Gulf Battle Force) and Battle Force Yankee (or Red Sea Battle Force).⁶⁹ The Red Sea Battle Force, as its name implies, operated out of the Red Sea and was comprised of the America, Kennedy, and Saratoga CVBGs.⁷⁰ The Persian Gulf Battle Force operated back and forth between the Gulf of Oman and the Persian Gulf during Desert Shield and stayed in the Persian Gulf during Desert Storm.⁷¹ It was comprised of the Midway, Ranger, and Roosevelt CVBGs.⁷² Before discussing the advantages and disadvantages of Navy training between the two Battle Forces, it is important to note the location of the early deployers versus the late deployers. See Figure 2 for a graphical depiction of the in-theater timeline as well as the CVBG location.

⁶⁸ Cohen, *Weapons, Tactics, & Training*, 417.

⁶⁹ Marvin Pokrant, *Desert Shield at Sea: What the Navy Really Did* (Westport, CT: Greenwood Press, 1999), 176.

⁷⁰ Ibid., 178.

⁷¹ Ibid.

⁷² Ibid.

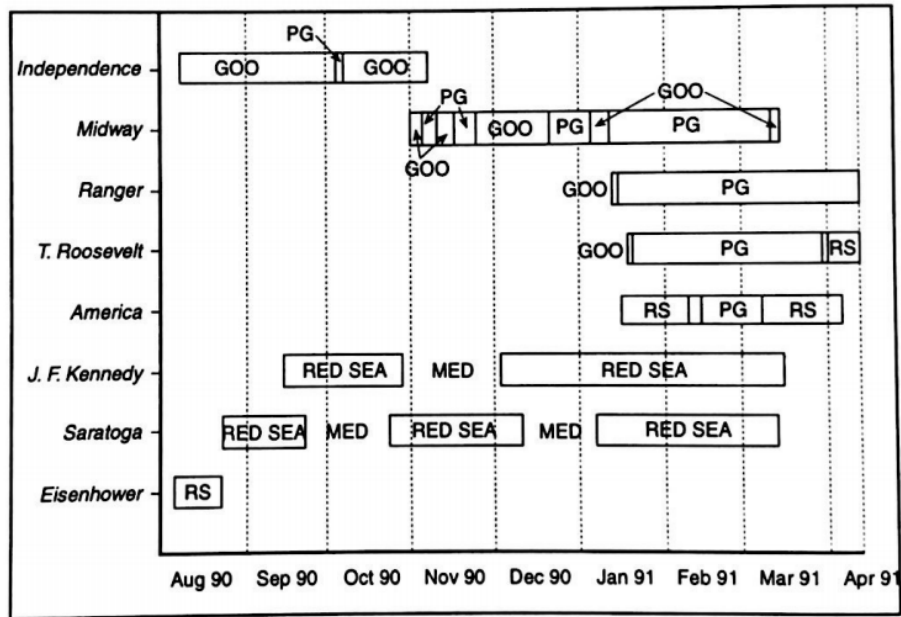


Figure 2. CVBG Movement during the Persian Gulf War

Source: Marvin Pokrant, *Desert Shield at Sea: What the Navy Really Did* (Westport, CT: Greenwood Press, 1999), 178.

The Persian Gulf Battle Force consisted only of the Midway CVBG, until just days before Desert Storm began. The Midway, an early deployer, was disadvantaged in pre-deployment training, but now had roughly two and a half months to train with the people alongside whom they would fight, and do so in theater, under the same command and control architecture that would operate in Desert Storm.⁷³ For the Midway, however, the latter would not be fully realized. As discussed previously, each CVBG participated in various recurring and unique training exercises, acting as a forcing function to participate in the ATO scheduling process. When not conducting these CENTAF-led

⁷³ Horowitz et al., *Unit Training in the Gulf War*, IV-8.

training exercises, units were left to their own training, with one caveat: the ATO scheduling process.

On 12 August 1990, Lt Gen Horner, in his role as USCinCCENT Forward, directed that all carrier air operations be placed on the ATO unless in “direct support of the carrier.”⁷⁴ Lt Gen Horner did not define the term “direct support,” but the Navy generally interpreted that to mean: any flights exclusively over water.⁷⁵ This presented the Persian Gulf Battle Force with a choice: fly overland and succumb to the JFACC and ATO process or fly over water and deal only with the familiar Navy scheduling process. The Persian Gulf Battle Force—mostly the Midway—“generally chose not to put its flights on JFACC’s schedule . . .” and “. . . avoided them as much as possible . . .”⁷⁶ The obvious ramification of this choice was that the Midway—an early deployer, that already had minimal JFACC and ATO experience—was “less well prepared when it had to operate with JFACC and the ATO during Desert Storm.”⁷⁷ The Red Sea Battle Force, on the other hand, had little choice.

The Red Sea Battle Force, for most of Desert Shield, was comprised of the Kennedy and Saratoga CVBGs. Like the Midway, these early deployers had little JFACC and ATO experience before arriving in theater; however, they had four to five months of training to familiarize themselves with the process. Based on geography and training

⁷⁴ Pokrant, *Desert Shield at Sea*, 70.

⁷⁵ Ibid., 71.

⁷⁶ Ibid., 72.

⁷⁷ Ibid.

airspace, the Red Sea Battle Force conducted most of its unit training in Saudi Arabia.⁷⁸ As a result, they dealt much more closely with the JFACC and became very accustomed to working with the ATO process.⁷⁹

Conclusion

In the zone of overlap between the operational and tactical levels of war, both pre-deployment training and training during Desert Shield did not prepare the joint air operations team to mitigate the effects of operational-level communications degradation, disruption, or denial on the JFACC's ability to centrally control taskings to tactical units. Tactically speaking, the GWAPS was correct in their assessment that "aircrews did not come to the Arabian Peninsula during Desert Shield to train for a war; they came prepared to fight a war." Although operationally speaking, the opposite is true.

The joint air operations team arrived in theater, having not adequately trained to close the gap between the operational and tactical levels. Additionally, they required a five-month-long Desert Shield for the Navy to become familiar with the JFACC concept and ATO scheduling process. Those five months, however, would not have been necessary had the Air Force and Navy capitalized on the year that followed Operation Solid Shield '89. This exercise should have been a catalyst for further discussion and testing on implementing the JFACC concept and solving the identified interoperability issues with JFACC communications. Instead, equipment procurement recommendations were not adequately prioritized, and units continued to train to air operations in their

⁷⁸ Pokrant, *Desert Shield at Sea*, 72.

⁷⁹ Cohen, *Weapons, Tactics, & Training*, 449.

service's stove pipe. Therefore, pre-deployment training and training during Desert Shield did not adequately prepare the joint air operations team to mitigate the effects of operational-level communications degradation, disruption, or denial on the JFACC's ability to centrally control taskings to tactical units.

In interviews after the Persian Gulf War, both General Schwarzkopf and Navy leadership regarded the "lack of joint training as an important deficiency of all CVBGs in the Gulf."⁸⁰ Additionally, following the Persian Gulf War, Atlantic Command implemented the requirement for CVBGs to conduct a Joint Task Force (JTF) Exercise, which includes the ATO scheduling process, as part of their pre-deployment training.⁸¹ Had this joint training been a requirement prior to the Persian Gulf War, the ATO dissemination challenges experienced during Desert Shield and Desert Storm might have been avoided.

ATO Dissemination Challenges

While the Air Force will rightly point to this document [ATO] (and often has) as the playbook for the vastly successful Air Bowl, we in the surface navy, from our more parochial perspective, remember it simply as the 300-page, "Personal For," flash-precedence, randomly sorted message, rarely received before the middle of the day to which it applied . . .

—Lieutenant Commander Larry Di Rita,
"Exocets, Air Traffic, & the Air Tasking Order"

⁸⁰ Horowitz et al., *Unit Training in the Gulf War*, IV-9.

⁸¹ Ibid.

Introduction

The purpose of the JFACC is to bring unity of command in applying airpower to achieve unity of effort for the JFC. The JFACC accomplishes this through centralized control of all air assets made available to him, which is enabled by the ATO. In Lt Gen Horner's words, "without the ATO, you don't have the JFACC. With the ATO, you don't have anything but a JFACC."⁸² With the ATO, came the requirement and challenge to disseminate the ATO to the increasing number of units deployed to the theater, including the six carriers that composed the Red Sea Battle Force and the Persian Gulf Battle Force. The GWAPS stated that this challenge was "arguably the most important task facing the quickly developing communications system in the theater."⁸³ This section—in answering SRQs three and four—discusses the sources of ATO dissemination challenges, between the TACC and the services, and examines the attempts made by the CENTAF communications team and the Navy to overcome those challenges during Desert Shield and Desert Storm.

Desert Shield ATO Dissemination – Air Force and Marines

CENTAF communication teams arrived in theater on 8 August 1990 and began working on their initial primary concern: how to disseminate the ATO.⁸⁴ The first ATO,

⁸² Edward C. Mann III, *Thunder and Lightning: Desert Storm and the Airpower Debates* (Maxwell AFB, AL: Air University Press, 1995), 59.

⁸³ Cohen, *Command and Control Report*, 116.

⁸⁴ Colonel Randy Witt, *Air Force Tactical Communications in War, The Desert Shield/Desert Storm Comm Story* (Riyadh, Saudi Arabia: Headquarters United States Central Command Air Forces, March 1991), 3-4.

published on 12 August 1990, was disseminated using a combination of a Saudi-only military fax system, the airlift control centers Ultra High Frequency (UHF) Tactical Satellite, and a quick reaction package VHF satellite communications system.⁸⁵ However, each of these were temporary solutions until the primary system—the Computer Assisted Force Management System (CAFMS)—became operational.

CAFMS

CAFMS was developed as an interactive system between TACC central planners and dispersed squadrons.⁸⁶ It was designed to fulfill “the functions of Air Tasking Order (ATO) preparation, mission monitoring, immediate tasking . . .” and was capable of “disseminating ATOs to remotes or through organic communications.”⁸⁷ In 1990, the Air Force had three CAFMS vans, one of which was allocated to 9 AF.⁸⁸ Not surprisingly, CENTAF—a dual-hatted organization with 9 AF—adopted CAFMS for use in Desert Shield and Desert Storm.⁸⁹ CAFMS worked as a network of central processors and remote terminals where each central processor was linked to each other and eleven remote terminals.⁹⁰ Initially, the CENTAF communications team setup one central

⁸⁵ Witt, *Air Force Tactical Communications in War*, 4-5.

⁸⁶ Pokrant, *Desert Shield at Sea*, 69.

⁸⁷ John Paul Hyde, Johann W. Pfeiffer, and Toby C. Logan, “CAFMS Goes to War,” in *The First Information War: The Story of Communications, Computers, and Intelligence Systems in the Persian Gulf War*, ed. Alan D. Campen (Fairfax, VA: AFCEA International Press, 1992), 38.

⁸⁸ *Ibid.*, 38–39.

⁸⁹ Pokrant, *Desert Shield at Sea*, 69.

⁹⁰ Cohen, *Command and Control Report*, 115-116.

processor at the TACC in Riyadh and connected it up to eleven remote terminals located at WOC, Control and Reporting Centers, Air Support Operations Centers, and the Marine Corps Tactical Air Operations Center (AOC).⁹¹ By 20 August 1990—eight days after the first ATO—TACC began disseminating the ATO via CAMFS; however, as Desert Shield progressed, the demand for connectivity steadily increased, and eleven remote terminals were not sufficient.⁹² By December, the communications team had set up a total of three central processors, and associated terminals, with five more central processors on order.⁹³ In the meantime, while the CAFMS network expanded, deployed squadrons still required the ATO, and the CENTAF communications team created a solution: the mini-ATO distribution system (MADS).⁹⁴

MADS

MADS developed out of a CENTCOM directive to establish a computer to Secure Telephone Unit (STU)-III system to securely exchange circuit channelization data.⁹⁵ The CENTAF communications team realized that this method could have a much broader application than initially envisaged. They hypothesized that this system could provide an alternate means of ATO dissemination to the units where CAFMS terminals had not yet

⁹¹ Cohen, *Command and Control Report*, 115-116.

⁹² Hyde, Pfeiffer, and Logan, “CAFMS Goes to War,” 39; Cohen, *Command and Control Report*, 116-117.

⁹³ Cohen, *Command and Control Report*, 117.

⁹⁴ Witt, *Air Force Tactical Communications in War*, 28.

⁹⁵ Ibid.

been installed. After a quick test, the hypothesis was confirmed, and in early September, CENTAF began distributing the necessary equipment and training WOC personnel to use MADS.⁹⁶ By late November, MADS setup was complete and delivered to the TACC as a temporary solution for ATO dissemination until the additional CAMFS central processors, and associated terminals were acquired and installed. Once each unit had a CAMFS terminal, MADS would become a commercial backup option for ATO dissemination.⁹⁷

C-21 Courier Flights

While MADS was being implemented across the theater, CENTAF still feared that with the impending increase in ATO size, CAFMS and MADS would become saturated rapidly. With the eventual size of the ATO—a max 3,280-sortie, 1,000-page ATO—if either system were disabled, for even a few hours, disseminating the ATO to tactical units with enough time to mission plan each sortie would be impossible.⁹⁸ A backup of the electronic dissemination methods was needed. On 21 August 1990, the CENTAF Director of Operations, Col James C. Crigger, Jr., requested that C-21 ferry flights be made available to CENTAF as a backup ATO dissemination method.⁹⁹ These

⁹⁶ Witt, *Air Force Tactical Communications in War*, 28.

⁹⁷ Ibid., 29.

⁹⁸ Cohen, *A Statistical Compendium*, 234; Cohen, *Command and Control Report*, 17, 154.

⁹⁹ Cohen, *Command and Control Report*, 154.

flights were approved and continued throughout Desert Storm as a backup method to electronic ATO dissemination for the Air Force and Marines.

Desert Shield ATO Dissemination – Navy

None of these methods—CAFMS, MADS, or C-21 ferry flights—however, would work to disseminate the ATO to the Navy’s “Desert Storm Six.” When CAFMS made its operational debut on 20 August 1990, the Navy was less than enthusiastic. From the NAVCENT perspective, CAFMS represented a departure from the methodology suggested in the JP for air schedule, was “profligate in communications capacity,” and was not universally accepted, even in the Air Force.¹⁰⁰ While the first two points are arguably subjective, the latter point is evidenced by even Air Force sources. First, there was no worldwide CAFMS system. The Pacific and European theaters had different sets of software for their CAFMS terminals, which, for a Navy that operated globally, a non-worldwide system was not of interest.¹⁰¹ Second, most WOC personnel had not trained or worked with CAFMS prior to their deployment. In one example, a 507th TACC communications team flew into Al Minhad, UAE, to install a CAFMS terminal for the 388th Fighter Wing.

The command post personnel had never worked with CAFMS before the deployment. The 507th personnel departed before the command post had an opportunity to get on the job training . . . we would be blessed with Sgt Anderson . . . [who] had worked extensively with CAFMS . . . Consequently, he corrected any CAFMS problems on base quickly and efficiently. OJT for the

¹⁰⁰ Pokrant, *Desert Shield at Sea*, 69; Marvin Pokrant, *Desert Storm at Sea: What the Navy Really Did* (Westport, CT: Greenwood Press, 1999), 273.

¹⁰¹ Cohen, *Command and Control Report*, 54.

command post controllers came over time, and they learned to become self-sufficient without whining to the comm squadron each time the system burped.¹⁰²

Suffice it to say, there was a shortage of Sgt Andersons at deployed communications squadrons in theater, and they certainly did not exist in the Navy. Aside from non-existent CAFMS specialists in the Navy, the command ship USS Blue Ridge and the “Desert Storm Six” did not have CAFMS terminals nor the requisite SHF radios to enable CAFMS.¹⁰³ CENTAF and NAVCENT communications personnel had to find another way to disseminate the ATO to the Navy electronically.

At the onset of Desert Shield, the Navy established a method of ATO dissemination from the TACC to their carriers. This method, similar to MADS, involved a computer-to-computer electronic transfer secured by a STU-III telephone, from Navy liaisons in the TACC to the command ship—while in port and with access to land telephone lines.¹⁰⁴ This method had an obvious limitation; the command ship was rarely in port, and thus, this method was not heavily used.

Paper Tapes – Fleet Flash and AUTODIN/Computer Processing and Routing System (COMPARS)

Shortly after CAFMS became operational, CAFMS division personnel in the TACC cut two paper tapes for the Navy. The first paper tape contained excerpts from the daily ATO—Navy taskings and all air refueling missions—and the SPINS in their

¹⁰² Witt, *Air Force Tactical Communications in War*, 92.

¹⁰³ Pokrant, *Desert Shield at Sea*, 69.

¹⁰⁴ Witt, *Air Force Tactical Communications in War*, 30; Pokrant, *Desert Shield at Sea*, 22.

entirety.¹⁰⁵ This tape was sent directly to each Carrier Battle Force over the Navy's Fleet Flash net; however, this net had low bandwidth, and the Carriers could not get even the smallest ATO until 0200L—three hours before when the ATO became effective.¹⁰⁶ The second tape contained the entire ATO and was sent over a higher bandwidth net to a Guam AUTODIN switching center and then through the COMPARS to the carriers. Predictably, this tape took even longer than the first tape because of the size of the entire ATO. This lengthy transmission meant that the carriers did not receive the second paper tape until 1000L the day of execution—6 hours after the ATO was in effect.¹⁰⁷

Several iterative improvements in the paper tape process, combined with a reduction in time that the TACC took to publish the ATO, resulted in carriers receiving their specific taskings, tanker information, and SPINS—first paper tape—by 0001L (5 hours before the ATO day), and the entire ATO—second paper tape—by 0400L (1 hour prior to the ATO day).¹⁰⁸ Not surprisingly, this was still not adequate for the crews to plan and brief their missions before takeoff. As a result, Navy liaison personnel in Riyadh began passing Navy specific taskings to carriers much earlier in the day via voice radio transmissions. This gave crews adequate time to mission plan their sorties, and when the

¹⁰⁵ Witt, *Air Force Tactical Communications in War*, 31.

¹⁰⁶ Witt, *Air Force Tactical Communications in War*, 31; Cohen, *Command and Control Report*, 17. There is discrepancy between *Air Force Tactical Communications in War*, which states that the ATO effective time was 0400L and the GWAPS report, which states that the ATO effective time was 0500L. This thesis will use the time from the GWAPS report, 0500L.

¹⁰⁷ Witt, *Air Force Tactical Communications in War*, 31.

¹⁰⁸ Ibid.

ATO finally arrived, crews could simply confirm their specific information and make fine-tune adjustments as needed.

It is important to note that this paper tape method was used during Desert Shield, where the ATO averaged 825-sorties per day, compared to the 2,697-sortie average during Desert Storm.¹⁰⁹ Anticipating the sortie surge, the Commander of NAVCENT, Vice Adm Stan Arthur, stated that “the ATO process would probably fall apart on the third day, and if that happened, they should be prepared to go back to the tried-and-true method of dividing up the area.”¹¹⁰ The CENTAF communications team also noted a renewed emphasis from NAVCENT to remedy the ATO dissemination issue, “it was apparent to [NAVCENT] that the current ATO dissemination procedures could not meet their needs if the daily ATO grew significantly.”¹¹¹ Thus, the issue of installing CAFMS terminals on the carriers was revisited by Air Force and Navy communications teams but ultimately was abandoned due to complications with frequency allocation.¹¹²

Desert Storm ATO Dissemination

While Desert Shield gave the entire joint air operations team five months to gain familiarity with the ATO dissemination process and improve the processes efficiency, Desert Storm was a different problem altogether. This section will explore the factors that

¹⁰⁹ Cohen, *A Statistical Compendium*, 140, 234.

¹¹⁰ Pokrant, *Desert Shield at Sea*, 220.

¹¹¹ Witt, *Air Force Tactical Communications in War*, 31.

¹¹² For more on the UHF and SHF CAFMS abandoned initiatives during Operation Desert Shield, see Witt, *Air Force Tactical Communications in War*, 31-32; Pokrant, *Desert Shield at Sea*, 220.

made ATO dissemination different between Desert Shield and Desert Storm—ATO publishing time and physical size—and will discuss the differences in how the Air Force and Marines received the ATO and how the Navy received the ATO.

Compounding Factors

First, ATO dissemination in Desert Storm proved different than Desert Shield based on the increased time it took for the TACC to publish the Desert Storm ATO. During Desert Shield, once planners in the TACC's Combat Plans Division (CPD) gained enough experience with CAFMS, they published the daily ATO by 1600L, the afternoon before the start of the ATO day.¹¹³ Once Desert Storm started, this time was delayed significantly, sometimes as late as 2100L.¹¹⁴

In principle, the ATO should be published and available to units by 1800L, and if all went according to plan, a unit would have a minimum of eleven hours to plan their sorties.¹¹⁵ However, the timeline could be delayed at any step in the planning process for any number of reasons; for example, one such reason was Battle Damage Assessments.

The Chief Attack Planner in the Black Hole, Lt Col Dave Deptula, recalled:

We were trying to achieve particular effects. So, at 1000L on Tuesday the 21st of January, I need to know whether the F-117s dropped on those priority targets, the chemical bunkers this morning at 0400L. I don't need a complete intelligence assessment as to how they did. What I need is whether they hit or not. If they hit, I

¹¹³ This time was not explicitly stated in any source; however, the author was able to come to this conclusion by correlating the time it took for the Navy to receive the entire ATO (12 hours) and the time they typically received the ATO from the paper tape method (0400L).

¹¹⁴ Cohen, *Command and Control Report*, 223. Additionally, see pages 8-17 for a detailed description of the planning process during Operation Desert Shield.

¹¹⁵ Ibid., 8-17.

can afford to wait for 24-48 hours to get the damage assessment. But if they didn't hit, that's what I really need to know because it is such a priority that I'll reschedule the MAP, and they'll get a visit from the F-117 tonight.¹¹⁶

Changes such as these, especially during the first few weeks of Desert Storm, could delay the ATO Division in publishing the ATO for hours, as significant changes could have cascading effects to the plan already built. Brig Gen Glosson—Chief Campaign Planner and 14th Air Division Commander—recalled after the war that “it took us almost half the war to get the ATO out at a time that was acceptable to me. That being about 1500 to 1700. For the first three weeks, the ATO would be published somewhere between 1800 and 2100.”¹¹⁷ Even after it was published, the ATO still had to be sent to the units, the size of which delayed delivery of the massive ATO to tactical units.

Second, ATO dissemination in Desert Storm proved different than Desert Shield based on the physical size of the ATO. During Desert Shield, the coalition flew their busiest day on 14 November 1990, totaling 1,416 sorties compared to the busiest day during Desert Storm, 24 February 1991, where the coalition flew 3,280 sorties.¹¹⁸ Comparing the average sortie rates, Desert Shield averaged 825-sorties per day, and Desert Storm averaged 2,697-sorties per day: a factor of 3 increase. Adding to the physical size of the ATO was the increase in details for each sortie, including time on target, time off target, target identification, target type, designated munitions point of

¹¹⁶ Lt Gen (Ret.) Dave Deptula, interview by author, Washington, DC, January 21, 2020.

¹¹⁷ Cohen, *Command and Control Report*, 223.

¹¹⁸ Cohen, *A Statistical Compendium*, 140, 234.

impact, and refueling information, to name a few.¹¹⁹ These two factors resulted in an ATO that could number up to 1,000 pages.¹²⁰ Depending on where a unit was located and which system they used for ATO dissemination, the available system bandwidth could cause significant delays in transmitting the massive ATO.

Air Force and Marines

For the Air Force and Marines, CAFMS was the primary method of disseminating the ATO; however, the planning method as a whole, including CAFMS, had its faults and concerned Brig Gen Glosson, among others.

Soon after the end of the war, Glosson noted that the system should have supported between 1,500 and 2,000 sorties a day, with a maximum of 2,400 sorties. The maximum number of sorties run in an exercise was 2,400. The system was overloaded by the attempt to generate and transmit more sorties than appropriate to the number of terminals in theater.¹²¹

It is not definitively known why, but some units required the ATO to be disseminated using MADS. Evidence suggests that units experienced slow download times from CAFMS or experienced frequent system errors, likely associated with the overloaded system Brig Gen Glosson discusses above. However, as discussed previously, some of these problems with CAFMS might be due to a lack of CAFMS trained personnel at the WOC or communications squadrons.¹²² Nevertheless, as of 1 February 1991, the TACC was disseminating the ATO using MADS to 27 units throughout the

¹¹⁹ Cohen, *Command and Control Report*, 145-147.

¹²⁰ Ibid., 17.

¹²¹ Ibid., 221.

¹²² Witt, *Air Force Tactical Communications in War*, 29, 92.

theater.¹²³ Ironically, what the system initially intended to be a secure, commercial backup to CAFMS turned out to be the method of choice for some locations.¹²⁴

Additionally, the TACC initially used C-21 courier flights to disseminate the ATO during Desert Shield before CAFMS and MADS came online.¹²⁵ After each location completed its installation of CAFMS and MADS, the TACC continued to use C-21 courier flights as a backup dissemination option throughout Desert Shield and Desert Storm.¹²⁶ It is clear that as of 22 August 1990, a minimum of four C-21s were in Riyadh, specifically to provide courier services; however, it is unclear how often the TACC used them in this capacity.

Finally, as discussed previously, changes to the MAP or ATO *before* publishing the ATO could cause multi-hour delays. Even worse, changes made to the ATO *after* it was published posed a significant problem: how to get the changes to the unit. During Desert Storm, the TACC made an average of 518 ATO changes per day. Since the Guidance, Apportionment, and Targeting planners could not rely on units to get their changes through CAFMS, “the Guidance, Apportionment, and Targeting would often call wings and tell them what the first two or three hours of the Air Tasking Order were going to be, so they could plan their missions.”¹²⁷ This ad-hoc process of notifying units of

¹²³ Witt, *Air Force Tactical Communications in War*, 29.

¹²⁴ Ibid.

¹²⁵ Cohen, *Command and Control Report*, 154.

¹²⁶ Ibid.

¹²⁷ Ibid., 223.

ATO changes was enabled by STU-III secure telephones and was the final backup method of ATO dissemination for the Air Force and Marines.¹²⁸

Navy

For the Navy, little from the process refined during Desert Shield would survive in Desert Storm, and the TACC's primary ATO dissemination tool, CAFMS, would still not be available to the Navy. What turned into their primary method of ATO dissemination during Desert Shield—two paper tapes sent over Fleet Flash Net and AUTODIN/COMPARS through Guam—would not work in Desert Storm for two reasons: bandwidth and other user requirements.

First, the paper tape system, as optimized by the end of Desert Shield, took six hours to send the first paper tape—which included Navy Specific ATO taskings, tanker information, and SPINS—over the Fleet Flash net.¹²⁹ The average Desert Storm ATO was roughly three times larger than the average Desert Shield ATO. The Fleet Flash Net simply did not have enough bandwidth—75 baud circuit—to send such a large file to the carriers in an adequate amount of time.¹³⁰ There is no evidence available that indicates how long the excerpts of the three times larger ATO took over the Fleet Flash Net; basic math would suggest that it took approximately 18 hours. Nonetheless, the limited

¹²⁸ Cohen, *Command and Control Report*, 224.

¹²⁹ Witt, *Air Force Tactical Communications in War*, 30-31.

¹³⁰ *Ibid.*, 30.

bandwidth available on the Fleet Flash Net made the “delays associated with radio transmission . . . unacceptable.”¹³¹

The Second reason that the paper tape method would prove unsatisfactory during Desert Storm is that the Navy and Marines needed the Fleet Flash Net for communications other than ATO dissemination. The Fleet Flash Net is purposed to “provide communications between operational command subscribers,” not to disseminate an ATO.¹³² Thus, at the onset of Desert Storm, other users needed the net for record communications. In the official Marine History of Desert Storm, the author describes one such example:

With the commencement of Operation Desert Storm and its strategic air campaign on 17 January, the amphibious task force’s communications network was temporarily saturated by the sheer volume of CentAF’s daily air tasking order. With no CAFMS terminals installed onboard its ships, the Navy was forced to retransmit the ATO over standard record message traffic means.¹³³

For these two reasons, the Navy paper tape method of disseminating the ATO to the carriers was inadequate, and the Navy turned to a primitive, yet reliable, form of ATO dissemination.

The final method of ATO dissemination—and the method that became the primary method during Desert Storm—was hand-delivery. Each evening after the ATO

¹³¹ Lt Cdr Larry D. Di Rita, “Exocets, Air Traffic, & the Air Tasking Order,” *Proceedings* (August 1992): 62.

¹³² Naval Education and Training Command, *Radioman 3&2: Rate Training Manual and Nonresident Career Course* (NAS Pensacola, FL: Naval Education and Training Command, 1978), 338.

¹³³ Major John T. Quinn II, *U.S. Marines in the Persian Gulf, 1990-1991: Marine Communications in Desert Shield and Desert Storm* (Washington, DC: History and Museums Division, Headquarters, U.S. Marine Corps, 1996), 65-66.

Division published the ATO—between 1500L and 2100L—NAVCENT LNOs printed several copies of the ATO and transferred digital copies to floppy disks.¹³⁴ The officers would then rush these copies to the Riyadh airport where two Navy S-3 Vikings waited.¹³⁵ The S-3s would then fly the ATOs to a designated carrier in each battle force—Red Sea Battle Force and Persian Gulf Battle Force. The S-3s typically arrived at the carriers between 0001L and 0200L.¹³⁶ From the carriers, helicopters would continue the “ATO-express” and deliver copies to other ships, such as the other carriers, guided-missile cruisers, and the NAVCENT command ship, USS Blue Ridge.¹³⁷ The helicopter portion of this mission would take between three and four hours to complete the final ATO delivery.¹³⁸

Needless to say, the new JFACC concept, combined with the size and lateness of the ATO, frustrated many Naval officers and senior leaders alike. One such Naval officer recalls his experience during Desert Storm:

While the Air Force will rightly point to this document [ATO] (and often has) as the playbook for the vastly successful Air Bowl, we in the surface navy, from our more parochial perspective, remember it simply as the 300-page, “Personal For,” flash-precedence, randomly sorted message, rarely received before the middle of the day to which it applied . . . The people who published this tome probably never envisioned that a couple of junior enlisted air controllers on a three-week caffeine high in the back of a combat information center would

¹³⁴ Pokrant, *Desert Storm at Sea*, 34.

¹³⁵ Ibid.

¹³⁶ Ibid.

¹³⁷ Pokrant, *Desert Storm at Sea*, 34; Di Rita, “Exocets, Air Traffic, & the Air Tasking Order,” 62.

¹³⁸ Pokrant, *Desert Storm at Sea*, 34; Di Rita, “Exocets, Air Traffic, & the Air Tasking Order,” 62.

have to flip through this six-pound chunk of fanfold paper on their knees to find the whereabouts of a tanker for the combat air patrol.¹³⁹

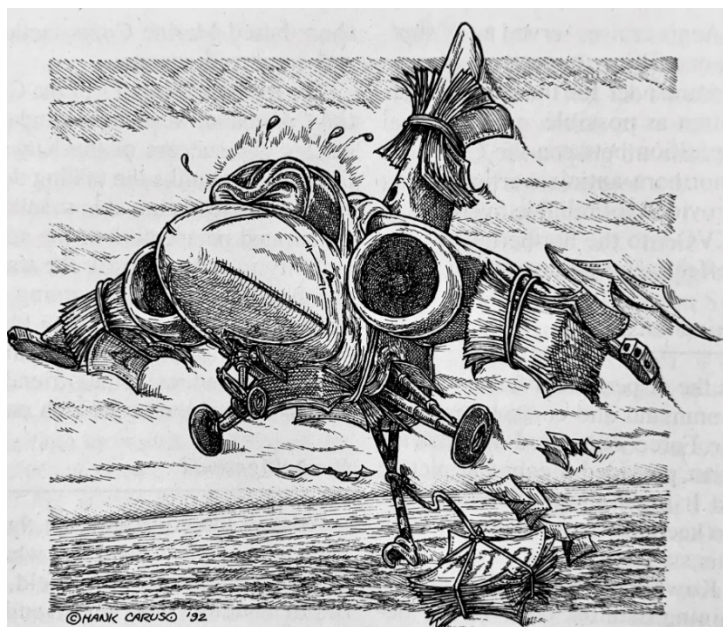


Figure 3. Artistic Rendering of the “ATO-express”

Source: Lt Cdr Larry D. Di Rita, “Exocets, Air Traffic, & the Air Tasking Order,” *Proceedings* (August 1992): 62.

Vice Adm Arthur—NAVCENT commander—conveyed his, and the rest of the Navy’s, frustration with the lateness of the ATO directly to Lt Gen Horner, “Since Day Three, the ATO time late [sic] has been driving all of us to distraction.”¹⁴⁰ NAVCENT liaisons, however, mitigated this lateness by continuing the Desert Shield practice of voice transmitting critical elements of the plan directly to the carriers much earlier in the day.

¹³⁹ Di Rita, “Exocets, Air Traffic, & the Air Tasking Order,” 62.

¹⁴⁰ Cohen, *Command and Control Report*, 56.

This allowed aircrew to begin mission planning and then use the ATO to confirm their expected plan once it finally arrived in the early hours of the morning.

Conclusion

In the end, the five-month-long Desert Shield gave the joint air operations team ample time to develop a myriad of ATO dissemination options before the start of Desert Storm. By the end of the first week of Desert Storm, each tactical unit had settled into its preferred method of ATO dissemination. By the end of the third week, the ATO Division was able to publish the ATO by a reasonable 12 hours before the start of the ATO day. While no service explicitly published an ATO dissemination PACE plan, two different PACE plans emerged from Desert Storm: one for the Air Force and Marines and one for the Navy (summarized in Figure 4). Ultimately, these PACE plans—made possible by the problem-solving and innovation of the CENTAF and NAVCENT communications teams—were effective at disseminating the ATO to four services and multiple coalition partners, resulting in zero lost sorties due to a tactical unit not receiving the ATO.

ATO Dissemination PACE Plan	
Air Force and Marines	
Primary	CAFMS
Alternate	MADS
Contingency	STU-III Secure Telephone
Emergency	Hand-Delivery via C-21
Navy	
Primary	Hand-Delivery via S-3
Alternate	Voice Radio Transmission
Contingency	Two Paper Tapes - AUTODIN/COMPARS
Emergency	-

Figure 4. ATO Dissemination PACE Plans – Persian Gulf War

Source: Author.

Chapter Conclusion

Following Saddam Hussein’s invasion of Kuwait in August of 1990, the Persian Gulf War debuted the first operational JFACC, Lt Gen Charles A. “Chuck” Horner, who went on to lead a successful 43-day air campaign comprised of all four services and coalition aircraft. While this war has been considered “one of the most operationally successful wars in history,” a study of the air campaign produces myriad lessons, most of which relate to the two landmark concepts: the JFACC and the ATO.¹⁴¹ This chapter answered the four SRQs by assessing the doctrine and training prior to the Persian Gulf War, examining the ATO challenges faced by the joint air operations team, and by assessing the methods the team used to prevent any lost sorties to the air campaign. This

¹⁴¹ Eliot A. Cohen, *Gulf War Air Power Survey*, vol. 1, pt. 2, *Planning Report* (Washington, DC: Office of the Secretary of the Air Force, 1993), v.

subsection briefly summarizes those answers and makes a final assessment on the primary research question for the Persian Gulf War.

Doctrine writers between the start of the Vietnam War and the beginning of the Persian Gulf War faced a significant challenge: keeping up with the times. Following the Vietnam war, several events shaped the joint force's view on the application of airpower: the Arab-Israeli War of 1973; the Army's new operating concept, AirLand Battle; the Goldwater-Nichols Act of 1986; and significant new technology. While doctrine established the JFACC concept and discussed many communication considerations, competing ideas emerged, giving the reader the daunting task of reconciling the differences in each publication. Moreover, joint doctrine failed to establish a joint standard for an ATO dissemination system, resulting in interoperability challenges between the services. Therefore, doctrine did not prepare the joint air operations team to mitigate the effects of operational-level communications degradation, disruption, or denial on the JFACC's ability to centrally control taskings to tactical units.

Joint air operations team training faced similar challenges. On the whole, units conducted most pre-deployment training along service lines and did not integrate tactical and operational echelons. In the two exceptions—Operation Solid Shield '87 and '89—the Air Force and Navy failed to capitalize on the JFACC execution and operational-level communications lessons. Once Desert Shield began, nearly all training exercises were, by necessity, conducted jointly and across the tactical and operational levels of war, which the Navy was in dire need for due to their unfamiliarity with the JFACC concept and ATO scheduling process. In the final analysis, the Desert Shield joint and multi-echelon training could not adequately make up for the lack of such training during pre-

deployment training. Therefore, training during Desert Shield did not adequately prepare the joint air operations team to mitigate the effects of operational-level communications degradation, disruption, or denial on the JFACC's ability to centrally control taskings to tactical units.

At the start of Desert Shield, CENTAF planned to use CAFMS as its primary ATO production and dissemination system. This system, however, required significant communications infrastructure that took all of Desert Shield to procure and install. Additionally, the Navy's carriers did not possess CAFMS and, despite NAVCENT and CENTAF's best efforts, CAFMS would not be installed for the entirety of the war. These two factors were the impetus for developing, testing, and validating additional ATO dissemination methods, which took the entirety of the five-month-long Desert Shield. Ultimately, while no service explicitly published an ATO dissemination PACE plan, the joint air operations team effectively created two PACE plans—one for the Air Force and Marines and one for the Navy—that worked well enough for the Persian Gulf War.

In the end, the JFACC did not lose one sortie due to a unit not receiving the ATO; however, this was not due to sound doctrine or training but rather due to the innovation and problem-solving ability of the CENTAF and NAVCENT communications teams.

CHAPTER 3

CASE STUDY 2: OAF

Other classified communications required passing a hard copy of the information by hand, repeating one of the worst command and control deficiencies that had been exposed earlier in Desert Storm, when the ATO had to be flown every day to each of the Navy's six participating aircraft carriers because the latter were not equipped to receive it electronically.

—Benjamin S. Lambeth, *NATO's AirWar for Kosovo: A Strategic and Operational Assessment*

Introduction

In the last decade of the 20th century, Serbian leadership persecuted the Kosovar ethnic Albanian majority, which led to over 1.5 million refugees by 1999. In the same year, Slobodan Milošević—the President of the Federal Republic of Yugoslavia—rejected several attempts to negotiate peace by the international community. NATO responded to the atrocities with OAF—an air campaign designed to end the regime's ethnic atrocities.

President Clinton, in his address to the nation, delivered simultaneously with the start of OAF, outlined the mission of NATO's actions:

Our mission is clear – to demonstrate the seriousness of NATO's purpose so that the Serbian leaders understand the imperative of reversing course, to deter an even bloodier offensive against innocent civilians in Kosovo and, if necessary, to seriously damage the Serbian military's capacity to harm the people of Kosovo. In short, if President Milošević will not make peace, we will limit his ability to make war.¹⁴²

¹⁴² White House Television (WHTV), "President Clinton's Address to the Nation on Kosovo (1999)," Clinton Digital Library, accessed March 30, 2020, <https://clinton.presidentiallibraries.us/items/show/15847>.

General Wesley Clark—Supreme Allied Commander in Europe and Commander-in-chief United States European Command—held the responsibility to carry out this mission. General Clark’s air component commander, Lieutenant General Michael Short, was responsible for the conduct of the air campaign. While Short, as the Combined Force Air Component Commander (CFACC) for Allied Forces Southern Europe, had the responsibility to develop “a joint air operations plan to best support joint force objectives,” these two men had several disagreements on how the air campaign should be run.¹⁴³ Short went as far as to say that “he was less an architect of the campaign than its implementor.”¹⁴⁴

The 78-day air campaign ended on June 3, 1999, after Milošević agreed to the terms of a peace plan based on a proposal from “the Group of Eight countries (the United States, Britain, France, Germany, Italy, Canada, Russia, and Japan).”¹⁴⁵ The peace proposal called for “the withdrawal of all Yugoslav forces from Kosovo; the deployment of an international peacekeeping force with NATO at its core; and international administration of Kosovo until elected interim institutions are set up, under which Kosovo will enjoy wide-ranging autonomy within Yugoslavia.”

¹⁴³ Chairman of the Joint Chiefs of Staff (CJCS), Joint Publication (JP) 3-56.1, *Command and Control for Joint Air Operations* (Washington, DC: Office of the Chairman of the Joint Chiefs of Staff, November 14, 1994), II-3; Benjamin S. Lambeth, *NATO’s AirWar for Kosovo: A Strategic and Operational Assessment* (Santa Monica: RAND, 2001), xix.

¹⁴⁴ Lambeth, *NATO’s AirWar for Kosovo*, 186.

¹⁴⁵ Steven Woehrel and Julie Kim, *Kosovo and U.S. Policy*, Congressional Research Service Issue Brief for Congress (Washington, DC: Library of Congress, June 22, 2001), CRS-2.

Similar to the Persian Gulf War, there are numerous lessons available from OAF. The more contentious issues—such as whether airpower was decisive in getting Milošević to accept the peace proposal—have been adequately addressed in literature. However, lessons such as the ATO dissemination challenges with coalition partners received minimal attention—even less than after the Persian Gulf War. This chapter examines the doctrine and training conducted before OAF. Additionally, this chapter highlights ATO dissemination challenges and analyzes the methods to overcome them. Finally, in answering the primary research question for the OAF case, this chapter assesses the combined air operations team’s preparedness in mitigating the effects of operational-level communications degradation, disruption, or denial on the CFACC’s ability to centrally control taskings to tactical units.¹⁴⁶

Doctrine

Just as technology, world threats, and opportunities change, so must our doctrine. We, each of us, must be articulate, knowledgeable, and unapologetic advocates of aerospace power.

—General Michael E. Ryan, Air Force Chief of Staff, quoted in Department of the Air Force, Air Force Doctrine Document 2

Introduction

Following the Persian Gulf War, joint and Air Force air operations doctrine experienced a momentous change. The doctrinal evolution that occurred before OAF manifested itself in two publications: JP 3-56.1, Command and Control for Joint Air

¹⁴⁶ As OAF was a NATO air campaign, this chapter utilizes the term “combined” rather than “joint” unless directly quoting U.S. doctrine or speaking specifically about U.S.-only operations (combined air operations team, CFACC, CAOC, etc . . .).

Operations, and Air Force Doctrine Document (AFDD) 2, Organization and Employment of Aerospace Power. This subsection assesses these two publications against the three doctrinal research questions then uses the answers as evidence to answer the first SRQ for the OAF case.

JP 3-56.1, Command and Control for Joint Air Operations

JP 3-56.1 was published in November of 1994, and while it does not share the same publication number or title, it is the successor to JP 3-01.2, Joint Doctrine for Theater Counterair Operations. JP 3-56.1 is the first publication the reader might recognize as a modern JP. This assessment is not exclusive to the document's appearance; as will be seen in Chapter 4, the content mostly aligns with current airpower theory and application. While not explicitly stated, this publication is heavily influenced by the lessons of the Persian Gulf War. The intent of the publication is to provide “fundamental principles and doctrine for the command and control (C2) of joint air operations throughout the range of military operations in order to ensure unity of effort for the benefit of the joint force as a whole.”¹⁴⁷ It is organized in four chapters: (1) introduction; (2) general considerations for command and control of joint air operations; (3) planning for joint air operations; and (4) targeting and tasking for joint air operations.¹⁴⁸ Chapters two and four are of particular importance in answering the three doctrinal research questions.

¹⁴⁷ CJCS, JP 3-56.1, I-1.

¹⁴⁸ *Ibid.*, v.

The discussion in JP 3-56.1 on the first doctrinal research question—concerning whom doctrine makes responsible for the command and control of joint air operations—expands on the JFACC discussion from JP 3-01.2. The publication states that “the JFC will normally designate a JFACC” and that the JFC will choose the JFACC based on “the component commander having the preponderance of air assets and the capability to plan, task, and control joint air operations.”¹⁴⁹ The JFACC is then given the responsibility, among several others, to provide “centralized direction for the allocation and tasking of capabilities/forces made available.”¹⁵⁰ The publication goes further to outline the JFACC’s organization, which enables the fulfillment of his responsibilities, see Figure 5. While this notional organization might look different in each theater, JP 3-56.1 states that the two divisions shown in the figure, Combat Plans and Combat Operations, “should be common to all JAOCs.”¹⁵¹ This publication gives each division specific responsibilities; most pertinent to this study, Combat Plans is given the responsibility of “building the daily joint ATO.”¹⁵² Thus, this publication answers the first doctrinal research question: the JFC gives the JFACC the responsibility to task tactical units, which is fulfilled through the daily joint ATO created by Combat Plans inside the JAOC.¹⁵³

¹⁴⁹ CJCS, JP 3-56.1, I-2.

¹⁵⁰ Ibid., I-3.

¹⁵¹ Ibid., I-7.

¹⁵² Ibid.

¹⁵³ JP 3-56.1 outlines another option for the command and control of joint air operations: the JFC staff option. The publication states that “there may be situation where designation of a JFACC is not required. Typically, this would occur when a conflict or situation is of limited duration, scope, and/or complexity.” In this option, the JFC delegates the authority and assigns responsibilities to whom he sees fit—for example, the

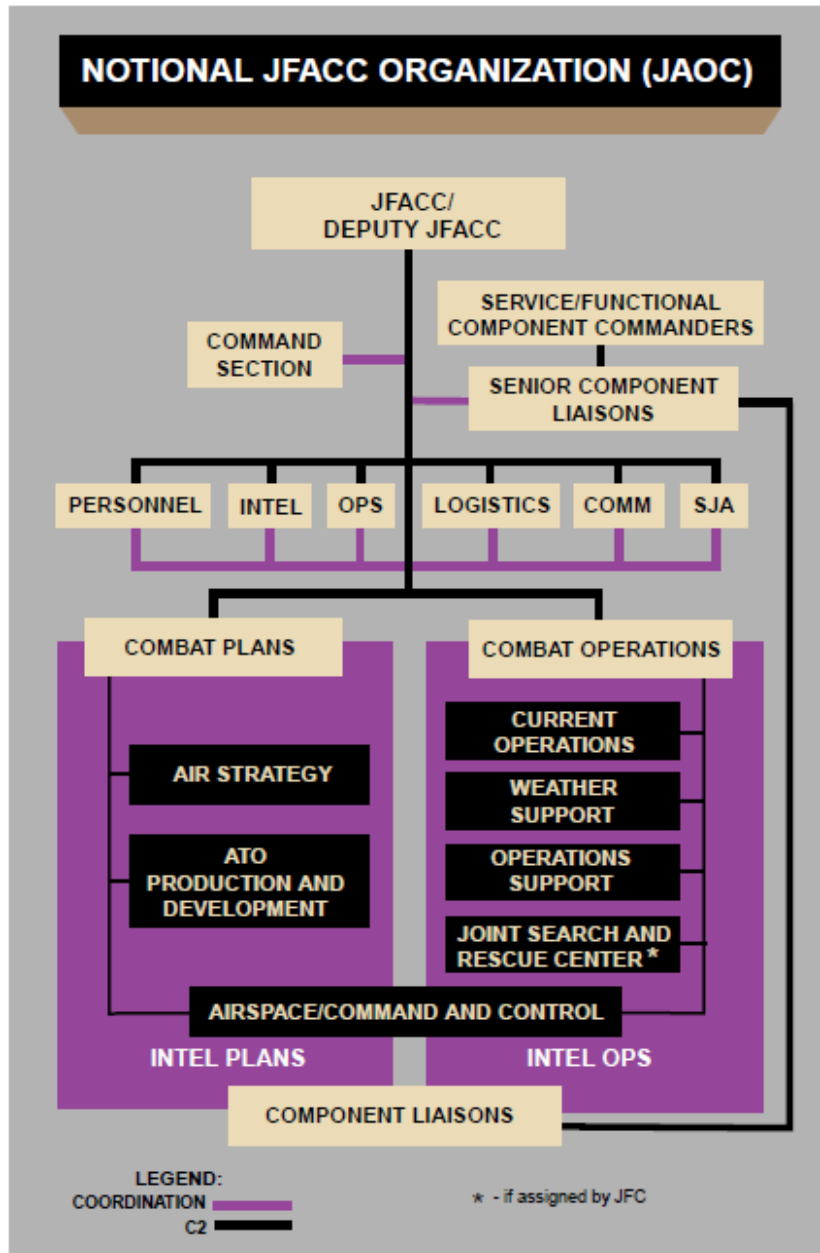


Figure 5. Notional JFACC Organization (JAOC) – JP 3-56.1

Source: Chairman of the Joint Chiefs of Staff, Joint Publication 3-56.1, *Command and Control for Joint Air Operations* (Washington, DC: Office of the Chairman of the Joint Chiefs of Staff, November 1994), I-6.

J-3, a specific staff officer, or to a special staff—and the JFC’s Joint Operations Center functions as the JAOC. See CCS, JP 3-56.1, II-11 – II-12.

The second doctrinal research question—concerning whether a primary ATO dissemination method and associated communications requirements are adequately addressed in doctrine—is addressed as well. First, JP 3-56.1 makes the JFACC “responsible for planning and activating all validated joint air communications links that support the JFC’s mission and allow the accomplishment of the JFC directives.”¹⁵⁴ Furthermore, this publication highlights the importance of such “reliable secure communications . . . to the successful integration of the joint air effort.”¹⁵⁵ Additionally, without naming the operation, JP 3-56.1 addresses the challenges with communications interoperability during the Persian Gulf War, “C4I data exchange requirements will be promulgated as early as possible to ensure that each component can meet unique interface requirements.”¹⁵⁶ Finally, in another nod to the communications interoperability challenges during the Persian Gulf War, this publication names the Contingency Theater Automated Planning System (CTAPS) as the joint standard for “ATO generation and dissemination.”¹⁵⁷ Therefore, JP 3-56.1 clearly answers the second doctrinal research question: the JFACC is responsible for planning and activating reliable and secure communications links, that adequately take data exchange requirements into account, and use CTAPS as the joint standard for ATO generation and dissemination.

¹⁵⁴ CJCS, JP 3-56.1, IV-12.

¹⁵⁵ Ibid.

¹⁵⁶ Ibid.

¹⁵⁷ Ibid.

Surprisingly after the challenges with ATO dissemination during the Persian Gulf War, JP 3-56.1 does not adequately answer the third doctrinal research question—concerning whether doctrine establishes the requirement to have alternate, contingency, or emergency ATO dissemination methods. The closest the publication comes to discussing this is an unplanned shift in JFACC responsibilities from one JFACC to another during hostilities—an Air Force JFACC-ashore to a Navy JFACC-afloat for example. First, the publication lists several events that might trigger a shift in JFACC responsibilities. One such event, pertinent to this study, is when C4I capabilities “to support the current JFACC become unresponsive or unreliable.”¹⁵⁸ Additionally, it also acknowledges that:

During unplanned shifts of JFACC responsibility, as a possible result of battle damage or major command and control equipment failure, a smooth transition is unlikely. Therefore, **the JFC should predesignate alternates** (both inter- and intra-component) and establish preplanned responses/options to the temporary or permanent loss of JFACC capability.¹⁵⁹

Moreover, as a JFACC transition consideration, it states that “all JFACC operations facilities should possess appropriate C4I capabilities to ensure shift of JFACC duties is as transparent to the components as possible (joint ATO dissemination and receipt should be unchanged).”

These three statements taken together assume that if the current JFACC’s C4I capabilities become unreliable or suffer a significant command and control equipment failure (CTAPS, for example), then the new JFACC’s C4I capabilities are operational.

¹⁵⁸ CJCS, JP 3-56.1, IV-9.

¹⁵⁹ Ibid.

Thus, joint ATO dissemination should be unchanged. However, it does not account for the scenario in which the communications failure affects both JFACCs. Furthermore, there is no discussion or stated requirement for alternate communication methods between the primary method (CTAPS) and the shift of JFACC responsibilities. Therefore, while the publication discusses the continuity of operations from one JFACC to another, it does so to shift a primary communication method (CTAPS) from one JFACC to another, rather than establishing the requirement to have alternate, contingency, or emergency communication methods.

AFDD 2, Organization and Employment of Aerospace Power

AFDD-2 was published in 1998 as an “entirely new document in our hierarchy of doctrine publications.”¹⁶⁰ While this publication claims to be “entirely new,” it addresses many similar topics to that of the 1969 Air Force Manual (AFM) 2-1. Its stated purpose is to describe “how our Air Force organizes and employs aerospace power throughout the spectrum of conflict at the operational level.”¹⁶¹ It is organized in six chapters: (1) aerospace operations; (2) the transition from peace to conflict; (3) organizing Air Force forces; (4) leading expeditionary air and space forces; (5) the JAOC; and (6) the joint air and space operations plan. Chapters four and five are of particular importance in answering the three doctrinal research questions.

¹⁶⁰ Department of the Air Force, *Air Force Doctrine Document (AFDD) 2, Organization and Employment of Aerospace Power* (Washington, DC: Department of the Air Force, September 28, 1998), Foreword.

¹⁶¹ *Ibid.*

The discussion in AFDD-2 on the first doctrinal research question—concerning whom doctrine makes responsible for the command and control of joint air operations—is nearly identical to the JFACC discussion in JP 3-56.1.¹⁶² AFDD-2 states that “the JFACC should be the component commander with the preponderance of air and in-theater space forces and the capability to control and direct joint air and space operations.”¹⁶³ Additionally, the JFACC has the responsibility, among others, to “plan, coordinate, allocate, and task the joint air and space capabilities and forces made available to the JFACC by direction of the JFC.”¹⁶⁴ Furthermore, AFDD-2 gives the JAOC’s CPD the “plan and task” portion of the JFACC’s responsibility by producing and disseminating “an operationally and tactically sound ATO.”¹⁶⁵ Therefore, in answering the first doctrinal research question: the JFC gives the JFACC the responsibility to plan and task forces made available to the JFACC, which is fulfilled by the JAOC’s CPD by producing and disseminating a tactically sound ATO.

The second doctrinal research question—concerning whether a primary ATO dissemination method and associated communications requirements are adequately addressed in doctrine—is addressed as well, albeit differently than in JP 3-56.1. First,

¹⁶² AFDD-2 also describes the Commander, Air Force Forces (COMAFFOR). The COMAFFOR is similar to the AFCC discussed in AFM 2-1 and TACM 2-1. He “normally exercises OPCON over all assigned and attached U.S. Air Force forces” and “will have complete ADCON of all assigned . . . and . . . attached U.S. Air Force forces.” When the COMAFFOR is designated the JFACC by the JFC, his responsibilities mirror that of the JFACC discussed later in this subsection.

¹⁶³ Department of the Air Force, AFDD-2, 47.

¹⁶⁴ *Ibid.*, 48.

¹⁶⁵ *Ibid.*, 71.

AFDD-2 makes it clear that the JFACC's Director of Operations and Plans (A-3/5) is responsible for coordinating "operational issues with the JFC and component staffs," such as "ATO and Airspace Control Order dissemination requirements."¹⁶⁶ Furthermore, the JFACC's Director of Communications and Information (A-6) is responsible for "establishing the theater communications and automated systems architecture to support operational and command requirement."¹⁶⁷ The A-6's responsibilities, however, are not exclusive to servicing the JFACC and JAOC; he is also responsible to "extend required communications and information connectivity to subordinate U.S. Air Force units (to include reach back units) and other components."¹⁶⁸ These three statements clearly assign responsibility for ATO dissemination requirements and sufficient communications architecture; however, AFDD-2 does not go beyond establishing responsibilities. There is no discussion on communication architecture considerations or requirements, nor does the publication establish a standard ATO dissemination system.

The third doctrinal research question—concerning whether doctrine adequately establishes the requirement to have alternate, contingency, or emergency ATO dissemination methods—is not addressed in AFDD-2. The only mention of alternate communication paths comes in a discussion on targeting the enemy in parallel operations. "Although parallel operations have been conducted in the past, it usually took considerable time for the effects to be felt. In the meantime, the enemy was often able to

¹⁶⁶ Department of the Air Force, AFDD-2, 55.

¹⁶⁷ *Ibid.*, 57.

¹⁶⁸ *Ibid.*

establish alternate transportation and communication links, slowing or even negating the effects of those operations.”¹⁶⁹ Interestingly, this publication highlights an example where the enemy created alternate communications links to mitigate losses to key command and control nodes; yet, it does not establish the same requirement for the friendly communications architecture.

Conclusion

Doctrine writers, in the eight years between the end of the Persian Gulf War and the beginning of OAF, made remarkable progress in evolving air operations doctrine. Doctrine writers incorporated many lessons from the Persian Gulf War, including standardizing JFACC implementation considerations, describing roles and responsibilities for the JFACC staff, and establishing CTAPS as the joint standard for ATO dissemination. These lessons, encapsulated in doctrine, helped the services in OAF eliminate the interoperability challenges in disseminating the ATO through the primary method—CTAPS. However, even though months were spent on establishing alternate, contingency, and emergency methods of ATO dissemination during Operation Desert Shield, these specific methods did not find their way into doctrine. Nor did the requirement to establish such backup methods make it into doctrine.

Therefore, in the final analysis, the collective body of doctrine available before OAF did not prepare the combined air operations team to mitigate the effects of operational-level communications degradation, disruption, or denial on the CFACC’s ability to centrally control taskings to tactical units. This lack of preparedness is

¹⁶⁹ Department of the Air Force, AFDD-2, 6.

evidenced by the ATO dissemination challenges between the CAOC and NATO participants in the air campaign, discussed further in a later subsection (page 92). Training, however, must be considered as well in order to determine the combined air operations team's overall preparedness.

Training

. . . our product in war is dead targets, and our product in peace is all that goes into generating the warrior proficiency that kills those targets in wartime.

—General John Jumper, quoted in Benjamin Lambeth,
NATO's Air War for Kosovo: A Strategic and Operational Assessment

Introduction

Few reports have been written on training during most of the 1990s, particularly training that bridges the gap between the tactical and operational levels of war. The seminal work on OAF is a RAND study titled *NATO's Air War for Kosovo: A Strategic and Operational Assessment*. This work, however, primarily focuses on the conduct of the air campaign and associated lessons but does not directly reference training conducted prior to OAF, as the GWAPS study did for the Persian Gulf War. Additionally, no report equivalent to *Unit Training in the Gulf War* was written for OAF. Thus, a portion of the evidence presented in this subsection is taken from interviews conducted with available experts who experienced joint and coalition training—namely Blue Flag and Red Flag—before OAF, firsthand. Prior to assessing Blue Flag, however, it is important to address a hole in this subsection's analysis.

Information on local unit training—both tactical and operational—is essential in understanding the entire picture. This information, however, is not presented in this subsection for two reasons. First, available source material on local unit training is

limited due to classification, access, and an overall lack of published material. Second, of the available source material on local unit training, no reports were found that indicated training bridged the gap between the operational and tactical levels. This fact, however, does not mean that units did not conduct such training. Instead, it means that without confirmation, one cannot assess the contribution of local unit training either positively or negatively. Thus, this subsection does not address local unit training; instead, the analysis focuses on unit training conducted within Air Force level exercises, such as Blue Flag and Red Flag. Additionally, the assessment does not address NATO training conducted in Europe during this period for the same two reasons given for unit training.

Therefore, without knowledge of local unit or NATO training, this subsection cannot adequately assess the overall training contribution to the primary research question. Instead, this subsection will assess the contribution of training conducted exclusively at Blue Flag and Red Flag. Blue Flag is assessed first.

Blue Flag

Before OAF, Blue Flag maintained its operational level focus, conducting 3-4 flags per year.¹⁷⁰ Not surprisingly, based on the interoperability issues and the lack of familiarity with the JFACC and ATO process, joint participation after the Persian Gulf War increased significantly. At the same time, where Blue Flag had conducted at least one exercise for a NATO AOC per year, the NATO exercise fell off the schedule in the 1990s for two reasons. First, U.S. and NATO AOCs were able to find joint and coalition

¹⁷⁰ Drain interview.

exercises in Europe to fulfill their training requirements. Second, at the same time, Air Combat Command (ACC) “decided that their focus would only be on stateside NAFs.”

Additionally, coalition participation in stateside Blue Flags also diminished. Throughout the 1990s, Blue Flags increasingly began to run from home station AOCs rather than exclusively at Hurlburt Field, FL, as had been the standard in the past. When Blue Flags were at Hurlburt, exercise controllers maintained a local exercise network—separate from real-world U.S. networks—for all participants to operate on. However, when Blue Flags ran from a home station AOC, such a network did not exist, and the lack of U.S. system access by coalition personnel hindered and eventually eliminated, coalition participation.¹⁷¹

The link between the operational level and tactical level during Blue Flag in the 1990s occurred predominately in the constructive environment by way of the Air Warfare Simulation (AWSIM). As more Blue Flags were conducted out of home station AOCs, simply handing over a disc with the ATO on it—as was done previously—was not possible with the Blue Flag exercise controllers operating AWSIM from Hurlburt Field.¹⁷² Thus, the ATO production team were now required to disseminate the ATO electronically and did so using the same method as they would during wartime. Mr. Drain recalls that “our first ‘away game’ was BF 92-1 . . . they were using CAFMS to create and disseminate the ATO. Due to connectivity issues, for that exercise, we had to File

¹⁷¹ Drain interview.

¹⁷² Ibid.

Transfer Protocol the ATO back to Hurlburt Field. In 1993/94, CTAPS was transitioned into the AOCs, and that was the system used for dissemination.”¹⁷³

Additionally, while the notion of “an adversary getting into our systems and stealing the ATO or preventing its dissemination” was not something that AOCs were concerned about, at times, necessity dictated the use of alternate methods for ATO dissemination.¹⁷⁴ “If there was ever a glitch in CTAPS, we would go to a backup method of ATO dissemination (e-mail via SIPR or File Transfer Protocol, for example).”¹⁷⁵ Thus, the operational level trained to ATO dissemination, but they did so unrealistically with a constructive tactical level. Therefore, since Blue Flag did not contribute to training NATO AOCs and did not train across the operational and tactical levels, it was not effective at preparing the combined air operations team to mitigate the effects of operational-level communications degradation, disruption, or denial on the CFACC’s ability to centrally control taskings to tactical units.

Red Flag

Following the Persian Gulf War, Red Flag did not change significantly. It was still focused on “Blue 4 and new mission commanders,” and the missions flown during Red Flag remained the same, large scale conventional strike missions, but with an increased emphasis on operating in an environment with enemy EA.¹⁷⁶ With the increase

¹⁷³ Drain interview.

¹⁷⁴ Ibid.

¹⁷⁵ Reese and Imonti interview.

¹⁷⁶ Ibid.

in EA, this tactically focused exercise aimed to provide aircrew an “experience in high-stress missions to prepare them for combat in advanced, high-end training scenarios.”¹⁷⁷ Additionally, the joint and coalition training audience has remained consistent with joint participation at each of the three annual Red Flags and coalition participation at two of the three annual Red Flags. Finally, during this time, the link between the operational level and tactical level is still non-existent. Aircrew still get their simulated ATO handed to them and do not utilize any force-level planning system, such as CTAPS, to receive the ATO from an AOC. By design, Red Flag remains tactically focused and, therefore, does not contribute to the combined air operations team’s ability to mitigate the effects of operational-level communications degradation, disruption, or denial on the CFACC’s ability to centrally control taskings to tactical units.

Conclusion

Fundamentally, the training conducted at Blue Flag and Red Flag in the 1990s was unaffected by the Persian Gulf War. Indeed, exercise planners made evolutionary changes throughout this period, but fundamentally Blue flag remained focused at the operational level, and Red Flag remained focused at the tactical level. Furthermore, the minimal training that bridged the gap between the operational level and tactical level was simulated. While Blue Flag—following the location shift to home station AOCs—trained to disseminate the ATO using CTAPS and a few alternate methods, the ATO production team disseminated it to one exercise controller rather than the more realistic numerous tactical squadrons. Considering the time required and potential problems that might arise

¹⁷⁷ Reese and Imonti interview.

with numerous tactical squadrons, this distinction is significant. This is not to say that Blue Flag and Red Flag failed to train to a requirement. As seen in the doctrine subsection, no such requirement existed. Rather, it is to say that during this time, both exercises were appropriately focused at their respective levels of war, and a gap existed between the two.

Finally, while Red Flag had consistent coalition participation, Blue Flag in the 1990s lost its NATO exercise, leaving a gap in training with the coalition along with the different systems and processes that are inherent in coalition operations. Therefore, considering the training conducted before OAF at the two premier Air Force level exercises—Blue Flag and Red Flag—training did not prepare the combined air operations team to mitigate the effects of operational-level communications degradation, disruption, or denial on the JFACC’s ability to centrally control taskings to tactical units. Particularly on the coalition side of the *combined* air operations teams, this fact is evident in the ATO dissemination challenges experienced during OAF.

ATO Dissemination Challenges

there is little in the way of interoperability in secure communications between European and U.S. forces in the current campaign. Target lists and air tasking orders have to be hand-carried to allied units for reinsertion into their own secure communication systems.

—John D. Morrocco, *Aviation Week & Space Technology*

Introduction

Following the Persian Gulf War, the challenges associated with ATO dissemination were addressed by senior leadership in the Air Force and Navy. As discussed in Chapter 2, two ATO dissemination PACE plans were developed during the

Persian Gulf War to overcome the interoperability issues with the TACC and the Navy as well as to mitigate reliability issues with the Air Force and Marines using CAFMS. The development of CTAPS, and the joint staff naming CTAPS as the joint standard for ATO generation and dissemination, fixed this issue. In a Senate Armed Services Committee hearing following OAF, Admiral Ellis, Commander-in-Chief, Allied Forces Southern Europe, and the Commander of the JTF Noble Anvil, stated that:

Clearly, we have learned a great many lessons in the years since, even as recently as Desert Storm. Things that were classic problems in that time, the air tasking order, for example, which could not be easily transported or transmitted between services and platforms, were not even an issue in this campaign *within the U.S. network* [emphasis added]. We had the ability to get that, not just to Navy platforms afloat, but to headquarters throughout the region and also into Task Force Hawk in Albania as well.¹⁷⁸

ADM Ellis' key phrase is "within the U.S. network." What he does not explicitly discuss in the Senate hearing is the problem with disseminating the ATO to the European NATO members, outside the U.S. network. This section—in answering SRQs three and four—discusses some of the unique command and control considerations during OAF, discusses the ATO dissemination challenges within NATO, and examines the attempts made to overcome those challenges.

Command and Control Challenges

OAF had one of the most unique, and inefficient, command and control structures seen to date. Each of the following command and control challenges—chain of

¹⁷⁸ U.S. Congress, House, *Hearing before the Armed Services Committee: U.S. Policy and NATO Military Operations in Kosovo*, 106th Cong., 1st sess. (October 21, 1999), 410.

command, two daily ATOs, and information-sharing—contributed to the challenges NATO faced in disseminating the ATO to tactical units.¹⁷⁹

Chain of Command

During the Persian Gulf War, the chain of command for air operations ran from the National Command Authorities to the CINC, General Schwarzkopf, to his JFACC, Lt Gen Horner; and finally to the tactical forces made available to the JFACC. This was not the case during Allied Force; in fact, General Short considered it “about as murky a command relationship as you could possibly get.”¹⁸⁰ Two parallel chains of command existed during OAF, the NATO chain of command and the U.S. chain of command (see Figure 6).

On the NATO side, political direction came from NATO’s political arm, the North Atlantic Council, and flowed to General Wesley Clark, the Supreme Allied Commander Europe. Underneath General Clark was Admiral James Ellis, Jr., commander in chief, Allied Forces Southern Europe, and his Allied Air Forces Southern Europe commander, Lieutenant General Michael Short, who served as the CFACC. The U.S. chain of command mirrored that of NATO’s chain of command, and each commander held an equivalent role in the parallel chain. Direction emanated from the President and Secretary of Defense to General Clark, serving as the Commander in Chief, United States European Command. Command then flowed to Admiral Ellis, serving as the JTF Noble Anvil Commander and to General Short serving as the JFACC for JTF Noble Anvil.

¹⁷⁹ Lambeth, *NATO’s AirWar for Kosovo*, 207-218.

¹⁸⁰ Ibid., 207.

Finally, in both the NATO and U.S. chain of command, operations were controlled through the CAOC in Vincenza, Italy.

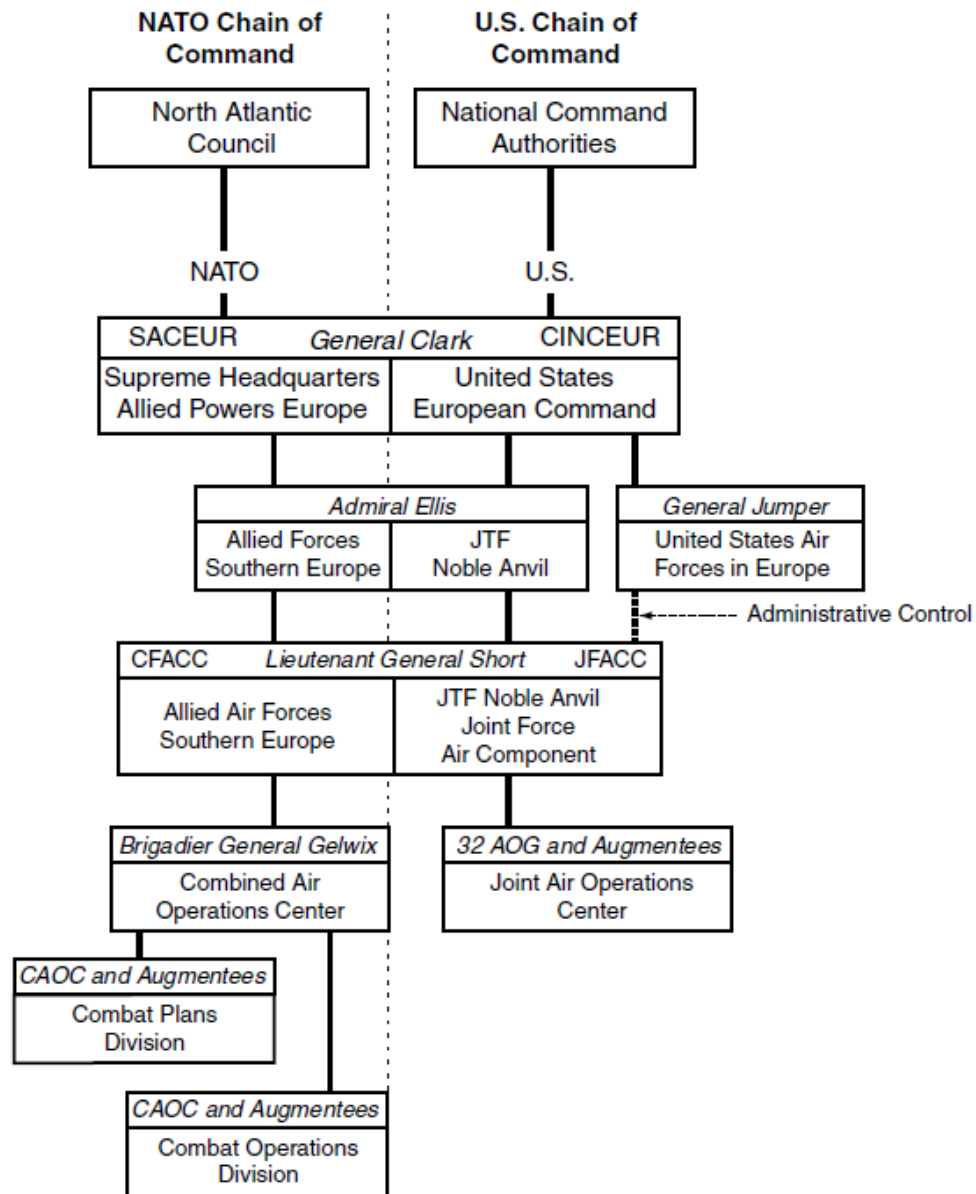


Figure 6. U.S. and Allied Organization for OAF

Source: Benjamin S. Lambeth, *NATO's AirWar for Kosovo: A Strategic and Operational Assessment* (Santa Monica: RAND, 2001), 208.

This parallel chain of command and dual-hatted nature of most commanders caused confusion. To start, General Clark directed operations for Allied Force, and his CFACC was located two echelons down, underneath Admiral Ellis.¹⁸¹ This effectively placed Admiral Ellis between the CINC and the CFACC. General Short thought that this unique command relationship “ [colored] the equation a bit in terms of [his] latitude, if you will, in this air campaign.”¹⁸² Additionally, the parallel chain of command also resulted in “conflicting guidance, command echelons being skipped or omitted entirely, and either a duplication of effort or functions not being performed at all, since one organization erroneously thought the other was responsible for a particular task.”¹⁸³ Arguably though, no command and control issue created more confusion than the existence of two daily ATOs.

Two daily ATOs

Before OAF, senior leaders envisaged assets such as the F-117, B-2, and Tomahawk Cruise missiles playing a vital role in the operation. Due to the sensitive nature of these assets, senior leaders wanted to keep them under U.S.-only control and to

¹⁸¹ It is interesting to note that since the operation fell within the Southern region, the control of the operation should have fallen to Admiral Ellis as the CINCSOUTH with the air effort controlled by the COMAIRSOUTH, General Short. Instead, General Clark assumed personal control of OAF and the air effort, effectively taking Admiral Ellis out of the chain of command. See Lambeth, *NATO's Air War for Kosovo*, 210.

¹⁸² Michael R. Gordon, “Allied Air Chief Stresses Hitting Belgrade Sites,” *New York Times*, May 13, 1999, sec. International, accessed April 7, 2020, <https://archive.nytimes.com/www.nytimes.com/library/world/europe/051399kosovo-nato.html>.

¹⁸³ Lambeth, *NATO's Air War for Kosovo*, 210.

create a security “firewall against leaks from any allies who might compromise those operations.”¹⁸⁴ These concerns were not unfounded, nor were they without recent historical justification.

Several NATO members—including Greece, France and Italy—retain close historical and cultural ties to Serbia, the main state in Yugoslavia. Greece is so cozy with Russia, another close partner to Belgrade, that some new NATO members who have histories of conflict with Moscow have openly lamented having to share security information with the government in Athens.

At NATO headquarters in Brussels, Belgium, last October, U.S. intelligence agents caught a French military officer named Pierre Henri Bunel passing top secret details of NATO airstrike plans against Yugoslavia to Jovan Milanovic, head of the Yugoslav diplomatic mission at the European Union. Bunel, facing espionage charges in France, has admitted to handing off the information.¹⁸⁵

Therefore, senior leaders decided to create a separate ATO for U.S.-only operations. This U.S.-only ATO included any “sorties to be flown by B-2 bombers and F-117 fighters, support elements for all strike packages, and U.S. Tomahawk and CALCM cruise missiles to strike selected targets.”¹⁸⁶ This dual-ATO construct had many adverse effects, including significant confusion among European NATO allies and potentially fatal tactical command and control problems.¹⁸⁷ Most applicable to this study, however, was

¹⁸⁴ Lambeth, *NATO’s AirWar for Kosovo*, 185.

¹⁸⁵ Bob Deans, “Pentagon Mum about Air Mission,” *European Stars and Stripes*, April 27, 1999, 1, 4.

¹⁸⁶ John E. Peters, Stuart Johnson, Nora Benshahel, Timothy Liston, and Traci Williams, *European Contributions to Operation Allied Force: Implications for Transatlantic Cooperation* (Santa Monica: RAND, 2001), 39.

¹⁸⁷ Lt Gen Short recalled after OAF that the absence of U.S.-only missions on the NATO ATO often led to NATO Allied air chiefs questioning what the assets were doing, and his response would be “trust me.” Additionally, Lt Gen Short said that the lack of knowledge of U.S.-only operations often led to confusion when “suddenly things showed up [on NATO Airborne Warning and Control System radar] where they didn’t expect

the “parallel but separate mechanisms for mission planning and air tasking” that the dual-ATO construct required.¹⁸⁸

Both ATOs were produced and disseminated from the CAOC in Vincenza, Italy, operated by NATO’s 5th Allied Tactical Air Force (ATAF). The 5 ATAF performed the command and control functions for NATO and U.S.-only operations, although separate ATO production teams planned each operation.¹⁸⁹ The process each ATO production team used was very similar to the process described in *JP 3-56.1, Command and Control of Joint Air Operations*. Figure 7 shows the NATO planning and implementation process during OAF. The center column of the figure depicts the ATO process (see Figure 8 for a comparison to the ATO process from JP 3-56.1). The integration between NATO’s command structure and the ATO process is depicted in the left column of the figure, where the U.S. command structure’s integration to the ATO process is depicted in the right column.¹⁹⁰ Inherent in parallel planning operations that include 19 participating nations, information-sharing posed a significant challenge to NATO operations.

them.” John A. Tirpak, “Washington Watch: Short’s View of the Air Campaign,” *Air Force Magazine* (July 11, 2008), accessed March 17, 2020, <https://www.airforcemag.com/article/0999watch/>.

¹⁸⁸ Lambeth, *NATO’s AirWar for Kosovo*, 188.

¹⁸⁹ Lambeth, *NATO’s AirWar for Kosovo*, 210; Major General Karsten Stoye, German Air Force, e-mail interview by author, April 28, 2020.

¹⁹⁰ The right column of Figure 7 depicts a Joint AOC, as compared to the Combined AOC on the left of the figure. Of note, all operations were run out of a single CAOC in Vincenza, Italy. No separate JAOC existed for OAF.

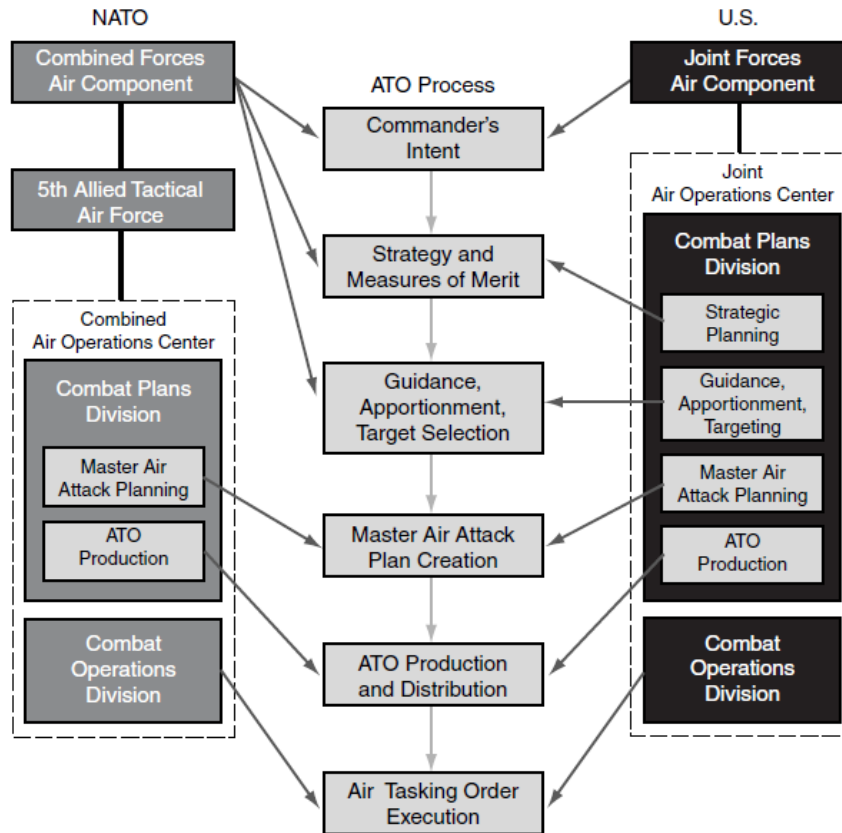


Figure 7. OAF Planning and Implementation

Source: Benjamin S. Lambeth, *NATO's AirWar for Kosovo: A Strategic and Operational Assessment* (Santa Monica: RAND, 2001), 189.

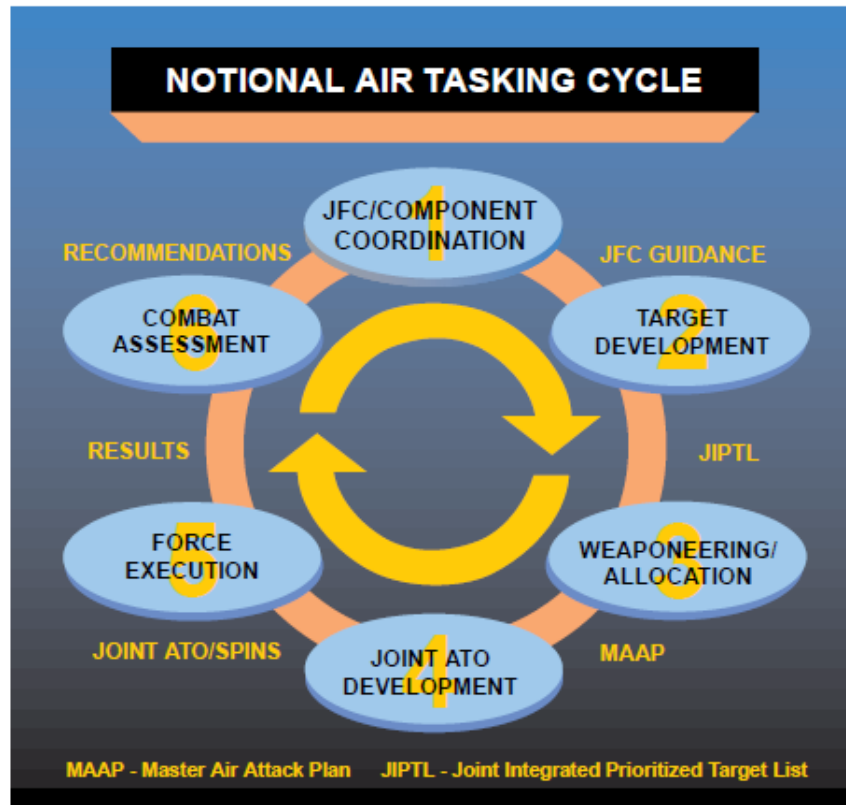


Figure 8. Notional Air Tasking Cycle from JP 3-56.1

Source: Chairman of the Joint Chiefs of Staff, Joint Publication 3-56.1, *Command and Control of Joint Operations* (Washington, DC: Office of the Chairman of the Joint Chiefs of Staff, 1994), IV-4.

Information-Sharing

Challenges with information-sharing affected virtually every step in the ATO process. Planners on the parallel teams faced “institutional roadblocks and delays” with freely exchanging classified information from any allied nation to NATO.¹⁹¹ “It’s not that the information is so secret. It’s that we have a bureaucracy, and the way we transfer

¹⁹¹ Lambeth, *NATO’s AirWar for Kosovo*, 213.

from ‘U.S. Secret’ to ‘NATO Secret’ takes a little bit of time.”¹⁹² Further complicating the information-sharing problem was the over-classification of information. Even though certain portions of the planning process were not classified, the mere fact that information resided in a classified system prevented U.S. planners from sharing the information, ultimately affecting operations.

due to the involvement of a few compartmented programs, the entire planning effort was classified at an unnecessarily high level, unreleasable to all but a very few U.S. planners. Unfortunately, implementing the overall plan was critical to the success of the operation, but because of the excessive classification, those charged with implementing it could not be told of the plan until it was too late.¹⁹³

As will be seen in the next subsection, the U.S. ATO production and dissemination system is one such “compartmented program.”

There are a several other command and control challenges left unmentioned in this subsection, such as the lack of a coherent strategy, the target nomination and approval process, the use of video teleconferencing, the initial dearth of CAOC staff members, and the eventual superfluity of CAOC staff members. A planner in the strategy cell at CAOC remarked that “operational effectiveness in Allied Force was probably achieved ‘in spite of the . . . command structures and processes rather than as a direct result of them.’”¹⁹⁴ Indeed, one could write a separate thesis on the multiple command and control challenges during OAF; however, the three aforementioned command and

¹⁹² Rowan Scarborough, “Kosovo Target Data Stalled in Transit: Allied Pilots Often in the Dark,” *Washington Times*, July 28, 1999, accessed April 9, 2020, <https://go-gale-com.lumen.cgsccarl.com/ps/i.do?p=BIC&u=97mwrlib&id=GALE|A55287864&v=2.1&it=r&sid=summon>.

¹⁹³ Lambeth, *NATO’s AirWar for Kosovo*, 214.

¹⁹⁴ *Ibid.*, 211.

control challenges—the chain of command, two daily ATOs, and information sharing—directly contributed to the ATO dissemination challenges faced by NATO during OAF.

ATO Dissemination

This subsection will examine the ATO production system, the eventual method of dissemination for the NATO ATO, and security implications for that method.

CTAPS and LOCE

As discussed in the previous subsection, during OAF, there were two daily ATOs: the U.S.-only ATO and the NATO ATO. The associated parallel planning processes both used the Contingency Theater Air Planning System (CTAPS)—a force-level planning system that is the U.S. joint standard—for ATO production.¹⁹⁵ The system could accommodate a 3,000 sortie per day ATO and was designed for an AOC with a 600 – 800 person staff.¹⁹⁶ The larger staff was required because CTAPS was comprised of “several interconnected modules, each devoted to a particular function within the air campaign planning process (preparing target folders, planning tanker orbits, etc.).”¹⁹⁷ Significant challenges, however, existed within CTAPS, such as ease of use, extensive required training, required computational power, and functionality, to name a few.¹⁹⁸

¹⁹⁵ Stoye interview; Myron Hura, ed., *Interoperability: A Continuing Challenge in Coalition Air Operations* (Santa Monica, CA: RAND, 2000), 46.

¹⁹⁶ Hura, *Interoperability*, 46.

¹⁹⁷ *Ibid.*

¹⁹⁸ *Ibid.*

For the U.S.-only ATO, CTAPS was also used for ATO dissemination, enabling the ATO to be disseminated “not just to Navy platforms afloat, but to headquarters throughout the region and also into Task Force Hawk in Albania as well.”¹⁹⁹ NATO, however, could not use CTAPS to disseminate the ATO to European NATO allies.²⁰⁰ NATO used a system called the Limited Operational Capability for Europe (LOCE) to, among other uses, disseminate the ATO to tactical units. Major General Karsten Stoye, German Air Force, Chief ATO Planner during OAF, stated that:

The ATO was transferred via a 3.5-inch diskette from CTAPS to LOCE . . . problems [existed] due to the low bandwidth of the LOCE system, and it took some time for dissemination to the point that it sometimes failed. In addition, MISREPS were also sent using LOCE as well as Recce pictures, which took quite a while.²⁰¹

With all the other classified information that was transmitted via LOCE, the system and its limited bandwidth—64 kilobits per second—became overwhelmed and unreliable for ATO dissemination.²⁰² The CAOC initially turned to the tried and true method of hand-delivery for ATO dissemination:

any time that U.S. commanders needed to convey sensitive information, such as target lists and the daily ATO, they had to print out the information and hand-deliver it to their allied counterparts. The allies would then type that information into their secure communications systems for transmission to their forces.²⁰³

¹⁹⁹ Woehrel and Kim, *Kosovo and U.S. Policy*, 410-411.

²⁰⁰ Stoye interview.

²⁰¹ Ibid.

²⁰² Peters et al., *European Contributions to Operation Allied Force*, 56.

²⁰³ Ibid., 56-57.

This method resulted in the allies receiving the ATO, although information security suffered tremendously.

Unintended Consequences

In the opening weeks of OAF, senior NATO officials suspected that some allies had leaked air tasking information to Yugoslav officials. While not expanding on details or implicating a particular ally, General Clark “said the security breach was ‘as clear as the nose on your’ face.”²⁰⁴ In one suspected case of the air tasking order information ending up in enemy hands, “two empty Interior Ministry buildings in Belgrade were struck by cruise missiles at the end of the third week. Only 24 hours previously, those buildings had been full of employees, suggesting that the enemy knew the attack was coming and when.”²⁰⁵ In another suspected case, the Serbs were able “to move surface-to-air missile batteries in anticipation of NATO flight plans.”²⁰⁶ After the air campaign ended, Pentagon officials were more open in acknowledging NATO’s security breaches.

Kenneth H. Bacon, a Pentagon spokesman, told reporters that “NATO believes that the Serbs somehow gained access to portions of the air tasking order . . . when parts of the order were sent by facsimile machine by representatives to NATO headquarters in

²⁰⁴ Hearst Newspapers, “NATO Chief: Targeting Goals Leaked to Yugoslavia,” *Pacific Stars and Stripes* 54, no. 224 (August 13, 1999): 1, 7.

²⁰⁵ Lambeth, *NATO’s AirWar for Kosovo*, 206.

²⁰⁶ Roberto Suro and Thomas E. Ricks, “Pentagon Acknowledges Leaks of NATO Kosovo Air War Data,” *Washington Post*, March 10, 2000), accessed March 20, 2020, <https://www.washingtonpost.com/archive/politics/2000/03/10/pentagon-acknowledges-leaks-of-nato-kosovo-air-war-data/c006f855-ea15-410a-8f80-282ad6581fa6/>.

Brussels back to their home capitals.”²⁰⁷ It is challenging, even in 2020, to attribute the preponderance of leaks to the hand-delivery method of ATO dissemination. Indeed, if the reports of a Serbian sympathizing spy were accurate, the leaks, at least in part, could be attributed to such espionage.²⁰⁸ Even so, once a U.S. representative printed off the ATO and hand-delivered it to representatives from allied nations within NATO, the chain of custody was undoubtedly in question. Whether it was an intercepted facsimile or act of espionage, Pentagon spokesman Rear Admiral Craig Quigley stated that “our operational security procedures in the early stages of the war were probably not as good as they should have been.”²⁰⁹ Following the several potential cases of leaked ATO data, NATO began “limiting the distribution of orders detailing its plans and making greater use of encoded communications.”²¹⁰ Admiral Quigley went on to say that, “We could see readily that we were not doing a very good job of securing our communications, and so we looked around and sewed it up in several different areas. It was a matter of imposing some self-discipline on ourselves all around, and it worked.”²¹¹ One such method was a new method of electronic ATO dissemination that sped up the timeline and brought additional security.

²⁰⁷ Suro and Ricks, “Pentagon Acknowledges Leaks of NATO Kosovo Air War Data.”

²⁰⁸ Ibid.

²⁰⁹ Ibid.

²¹⁰ Ibid.

²¹¹ Ibid.

Secure Internet Protocol Router Network (SIPRNet)
Community of Interest Network

While the physical method of ATO dissemination worked, albeit with speed and security problems, a backup digital ATO dissemination method was needed. In the first few months of the air campaign, communications were at their worst. One senior official, speaking as an anonymous source due to General Clark's gag order, stated in mid-April that "the ability to cooperate in a collation command-and-control net is also missing."²¹² I have blank connectors [in the wall] because we don't have anyone that can authorize a classified coalition local area network. We have no doctrine whatsoever. If I can't talk to my coalition partner, how can I work with him."²¹³ After a few months, however, communications capabilities seemed to improve.

Following OAF, Lieutenant General Marvin R. Esmond, Deputy Chief of Staff for Air and Space Operations, testified that United States Air Forces in Europe (USAFE) communications and intelligence teams "worked through a myriad of restrictive SIPRNet policies to develop an acceptable 'community of interest network' to address [the ATO dissemination] issue. Essentially, this was a pipe within a pipe . . . "²¹⁴ Once functional, the team was able to reduce ATO dissemination time from "several hours," using LOCE,

²¹² David A. Fulghum, "Serb Threat Subsides, But U.S. Still Worries," *Aviation Week & Space Technology* (April 12, 1999): 26.

²¹³ *Ibid.*, 24-25.

²¹⁴ U.S. Congress, House, *Lieutenant General Marvin R. Esmond, Testimony to the House Armed Services Committee, Subcommittee on Military Procurement*, 106th Cong., 1st sess. (1999).

to “a matter of minutes.”²¹⁵ General Esmond, in his evaluation of this method, stated that it “worked extremely well,” but that “in the future, the Air Force must still resolve the issue of disseminating classified NATO air tasking orders to participating units outside the theater—such as direct delivery support missions.”²¹⁶

Conclusion

In the end, while several OAF missions were canceled—due to weather, maintenance, or the perceived risk of causing collateral damage—there is no evidence indicating that any sortie was canceled due to a tactical unit not receiving the ATO, despite several ATO dissemination challenges.²¹⁷ This was not due to a published and well-trained-to ATO dissemination PACE plan; indeed, evidence suggests that such a plan did not exist. Rather, like similar solutions to the ATO dissemination challenges during the Persian Gulf War, the success was due to innovation and problem-solving. Thus, two ATO dissemination PACE plans emerged during the 78-day air campaign—one for U.S. forces and one for European NATO forces (summarized in Figure 9).

²¹⁵ U.S. Congress, House, *Lieutenant General Marvin R. Esmond Testimony*; Stoye interview. While General Esmond explains this method in quite certain terms, the author can find no other reference to this method of dissemination. Additionally, Maj Gen Stoye could not recall any other system for distribution to NATO units. Therefore, it is unclear at which point during OAF this method was used and to what extent. Other sources, such as *NATO’s Air War for Kosovo* and *European Contributions to Allied Force*, speak of the hand-delivery method of ATO dissemination as if it were the prevalent method throughout OAF.

²¹⁶ U.S. Congress, House, *Lieutenant General Marvin R. Esmond Testimony*.

²¹⁷ Lambeth, *NATO’s Air War for Kosovo*, 37, 140.

ATO Dissemination PACE Plan	
U.S.	
Primary	CTAPS
Alternate	-
Contingency	-
Emergency	Hand-Delivery
NATO	
Primary	LOCE
Alternate	Hand-Delivery
Contingency	SIPRNet Community of Interest Network
Emergency	-

Figure 9. ATO Dissemination PACE Plan – OAF

Source: Author.

Chapter Conclusion

The successful, 78-day air campaign generated numerous lessons, some of which were repeated from the Persian Gulf War nearly a decade in the past. The lessons of significance to this study are centered around ATO dissemination challenges within NATO. Specifically, this chapter answered the four SRQs by assessing the doctrine and training prior to OAF, examining the ATO challenges faced by NATO, and by analyzing the methods NATO used to prevent any lost sorties. This section briefly presents the conclusions from each SRQ and makes a final assessment of the primary research question for the OAF case.

Collectively, authors made noteworthy progress in evolving air operations doctrine following the Persian Gulf War. The most noteworthy change came in joint doctrine, where the joint staff J-6 named CTAPS as the joint standard for ATO production and dissemination. This change was a significant contributing factor in

eliminating the interoperability issues with ATO dissemination experienced in the Persian Gulf War. Doctrine, however, failed to establish the requirement—which was made clear in the Persian Gulf War—for the joint air operations team to have an ATO dissemination PACE plan. Therefore, in the final analysis, the collective body of doctrine available before OAF did not prepare the combined air operations team to mitigate the effects of operational-level communications degradation, disruption, or denial on the CFACC's ability to centrally control taskings to tactical units.

Exclusively considering the available information on training prior to OAF—Blue Flag and Red Flag—training was fundamentally unchanged following the Persian Gulf War and each of the exercises remained focused on their respective level of war, leaving a training gap between the two. During Blue Flags, while the ATO production team in the AOC now trained to ATO dissemination, they did not disseminate the ATO to actual tactical units, only to an exercise planner. Additionally, coalition participation in Blue Flag ended in the 1990s, leaving training for NATO AOCs to resident exercises available in Europe. Therefore, Red Flag and Blue Flag did not prepare the combined air operations team to mitigate the effects of operational-level communications degradation, disruption, or denial on the CFACC's ability to centrally control taskings to tactical units.

Inadequate pre-conflict doctrine and training are evidenced by NATO's challenges with ATO dissemination during OAF. U.S. forces successfully utilized CTAPS for ATO production and dissemination; however, no available evidence exists indicating an ATO dissemination PACE plan was developed or used. European NATO forces only went into the conflict with a primary plan—LOCE—but the limited bandwidth of LOCE made this method ineffectual, forcing the hand-delivered method of

dissemination until the SIPRNet Community of Interest Network was created. In the end, neither the U.S. nor NATO went into OAF with an established, published ATO dissemination PACE plan, yet two effective PACE plans emerged, nonetheless.

In conclusion, while the degree of success is a topic of debate to this day, OAF was a successful air campaign that ended with Milošević accepting NATO's terms of peace. There were no sorties lost due to a tactical unit not receiving the ATO; however, this was not due to sound doctrine or training. *NATO's Air War for Kosovo* sums this point up nicely, "other classified communications required passing a hard copy of the information [ATO] by hand, repeating one of the worst command and control deficiencies that had been exposed earlier in Desert Storm . . ." ²¹⁸ Instead, the success in disseminating two daily ATOs was due to the innovation and problem-solving exhibited by the combined air operations team.

²¹⁸ Lambeth, *NATO's Air War for Kosovo*, 167.

CHAPTER 4

CASE STUDY 3: PRESENT-DAY (2020)

Today, we are emerging from a period of strategic atrophy, aware that our competitive military advantage has been eroding. We are facing increased global disorder, characterized by decline in the long-standing rules-based international order—creating a security environment more complex and volatile than any we have experienced in recent memory.

—Office of the Secretary of Defense,
*Summary of the 2018 National Defense Strategy
of the United States of America*

We’ve been embroiled in limited warfare for decades, and it’s time for us to read, understand, contemplate, and retool in the face of great power competition.

—General David L. Goldfein, Air Force Chief of Staff,
“A Call to Arms . . . Fueled by Doctrine”

Introduction

Between the end of OAF and the present day, the United States experienced a “black swan” event—September 11, 2001—that has defined warfare over the last two decades. The consequences of the shift towards countering violent extremist organizations and the recent shift toward “inter-state strategic competition” are encapsulated in this chapter’s epigraphs by Secretary Mattis and General Goldfein.²¹⁹ This transformation has brought about a mindset shift within the Department of Defense and a renewed emphasis on operating within a CDO environment.

This chapter answers the first and second SRQs by examining current doctrine and training as it relates to the JFACC’s responsibility to task capabilities and forces made available to him using centralized control. Additionally, this chapter highlights the

²¹⁹ SecDef, NDS, 1.

joint air operations command and control implications of the ongoing efforts by the Air Force to adapt their ingrained concept of operation to an adversary capable of contesting every domain. Finally, in answering the primary research question for the present-day case, this chapter assesses the joint air operations team's preparedness in mitigating the effects of operational-level communications degradation, disruption, or denial on the JFACC's ability to centrally control taskings to tactical units.

Doctrine

Our doctrine gives us an agreed upon, operationally relevant body of best practices and principles that allow us to continue to be the best most capable Air Force on the planet. In today's complex global security environment, victory goes to the force that can most rapidly integrate and disseminate ideas.

—General David L. Goldfein, Air Force Chief of Staff,
“A Call to Arms . . . Fueled by Doctrine”

Introduction

Air operations doctrine available prior to OAF was the first set that one might recognize as modern air operations doctrine. Two and a half decades later, while certain nomenclature has changed and certain sections have expanded to accommodate changes and additions in technology, the broad air operations process has remained relatively the same. Changes to the process have been evolutionary, not revolutionary, and these changes reflect the continuous refinements made possible by the ongoing, nineteen-year Overseas Contingency Operations. However, following the publication of the 2018 National Defense Strategy (NDS), joint and Air Force doctrine have begun to better address adversaries capable of contesting every domain and disrupting the airpower and technology-dependent American Way of War. Thus, where previous sets of doctrine have

lacked considerations for ATO dissemination in a contested and degraded operationally limited (CDO) environment, current doctrine has begun to address such environments.

Compared to the first two cases, the present-day case benefits from the availability of doctrine and sources familiar with current doctrine. Thus, in addition to the successor publications to JP 3-56.1 and AFDD-2, this subsection will assess Air Force Instruction 13-1AOC Volume 3 (AFI 13-1 AOCV3), *Operational Procedures—AOC* and Air Force Tactics, Techniques, and Procedures (AFTTP) 3-3.AOC, *Operational Employment - AOC*. This subsection assesses these four publications against the three doctrinal research questions, then uses the answers as evidence to assess the first SRQ.

JP 3-30, Joint Air Operations

JP 3-30, published in July of 2019, is the most recent publication in the line of JFACC-era Joint Air Operations doctrine, dating back to April 1986. Following the 1994 JP 3-56.1, *Command and Control for Joint Air Operations*, the publications name changed in 2003 to JP 3-30, *Command and Control for Joint Air Operations*. It kept the new name through two additional iterations, and in 2019, the publication dropped the “Command and Control” portion of the subtitle and became JP 3-30, *Joint Air Operations*. While the name has changed constantly in its 34-year history, since 1994, the focus of the publication has remained constant. The purpose of this publication is to provide “fundamental principles and guidance for the conduct of joint air operations.”²²⁰ It is organized into three chapters: (1) introduction; (2) command and control of joint air

²²⁰ CJCS, JP 3-30 (2019), i.

operations; and (3) planning and executing joint air operations. Chapter two is of particular importance in answering the three doctrinal research questions.

JP 3-30's response to the first doctrinal research question—concerning whom doctrine makes responsible for the command and control of joint air operations—does not depart from the previously discussed JP 3-56.1. Among the JFACC's responsibilities is the responsibility to “allocate and task the joint air capabilities and forces made available . . . “ and to “provide the JFACC's guidance in the air operations directive (AOD).”²²¹ The AOD, introduced in joint doctrine in the 2003 JP 3-30, is a document that contains the JFACC's guidance for a specified period and “is used throughout the planning stages of the joint air tasking cycle and the execution of the ATO. The AOD may include the JFC's apportionment decision, the JFACC's intent, objectives, weight of effort, and other detailed planning guidance . . . “²²² These two JFACC responsibilities are further delegated to the CPD within the JAOC, who is “devoted to near-term planning and drafting of the daily ATO.”²²³ Thus, JP 3-30 clearly answers the first doctrinal research question: the JFC gives the JFACC the responsibility to allocate and task the capabilities and forces made available to him, which he executes through the CPD's daily ATO.

The discussion on the second doctrinal research question—concerning whether a primary ATO dissemination method and associated communications requirements are

²²¹ CJCS, JP 3-30 (2019), II-3.

²²² Ibid.

²²³ Ibid., II-15.

adequately addressed in doctrine—is expanded from JP 3-56.1. The expanded discussion is evident in three points. First, the publication states that “the ability to exchange information via reliable, secure communications with the JFC, joint force staff, other component commanders, and *tactical units* [emphasis added] is a key factor to the successful integration of the joint air effort.”²²⁴ This statement, originally added in 2003, includes “tactical units” for the first time in the 2019 JP 3-30. This addition emphasizes the important operational-level communications link between the operational and tactical levels of war. Second, in place of CTAPS, in 2003, JP 3-30 named the Theater Battle Management Core System (TBMCS) as the joint standard for ATO generation and dissemination.²²⁵ Finally, representative of the developments in cybersecurity since 1994, JP 3-30 has incrementally improved the statement concerning cybersecurity. “Planning for all information exchange requirements and procedures should consider the cybersecurity elements of Department of Defense (DOD) information network operations affecting confidentiality, availability, and integrity of networks used for air operations.”²²⁶ Therefore, JP 3-30 answers the second doctrinal research question by articulating the importance of secure, reliable communications between all members of the joint air operations team, establishing TBMCS as the joint standard for ATO

²²⁴ CJCS, JP 3-30 (2019), II-25.

²²⁵ Chairman of the Joint Chiefs of Staff (CJCS), Joint Publication 3-30, *Command and Control for Joint Air Operations* (Washington, DC: Office of the Chairman of the Joint Chiefs of Staff, June 5, 2003), II-28.

²²⁶ CJCS, JP 3-30 (2019), II-25.

dissemination, and emphasizing the importance of cybersecurity to digital information exchange.

JP 3-30 significantly progresses the discussion on the third doctrinal research question—concerning whether doctrine establishes the requirement to have alternate, contingency, or emergency ATO dissemination methods. Initially introduced in 2014, JP 3-30 recognizes the degree of which centralized control relies on communications as well as their vulnerability in degraded environments:

Centralized control and decentralized execution requires a robust communications architecture. Planning should anticipate the need for communications in degraded environments at all levels and phases of operations and include considerations for alternate routing, redundant systems, use of other systems, protocols, and message standards. Impaired/inadequate information exchange capability should be anticipated and incorporated into risk management considerations during air operations planning.²²⁷

Additionally, in line with the previous statement, JP 3-30 gives the ATO production team, within the JAOC's CPD, the responsibility to "coordinate redundant procedures for timely ATO dissemination and receipt."²²⁸ Therefore, while JP 3-30 does not use the specific terms in the third doctrinal research question, JP 3-30 establishes the requirement for operational-level communications in degraded environments and gives that responsibility to the ATO production team.

²²⁷ CJCS, JP 3-30 (2019), II-26. It is interesting to note that the word "should," emphasized in the quote above, changed from the word "must" in the 2014 JP 3-30, reducing the overall effectiveness of the passage. In the comment resolution matrix for the 2019 JP 3-30, USCYBERCOM suggested this change in order to "remove policy language."

²²⁸ CJCS, JP 3-30 (2019), III-25.

Air Force Doctrine Annex 3-30 Command and Control

Annex 3-30 was published in January of 2020 and is the Command and Control annex to the Air Force's capstone operational doctrine, Air Force Doctrine Volume 3: Command. While Air Force Doctrine (AFD) Volume 3 is the successor to the 1998 AFDD-2 and the 1969 AFM 2-1, Annex 3-30 contains greater detail to the broad discussion on the three doctrinal research questions in Volume 3. Additionally, by design, this Annex is the service companion to joint doctrine's JP 3-30. Thus, this subsection will review Annex 3-30 instead of Volume 3. Annex 3-30 has no stated purpose, other than its title "Command and Control." It is organized into six Doctrine Topic Modules and five appendixes, which all aid in answering the three doctrinal research questions.

Annex 3-30 leaves the first doctrinal research question—concerning whom doctrine makes responsible for the command and control of joint air operations—unchanged. The publication states that the JFACC "should be the Service component commander with the preponderance of forces to be tasked and the ability to plan, task, and control joint air operations."²²⁹ Additionally, the JFACC has the responsibility to plan, coordinate, allocate, task, execute, and assess joint air operations.²³⁰ Furthermore, the JFACC's "task" responsibility is executed through the JAOC, CPD, and ATO production team.²³¹ Thus, Annex 3-30 is clear on the first doctrinal research question: the

²²⁹ LeMay Center for Doctrine, Annex 3-30, *Command and Control* (Maxwell AFB, AL: LeMay Center for Doctrine, January 7, 2020), 7, accessed April 16, 2020, <https://www.doctrine.af.mil/Doctrine-Annexes/Annex-3-30-Command-and-Control/>.

²³⁰ Ibid.

²³¹ Ibid., 56-57.

JFC gives the JFACC the responsibility to task joint air operations, which he executes through his JAOC, CPD, and ATO production team.

The second doctrinal research question—concerning whether a primary ATO dissemination method and associated communications requirements are adequately addressed in doctrine—is not addressed in Annex 3-30. There is no mention of ATO dissemination, and the only mention of communications, as it could relate to ATO dissemination, comes in discussing the need for the AOC to “have secure and redundant communications with higher and lateral headquarters, as well as subordinate units.”²³² One might argue that Air Force doctrine need not name an ATO production and dissemination system since JP 3-30 makes TBMCS the joint standard, and its inclusion would risk obsolescence once JP 3-30 declares a new joint standard. Nonetheless, other than establishing the general need for secure and redundant communications between the JAOC and subordinate units, Annex 3-30 does not adequately address the second doctrinal research question. It does, however, adequately answer the third doctrinal research question, in a revolutionary way.

The third doctrinal research question—concerning whether doctrine establishes the requirement to have alternate, contingency, or emergency ATO dissemination methods—is substantively and boldly addressed in Annex 3-30, but not in the way one might expect. In two boxouts—“Control of Airpower in Contested Environments” and a quote from General Charles Q. Brown, Jr. Commander, Pacific Air Forces (PACAF)—Annex 3-30 describes a method to maintain air operations momentum even when tactical

²³² LeMay Center for Doctrine, Annex 3-30, 65.

units are disconnected from the JAOC, due to actions taken by an adversary.²³³ In this method, a standing integrated tasking order (ITO) is disseminated—presumably before the start of the conflict—to local, forward based subordinate commanders.²³⁴ In conjunction with the standing ITO, the JFACC’s AOD gives “CBA”—procedures for predetermining delegation of authority in anticipation of degraded or lost communications—and the JFACC’s intent.²³⁵ Each of these empowers subordinate commanders at the “lowest capable and competent level” to maintain pressure on the enemy.²³⁶ Finally, while subordinate commanders are maintaining pressure on the enemy, subordinate units and the JAOC are independently “working toward moments of clear C2.”²³⁷

While Annex 3-30 does not explicitly state this much, this method could be applied as the “E”—the emergency method—of the ATO dissemination PACE plan. Except, instead of the traditional methodology for executing a PACE plan where each step is attempted sequentially, the ATO dissemination team would disseminate this standing order before the start of hostilities; to be executed should the AOC be disconnected. Therefore, while Annex 3-30 does not articulate an entire PACE plan for dissemination, it describes a revolutionary method for control of joint air operations. This

²³³ LeMay Center for Doctrine, Annex 3-30, 3.

²³⁴ Ibid.

²³⁵ Ibid.

²³⁶ Ibid.

²³⁷ Ibid., 2.

method is a doctrinal reflection of the several ongoing efforts, discussed in a later subsection (see page 126).

AFI 13-1 AOCV3 and AFTTP 3-3.AOC

AFI 13-1 AOC was published in 2011 and incorporates Change 1, published in 2012. As the AOC fundamentals reference document for operational-level C2, it describes the process used by the AOC weapon system during major contingency operations.²³⁸ The current AFTTP 3-3.AOC was published in 2018, although the 3-3.AOC authors made the current draft available for review, which is the subject of this subsection's analysis. Since the 3-3.AOC "expands on AFI 13-1 AOC, Volume 3, *Operational Procedures—AOC*," the answers to the three doctrinal research questions in each publication are nearly identical. Thus, this subsection will use both publications as evidence but will primarily refer to the 3-3.AOC due to the level of detail provided in the AFTTP.

The discussion in both publications on the first doctrinal research question—concerning whom doctrine makes responsible for the command and control of joint air operations—focuses on the JAOC and the responsibilities given to it by the JFACC. "Based on the tenet of centralized planning and control, and decentralized execution, the AOC enables the JFACC to exercise operational-level C2 of air and space forces," which

²³⁸ Department of the Air Force, Air Force Tactics, Techniques, and Procedures (AFTTP) 3-3.AOC, *Operational Employment-AOC, Draft (U//FOUO, Excerpts Unclassified)* (Washington, DC: Department of the Air Force, Draft), 1-1; Department of the Air Force, Air Force Instruction (AFI) 13-1AOC Volume 3, *Operational Procedures-Air Operations Center (AOC), Change 1* (Washington, DC: Department of the Air Force, May 18, 2012), 1.

he charges the JAOC director “with effectively conducting joint air and space operations based on” the JFC’s and his guidance.²³⁹ The JAOC director then makes the Chief of Combat Plans “directly responsible . . . for planning, allocation, and tasking of air and space forces based on C/JFC and C/JFACC guidance . . .”²⁴⁰ Within the CPD, the Chief of ATO production has the responsibility to “establish procedures to assemble, disseminate, and publish the daily ATO.” At the end of the responsibility chain, originally given by the JFC, the ATO production team holds the final responsibility to disseminate the daily ATO.²⁴¹ Thus, in answering the first doctrinal research question, the 3-3.AOC and 13-1 AOCV3 clearly articulate the chain of responsibility for tasking forces and capabilities, running from the JFC down to the ATO production team.

The second doctrinal research question—concerning whether a primary ATO dissemination method and associated communications requirements are adequately addressed in doctrine—is addressed in both publications. First, since JP 3-30 establishes TBMCS as the joint standard for ATO production and dissemination, the 3-3.AOC gives extensive direction and guidance on disseminating the ATO using TBMCS.²⁴² Additionally, while the 3-3.AOC does not discuss specific considerations for

²³⁹ Department of the Air Force, AFI 13-1AOCV3, 5; Department of the Air Force, AFTTP 3-3.AOC, Draft, 2-1.

²⁴⁰ Department of the Air Force, AFTTP 3-3.AOC, Draft, 4-8.

²⁴¹ Department of the Air Force, AFTTP 3-3.AOC, Draft, 4-70; Department of the Air Force, AFI 13-1AOCV3, 35.

²⁴² Department of the Air Force, AFTTP 3-3.AOC, Draft, 4-72 – 4-74; Significant portions of the discussion on ATO dissemination using TBMCS is Unclassified//FOUO and thus, this study omits specific details.

communications requirements, AFI 13-1 AOCV3 provides clear direction to all AOC divisions to:

establish communications support requirements including, but not limited to, spectrum/frequency use, internal and external data network requirements . . . and computer hardware requirements.²⁴³

Therefore, both publications adequately address the primary ATO dissemination method—TBMCS—and associated communications requirements.

The third doctrinal research question—concerning whether doctrine establishes the requirement to have alternate, contingency, or emergency ATO dissemination methods—is answered within both publications. First, the requirement is established in AFI 13-1 AOCV3 by giving the AOC commander the responsibility to “establish contingency plans and procedures for elements of the TACS that may be disabled or forced into performing autonomous operations.”²⁴⁴ The 3-3.AOC additionally makes the AOC director responsible for assuring the “survivability, reliability, and availability of C2 systems across the spectrum of threats”²⁴⁵ One such method to assure the reliability of C2 systems within a CDO environment, as described in the 3-3.AOC is to develop a PACE plan for communications, considering redundant telecommunications rather than a sole telecommunications capability.²⁴⁶ This PACE plan for communications and information-sharing, although approved by the AOC director, is built by the C2

²⁴³ Department of the Air Force, AFI 13-1AOCV3, 103.

²⁴⁴ *Ibid.*, 14.

²⁴⁵ Department of the Air Force, AFTTP 3-3.AOC, Draft, 2-1.

²⁴⁶ *Ibid.*, 2-14.

Architecture Planning Cell within the CPD.²⁴⁷ While the specifics of this PACE plan are classified, the 3-3.AOC gives planners certain options to disseminate the ATO, see Figure 10. Therefore, both publications address the third doctrinal research question, in more detail than any publication has provided thus far.

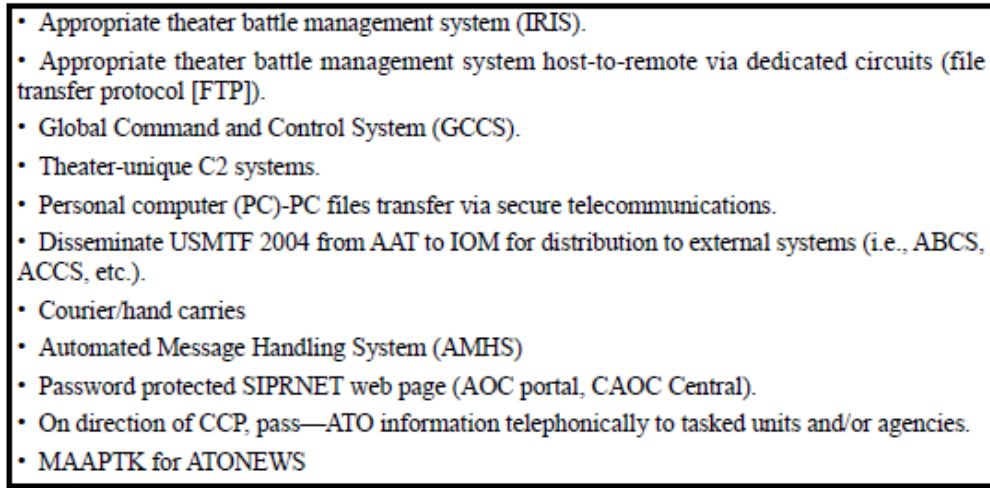
- 
- Appropriate theater battle management system (IRIS).
 - Appropriate theater battle management system host-to-remote via dedicated circuits (file transfer protocol [FTP]).
 - Global Command and Control System (GCCS).
 - Theater-unique C2 systems.
 - Personal computer (PC)-PC files transfer via secure telecommunications.
 - Disseminate USMTF 2004 from AAT to IOM for distribution to external systems (i.e., ABCS, ACCS, etc.).
 - Courier/hand carries
 - Automated Message Handling System (AMHS)
 - Password protected SIPRNET web page (AOC portal, CAOC Central).
 - On direction of CCP, pass—ATO information telephonically to tasked units and/or agencies.
 - MAAPTK for ATONEWS

Figure 10. ATO Dissemination Options – AFTTP 3-3.AOC

Source: Department of the Air Force, Air Force Tactics, Techniques, and Procedures 3-3.AOC, *Operational Employment-AOC, Draft (U//FOUO, Excerpts Unclassified)* (Washington, DC: Department of the Air Force, Draft), 4-70.

Conclusion

Since OAF, the joint air operations team has enjoyed a nearly two-decade-long low-intensity conflict to operationally test, evaluate, and continually refine C2 processes. Most changes in doctrine during this period have reflected these evolutionary changes, although the recent emphasis on CDO environments against a near-peer adversary have

²⁴⁷ Department of the Air Force, AFTTP 3-3.AOC, Draft, 4-83.

resulted in some revolutionary ideas in doctrine. Since 1994, doctrine has maintained a consistent message on the JFACC's responsibility—delegated to the JAOC's CPD and ATO production team—to plan, allocate, and task tactical units. In an evolutionary change, current doctrine establishes TBMCS and replaces CTAPS as the joint standard for ATO dissemination. Furthermore, current doctrine provides C2 planners with extensive considerations for the associated communications requirements. It also establishes the requirement for a communications and information-sharing PACE plan and provides an extensive list of ATO dissemination options for C2 planners. Finally, and most significantly, current doctrine describes a revolutionary method to disseminate orders and CBA to subordinate commanders, before the conflict, enabling them to maintain pressure on the enemy while operating in a CDO environment and disconnected from the JAOC. This method could effectively become the “E” in the ATO dissemination PACE plan.

Therefore, in the final analysis, the collective body of current doctrine has adequately prepared the joint air operations team to mitigate the effects of operational-level communications degradation, disruption, or denial on the JFACC's ability to centrally control taskings to tactical units. This is not to say that there is not significant room for improvement. Indeed, there are several topics not addressed in current unclassified doctrine, including what circumstances each ATO dissemination option should be used or *any* considerations on how to implement the method to control airpower in contested environments, as described in Annex 3-30. Rather, this conclusion on current doctrine merely indicates that all three doctrinal research questions are addressed; however, doctrine is not the final say in preparedness. It is up to commanders

to take the abundant considerations made available in doctrine and apply them to training their force. Without training to doctrine, one cannot articulate inadequacies in doctrine nor recommend changes.

Training

Training and exercises programs should be structured to ensure Air Force commanders are equipped with the skills and knowledge to accomplish assigned or implied tasks in a degraded or contested environment.

—LeMay Center for Doctrine, Air Force Doctrine Annex 3-30

Introduction

The Air Force, joint community, and coalition partners all have significant training requirements and separate training and exercise programs associated with them. To scope this subsection and be consistent with the types of training reviewed in the previous chapters, this subsection will present evidence from Exercise Blue Flag, Exercise Red Flag, tactical unit training, and individual training in answering the second SRQ. Invariably, in reading the conclusions of this subsection, some readers will find the breadth of training exercises presented lacking and judge the conclusions not applicable to a certain exercise not assessed in this subsection. Indeed, the author has this same concern; however, the author cannot assess an exercise he has no knowledge of due to classification or infancy of the exercise. Blue Flag and Red Flag were chosen due to their wide-reaching training audiences—AF, joint, and coalition—and because each of them was active for the entirety of the period of relevance to this chapter, post-OAF. Thus, the author uses Blue Flag and Red Flag as representative exercises for the myriad training and exercise programs not assessed in this subsection. Finally, due to the recency of this

case study, this subsection presents information obtained exclusively from interviews with individuals that have unique, expert knowledge that applies to this subsection.

Blue Flag

In the two decades since OAF, the purpose of Blue Flag has remained constant. However, it has been challenged by manning, scheduling, training audience participation, and system access restrictions for coalition participants. The 505th Combat Training Squadron (CTS) now only conducts one Blue Flag per year due to personnel shortages and numerous additional taskings that make it difficult to schedule additional exercises.²⁴⁸ Following a brief halt in Blue Flag between 2014 and 2016, the 505th CTS has conducted five Blue Flag's training the 603rd AOC and the USAFE AFFOR staff, the 609th AOC, Det. 1, and the 612th AOC and 12th Air Force AFFOR staff.²⁴⁹ Ideally, the training audience is both the AOC and the AFFOR staff, although reductions in manning coupled with increased "real-world" taskings have hindered full AOC and AFFOR staff participation.²⁵⁰ Joint participation with the Navy and Marines is consistent and beneficial, but the Army's exercise schedule leaves them little room to participate in a

²⁴⁸ Drain interview.

²⁴⁹ Ibid.

²⁵⁰ The AOCs, for example, are so undermanned that "no AOC anywhere in the world can go to war without augmentation," so when the time comes for a Blue Flag, AOCs have to get considerable augmentation from the Air Reserve Component (ARC). If the AOC cannot coordinate augmentation from the ARC, the AOC typically only conducts one shift in the Combat Operations Division and misses out on training to handover between shifts.

Blue Flag.²⁵¹ Coalition participation is also consistent—Blue Flag 18 had approximately 21 participating nations—although access to systems can be debilitating. Mr. Drain said that some coalition partners after Blue Flag 18 indicated that “they did not want to come back . . . unless they had more complete access to systems.”²⁵² This lack of access to systems inhibited their ability to accomplish training objectives alongside their U.S. counterparts.

By design, Blue Flag continues to focus at the operational level of war with links to the tactical level of war in the constructive environment—made possible through the Air Force’s operational-level simulation of record, the Air Warfare Simulation (AWSIM). Some live-fly participation happens periodically, although Mr. Drain states that, “we try to avoid live-fly integration in BFs. Our simulation, AWSIM, is so flexible, we provide training at the AOC that is just as realistic as live play from a C2 perspective.”²⁵³ For live-fly participation to be successful, it “must be done smartly.” In order to achieve the desired training objectives for the AOC, the Blue Flag exercise controllers allow live mission results to come into the AOC “unless the live outcomes will derail a training objective for our primary training audience.”²⁵⁴ Said a different way, the operational to tactical levels are only linked when it is beneficial to the primary

²⁵¹ Drain interview.

²⁵² Ibid.

²⁵³ Ibid.

²⁵⁴ Ibid.

training audience—the AOC and AFFOR staff. Thus, most of the operational to tactical level linkage is accomplished constructively.

While the tactical component to Blue Flag is predominately constructive, tasking tactical units cannot be simulated. The AOC must follow the same joint air tasking cycle, culminating in ATO dissemination for the CPD. To accomplish this and gain useful training out of it, the ATO production team disseminates the ATO to exercise planners the same way they would disseminate it to an Expeditionary Wing. “Typically, ATO Production (in CPD) hangs the ATO on their exercise Portal, and we reach out and grab it. Secure e-mail is typically the backup.”²⁵⁵ Additionally, according to the 505th CTS Chief of ATO Production and the Chief of Wing Reports, the ATO production team also uses most of the other ATO dissemination options from *AFTTP 3-3.AOC* (see Figure 10), except for “Personal Computer to Personal Computer file transfer via secure telecommunications and Courier/hand carries.”²⁵⁶ These methods, however, are used as primary methods of dissemination, for training purposes, rather than by necessity due to exercise injected CDO.

On the ATO process, the only CDO challenges injected into the training scenario is on “systems within the AOC that personnel use to create the ATO. We will inject some cyber activity into a specific set of workstations, forcing the use of backup TTPs. Then, after they show that they can work through the cyber problem, we give the primary

²⁵⁵ Drain interview.

²⁵⁶ Elizabeth Casey and Mary Coleman, e-mail interview by author, April 17, 2020.

systems back to them.”²⁵⁷ Blue Flag exercise controllers, however, do not typically target the dissemination process.²⁵⁸ Therefore, the ATO production team, while they practice alternate methods of *electronic* ATO dissemination, are not typically forced to do so by enemy action.

Aside from the two ATO dissemination methods not typically trained to during Blue Flag, Annex 3-30’s method for control of airpower in contested environments (see page 109) is also not trained to. Although Blue Flag planners recognize the importance of training to this method, Mr. Drain states that Blue Flag is not the appropriate venue.²⁵⁹ The use of this method is predicated on the AOC’s disconnection from tactical units, and while they “have short-term outages where the AOC loses connectivity” they do not induce a “long-term loss of connectivity where the tactical units must pick up the ball and execute based on ‘mission orders’ or ‘commander’s intent.’”²⁶⁰ At an operationally-focused exercise, such a loss of connectivity would result in the AOC “sitting around waiting to regain connectivity,” while “a bunch of controllers at Hurlburt Field would be doing the fighting.”²⁶¹ Thus, methods of control where tactical units execute mission orders based on commander’s intent do not achieve the training objectives of Blue Flag.

²⁵⁷ Drain interview.

²⁵⁸ Ibid.

²⁵⁹ Ibid.

²⁶⁰ Ibid.

²⁶¹ Ibid.

Before concluding, it is important to briefly discuss how training objectives are established for Blue Flag exercises. If one might think to conclude the 505th CTS as negligent in their exercise injects, the focus of each Blue Flag is not determined by the 505th CTS nor directed by ACC. Rather, the focus of each Blue Flag—and associated injects to achieve the focus—is determined by the ranking training audience member, “typically the AOC or [Component-Numbered Air Force] commander.”²⁶² If the training audience does not wish to focus on CDO, 505th CTS personnel recommend the inclusion of the limited system disruptions described above into the exercise. If disruptions are included, the training audience determines the extent of disruption they are willing to accept due to the trade-off in loss of other training the disruptions typically cause. Therefore, the training audience determines the operational environment, not the 505th CTS.

Red Flag

Over the last two decades, Red Flag has continually changed to meet new operating environments and has expanded the Red Flag organization and the type of missions trained to during each flag. Fundamentally, however, Red Flag remains a tactically oriented exercise and has only minimally incorporated the operational level. In 2006, with the creation of Red Flag-Alaska—PACAF tactically focused exercise—Red Flag became Red Flag-Nellis. Additionally, in 2018, the 414th CTS created Red Flag-Rescue, a combat search and rescue (CSAR) exercise focused on the terminal phase that

²⁶² Drain interview.

operates out of Davis-Monthan AFB, AZ.²⁶³ Between these two, Red Flag focuses on five scenarios: (1) defensive counterair; (2) offensive counterair-attack operations; (3) offensive counterair and suppression of enemy air defenses; (4) dynamic targeting; and (5) CSAR. These five scenarios were “defined by the three primary threat environments as outlined in the NDS 2018,” with one exercise focused on each threat environment, covering all three during a year.²⁶⁴ Additionally, in these three annual flags, joint participation consistently occurs in every flag, and two of the three flags have coalition participation.²⁶⁵ Although the joint and coalition training audience has remained consistent throughout the years, Red Flag has recently added portions of the operational level as an additional training audience.

While Red Flag is still primarily focused at the tactical level, in 2014, Red Flag expanded to include the operational level of war with the addition of certain functions within the Combat Operations Division (COD) of the AOC.²⁶⁶ This move adds realistic training and stresses the linkages between tactical execution and the JFACC’s responsibility, executed by the COD, to “provide oversight and guidance during the execution of joint air operations.”²⁶⁷ However, without CPD inclusion in the flag, ATO dissemination is not executed, and tactical units still receive a simulated ATO from

²⁶³ Reese and Imonti interview.

²⁶⁴ Ibid.

²⁶⁵ Ibid.

²⁶⁶ Ibid.

²⁶⁷ CJCS, JP 3-30 (2019), II-3.

exercise planners to initiate planning for the following day. The 414 CTS Commander, Colonel William Reese, assesses such CPD involvement as beyond the scope for the tactically focused Red Flag-Nellis and Red Flag-Rescue.”²⁶⁸

Finally, as discussed in the previous subsection on doctrine, Air Force doctrine Annex 3-30’s method for “Control of Airpower in Contested Environments” states that, “. . . mission commanders (TACON to the air component commander) plan different types of “packages” to defeat integrated air defense systems, interdict C2 and fielded forces, and gain control of the air. During these operations, forward-based airpower can conduct air operations based on a standing ITO.”²⁶⁹ The first sentence of the previous quote refers to the same mission commanders and the same mission types that Red Flag seeks to train to. This idea expressed in Annex 3-30, however, would have these mission commanders and the aircraft assigned to them, without prior coordination, rendezvous in the air to perform a high-threat mission against advanced integrated air defense systems deep behind enemy lines. For comparison, such a mission executed at Red Flag, under the normal ATO process, would require a 12-hour mission planning cycle, culminating in a highly coordinated, yet flexible plan to be approved by a Colonel. Training to this idea expressed in Annex 3-30 is not conducted at Red Flag. The closest Red Flag comes to training to such an idea is in their alert CSAR missions or Dynamic Targeting missions where pilots takeoff without an exact idea on what their mission will be.²⁷⁰ While these

²⁶⁸ Reese and Imonti interview.

²⁶⁹ LeMay Center for Doctrine, Annex 3-30, 3.

²⁷⁰ Reese and Imonti interview.

missions certainly train aircrew to be flexible and adaptable—skills of which are important in executing this idea—the amount of in-person mission planning and prior coordination for these missions is significant. Red Flag, however, is not the entire picture; unit and individual training must be considered as well.

Tactical Unit and Individual Training

As tactical units are a part of the joint air operations team, tactical unit training is important in understanding the overall training contribution to the primary research question. In previous chapters, the author has not presented evidence of such training for two reasons, first, due to a lack of published information on the subject. Second, even though the author could find no evidence that ATO dissemination PACE plan training took place, the absence of such information, without confirmation, does not mean that units did not accomplish such training. It merely indicates that no one published reports about it. The present-day case, however, benefits from the availability and access to current Wing commanders and members of tactical squadrons that can provide such confirmation, either positively or negatively. This subsection utilizes interviews from such individuals in assessing tactical unit training's contribution to the second SRQ.

Tactical units each have their own Mission Essential Task List that “consists of the fundamental capabilities for which a unit was organized and designed.”²⁷¹ Not surprisingly, for tactical units, these fundamental capabilities are tactical in nature. Thus, annual tactical unit training not conducted at an Air Force level exercise is focused at the

²⁷¹ Department of the Air Force, Air Force Instruction (AFI) 10-201, *Force Readiness Reporting* (Washington, DC: Department of the Air Force, March 3, 2016), 70.

tactical level and has little tie into the operational level. While a local Large Force Exercise might initiate tactical planning with a simulated ATO, an AOC does not disseminate the ATO to units; rather, the simulated ATO is given to tactical planners, much like during Red Flag.

Additionally, on an individual level, the person in a tactical unit that influences the planning interaction between the tactical and operational levels during deployed operations is the MPC chief. While deployed, the MPC chief is responsible for establishing mission planning procedures, starting with the receipt of the ATO. In the minimal training that MPC chiefs receive, they get a basic understanding of primary methods to receive the ATO; however, MPC chiefs do not receive training on alternate methods of receipt. One tactical aviator with firsthand knowledge of deployed operations stated that “while I was serving as the operations supervisor, if the MPC chief did not see the ATO posted at the normal times, he would approach me with concern that he would not get the ATO in time to complete his duties. He was only trained to get the draft from our liaison in the CAOC and the final ATO from the CAOC portal.”²⁷² Officers from six other flying communities echoed these remarks.²⁷³ Therefore, tactical units, while they are very experienced in receiving the ATO via primary means, they do not train to nor understand what alternate methods exist for ATO dissemination.

²⁷² Ryan Leavitt, Scott VanOort, Eric Joachim, John Widmer, and John Conway, e-mail interview by author, April 22, 2020.

²⁷³ Leavitt et al., interview; Colonel Michael R. Drowley, interview by author, April 22, 2020; Colonel Daniel P. Walls, interview by author, April 21, 2020.

Conclusion

Training over the last two decades has not focused on the seam between the operational level and the tactical level of war. Each organization, based on their assigned missions, focuses their training on building the requisite skill sets to accomplish those missions. As a representative operational-level training exercise, participants in Blue Flag train to the entirety of the operational level of war. From initiation of the Joint Planning Process for Air, through the joint air tasking cycle, and down to ATO production, planning is conducted entirely within the AOC. Aside from tactical unit liaison input, ATO dissemination is the first step in which the operational level and tactical level meet. At Blue Flag, the seam is connected by the ATO production team disseminating the ATO to Blue Flag AWSIM operators, playing the role of a tactical unit. Thus, while the ATO production team gains valuable, yet unrealistic, training and experience using various methods on their ATO dissemination PACE plan, the tactical side of this step receives no training.

As a representative tactical-level training exercise—from ATO receipt, through tactical mission planning, execution, and debrief—participants in Red Flag train to the entirety of the tactical level of war. The operational and tactical level seam, however, is not connected at Red Flag. While the ATO initiates tactical mission planning, units are given the ATO by exercise planners. Thus, tactical units gain no training or experience retrieving the ATO using any method on the AOC's ATO dissemination PACE plan. Furthermore, local unit training and individual training for the tactical units MPC chief also does not train to the ATO dissemination PACE plan.

Consequently, should a situation arise during large scale combat operations where an alternate or contingency method of ATO dissemination is required, the ATO production team is trained for such an eventuality while the tactical level is not. Likewise, should a situation arise during large scale combat operations where no form of electronic ATO dissemination is viable, neither the operational level nor the tactical level is trained to execute an “air equivalent of mission command” to “maintain pressure on the enemy,” as described in Annex 3-30.²⁷⁴ Therefore, considering the operational-level training conducted at Blue Flag and the tactical level training conducted at Red Flag and home station, current training does not adequately prepare the joint air operations team to mitigate the effects of operational-level communications degradation, disruption, or denial on the JFACC’s ability to centrally control taskings to tactical units.

Ongoing Efforts

As a land-based force, we no longer can assume sanctuary in any of our bases. That we have to be agile. That we have to be expeditionary. That we have to accomplish the five key tasks of an Expeditionary Wing Commander: establish the base; defend the base; receive follow on forces; establish your command and control; and fight that base in an environment where you’re likely to be taking losses, and *you’ll be cut off from higher headquarters based on network attacks* [emphasis added]. So, our return to our expeditionary roots continues.

—General David Goldfein, Air Force Chief of Staff,
2019 Air, Space & Cyber Conference

Introduction

Following Secretary James Mattis’ 2018 NDS, the Department of Defense has acknowledged that the future operating environments will be contested. “For decades, the

²⁷⁴ LeMay Center for Doctrine, Annex 3-30, 3.

United States has enjoyed uncontested or dominant superiority in every operating domain. We could generally deploy our forces when we wanted, assemble them where we wanted, and operate how we wanted. Today, every domain is contested—air, land, sea, space, and cyberspace.”²⁷⁵ Each service has ongoing initiatives to both mitigate the adversary’s ability to contest each domain and, should mitigating measures fail, to operate in the contested environment. This subsection briefly discusses the Air Force’s Agile Combat Employment (ACE) concept and associated initiatives. This subsection is not intended to provide an assessment of these concepts. Rather, it is to highlight the Air Force’s ongoing efforts to develop the capability for the JFACC to exercise centralized control by providing commander’s intent, MTO, and distributing planning and authorities to subordinate commanders. Before discussing the Air Force’s ongoing efforts, a point of clarification must be made on the Air Force’s tenet of CCDE.

While some might consider the move towards relying on commander’s intent, MTOs, and distributing planning and CBA as “decentralized” or “distributed” control, it is, in fact, in line with the Air Force’s tenet of CCDE. Air Force Doctrine, Volume 1, describes CCDE as a “general philosophy for the command and control (C2) of airpower” and that “command and control is a continuum between direct control and total autonomy.”²⁷⁶ In some situations—and often overused in the last two decades—the continuum tends to favor centralized control, sometimes bordering on centralized

²⁷⁵ SecDef, NDS, 3.

²⁷⁶ LeMay Center for Doctrine, Volume I, *Basic Doctrine* (Maxwell AFB, AL: LeMay Center for Doctrine, February 27, 2015), 67, accessed April 16, 2020, https://www.doctrine.af.mil/Portals/61/documents/Volume_1/Volume-1-Basic-Doctrine.pdf.

execution. In other situations, less centralized control and more decentralized execution are required, such as operations in contested environments with limited communications. In these situations, the JFACC exerts a minimal amount of centralized control by passing his overall intent and providing MTOs. He then conditionally delegates some of his authorities to subordinate commanders to “achieve effective span of control and to foster disciplined initiative and tactical flexibility,”—which is, by definition, “decentralized execution.”²⁷⁷ Therefore, as the primary research question involves the JFACC’s ability to *centrally control taskings to tactical units*—be that via an ATO or via commander’s intent, MTOs, and CBAs—the ongoing efforts contribute to the overall preparedness of the joint air operations team concerning the primary research question.

ACE – Higher Headquarters (HHQ) Concepts

The Air Force’s ACE concept was designed to present forces to Combatant Commanders that are organized, trained, and equipped to operate in the environments and against the adversaries outlined in the 2018 NDS.²⁷⁸ General Charles Q. Brown, PACAF Commander, states that:

The biggest thing I’m concerned about is missiles. Whether it be ballistic missiles, maneuvering missiles, cruise missiles. So, its really how do we defend ourselves against those, whether it be a system, or it is our tactics, and part of our tactic is

²⁷⁷ LeMay Center for Doctrine, Volume I, *Basic Doctrine*, 69.

²⁷⁸ General Michael Holmes, “USAF’s Holmes on Expeditionary Operations, Readiness, Improving Cyber Capabilities, Future Fighter,” interview by Vago Muradian, September 2019, accessed April 27, 2020, <https://www.youtube.com/watch?v=flNcfNdnP7o>; General Charles Q. Brown Jr., “PACAF’s Brown on China, Distributed Operations, Innovative Warfighting Concepts, Air Defense,” interview by Vago Muradian, September 2019, accessed April 27, 2020, <https://www.youtube.com/watch?v=a22yE3cQj3M>.

ACE. And its really to be agile to not disperse to some airfield, but to disperse across the region in order to make it more complicated for our adversary.²⁷⁹

With the adversary's capabilities to contest all domains—including communications within and between domains—command and control of dispersed forces become a significant challenge. General Brown clearly articulates this point:

We must be prepared to execute in a degraded C2 environment where clearly delineated and forward thinking commander's intent will be a requirement. It is imperative senior leaders provide our commanders with CBA delegated to the lowest capable and competent level, and empower command by negation to accept the appropriate level of risk, all while working toward moments of clear C2.²⁸⁰

Thus, in the moments of clear C2, the JFACC could still fulfill his JFC-given responsibility to task capabilities and forces made available to him through centralized control in the form of the AOC and the ATO.

Although, in the likely event where forces operate in a degraded C2 environment, the JFACC needs the ability to execute the same JFC-given responsibility to task capabilities and forces made available to him through centralized control in the form of commander's intent, MTO, and CBAs. While General Brown describes considerations from the PACAF perspective, other Air Force Major Commands (MAJCOM)—USAFE and ACC—have similar, yet different, ACE concepts. While each concept might solve the problem in a slightly different way—due to different operating environments—they all aim to solve the same problem of mitigating an adversary's ability to contest all

²⁷⁹ Brown, "PACAF's Brown on China, Distributed Operations, Innovative Warfighting Concepts, Air Defense."

²⁸⁰ LeMay Center for Doctrine, Annex 3-30, 2.

domains and, if required, operate within a contested environment..²⁸¹ Integral to this concept are the actions of subordinate commanders.

ACE – Wing Concepts

Wings across the Air Force are developing their own concept of operations to work within the Air Force’s ACE concept. Each Wing concept is different based on the unique missions and organic capabilities resident within each Wing. For example, two wings—the 355th Wing and the 23rd Wing—with nearly identical forces have different concepts for dispersing their forces based on the same primary missions of Close Air Support and Combat, Search, and Rescue..²⁸² Additionally, both the 355th Wing and 23rd Wing have an organic airlift capability advantage—the HC-130 Combat King—over most other wings, such as the 4th Fighter Wing, which only has two operational squadrons of F-15Es..²⁸³ As Wings execute their own exercises or participate in HHQ exercises, they are identifying several challenges associated with the way their wings are organized, trained, and equipped (OT&E). One such challenge is their organic command and control capability. Colonel Michael Drowley, 355th Wing Commander, stated that:

My command post, its C2 capability is for if you have an aircraft incident, unfortunately, on base. That is what our command post is made for. It is not made for what you would consider a Wing Operations Center or a TOC . . . the wing is made for peacetime garrison use. It is not made for wartime, as in an entity in and of itself that can C2.

²⁸¹ Holmes, “USAF’s Holmes on Expeditionary Operations, Readiness, Improving Cyber Capabilities, Future Fighter.”

²⁸² Drowley interview; Walls interview.

²⁸³ Drowley interview; Walls interview.

As wings identify issues such as these, ACC—as the force provider—is working to help solve their OT&E challenges. On training, General Holmes states that “in ACC our job is to help [PACAF and USAFE] distill [ACE] down to what we’d call the mission essential tasks, so we can train our teams that’ll be ready to go to either place.”²⁸⁴ Similarly, on organization, General Holmes states that “over the last 15 years, we’ve paired down a lot of things to focus on efficiency . . . now that we’re going to places we haven’t been [recently], are we organized right at home to support operations downrange, or are we overdoing the efficiency at home station at the expense of effectiveness downrange?”²⁸⁵

Conclusion

In conclusion, the Department of Defense and the United States Air Force recognize that future adversaries will contest all domains along with the ability to communicate within and between each domain. Additionally, to increase survivability and give the adversary a more complicated problem, the Air Force intends to disperse tactical units in their ACE concept. The combination of these two ideas—disrupted communications and dispersed tactical units—means that the JFACC will not be able to centrally control forces, as has been done since the Persian Gulf War, until the joint air operations team regains clear C2. Until that point, the JFACC will sacrifice some degree of centralized control for more decentralized execution, enabling subordinate units—

²⁸⁴ Holmes, “USAF’s Holmes on Expeditionary Operations, Readiness, Improving Cyber Capabilities, Future Fighter.”

²⁸⁵ Ibid.

based on commander's intent, MTOs, and CBAs—to operate within a contested environment while disconnected from the JAOC.

MAJCOMs and wings alike have their own concepts that have varying degrees of similarity; nonetheless, for a concept that is in the experimentation phase, such seemingly disparate efforts prevent groupthink and foster innovation. Therefore, while many ongoing efforts, mostly classified, are underway, much work and many challenges remain before the joint air operations team is properly organized, trained, and equipped to effectively operate the ACE concept as part of the joint force.

Chapter Conclusion

In 1991, as the Persian Gulf War wrapped up, RAND published a monograph titled “Command and Control of Joint Air Operations: Some Lessons Learned (LL) from Four Case Studies of an Enduring Issue.” In this monograph, the authors come to several conclusions, one of which is that “Communications are the Achilles’ heel of any joint operation, but particularly a joint air operation. No joint commander should ever be satisfied with his communications plan or the training of his forces in using it.”²⁸⁶ The same can be said about the current joint air operations team. This chapter answered secondary questions one and two by assessing present-day doctrine and training as it relates to centralized control and the JFACC’s responsibility to task capabilities and forces made available to him. This section briefly presents the conclusions from each subsection.

²⁸⁶ Winnefeld and Johnson, *Command and Control of Joint Air Operations*, xi.

Over the past two decades, doctrine authors have continually refined the joint air operations process based on experiences and lessons from 19 years of Overseas Contingency Operations. Although these refinements have added clarity and specificity to communications considerations and ATO dissemination options, the process has fundamentally remained the same, until recently. In January 2020, with the update to Air Force Doctrine Annex 3-30, the Air Force introduced a revolutionary method for control of joint air operations in a contested environment. Thus, two methods of centralized control of joint air operations are present in current doctrine.

In the first and more traditional method, the JFACC fulfills his responsibility to task the capabilities and forces made available to him by relying heavily upon centralized control and the joint air tasking cycle. In this method, the JFACC's application of the tenet of CCDE favors centralized control.

In the second method, the JFACC fulfills the same responsibility by passing his commander's intent, a standing order, and conditionally delegating some of his authority to subordinate commanders to empower them to maintain pressure on the enemy while disconnected from the JAOC. In this method, the JFACC still utilizes centralized control, but his application of the tenet of CCDE favors decentralized execution. Despite the lack of specificity in doctrine for the second method, these two methods, taken together, give the joint air operations team options when facing a near-peer adversary. Therefore, in the final analysis, the current body of doctrine has adequately prepared the joint air operations team to mitigate the effects of operational-level communications degradation, disruption, or denial on the JFACC's ability to centrally control taskings to tactical units.

Training over the last two decades has evolved to focus on new threats, new operating environments, and to incorporate modern technology. Despite these advances in training, the joint air operations team still does not effectively train to the seam between the operational and tactical levels of war. The ATO production team, during Blue Flag, trains to the various methods of ATO dissemination that are likely on their PACE plan. However, this training is unrealistic as they do not train to the fog and friction of war by disseminating to actual tactical units and their unique communication challenges. On the tactical side of the seam, units do not practice or train to alternate forms of ATO receipt, and no formal training exists for MPC chiefs on the subject. Additionally, aside from units selected to participate in experiments with the Air Force's ACE concept, neither the operational level nor tactical level train to the method for control of joint air operations in contested environments, as described in Annex 3-30. Therefore, considering the operational-level training conducted at Blue Flag and the tactical-level training conducted at Red Flag and home station, current training does not adequately prepare the joint air operations team to mitigate the effects of operational-level communications degradation, disruption, or denial on the JFACC's ability to centrally control taskings to tactical units.

In conclusion, current commanders should not be satisfied with their communications plan or the training of their forces in using it. While the communications plan, as described in doctrine, contributes to the joint air operations preparedness, there is still room to improve. Additionally, while the operational level trains to ATO dissemination, the tactical level does not; and neither train to the control of joint air operations in a contested environment where the JAOC is disconnected from tactical

units. Therefore, the current joint air operations team is not adequately prepared to mitigate the effects of operational-level communications degradation, disruption, or denial on the JFACC's ability to centrally control taskings to tactical units.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Introduction

This study has reviewed three cases, the Persian Gulf War, OAF, and the present-day case. In these three cases, this study has assessed doctrine and training to ascertain the joint air operations team's preparedness to mitigate the effects of operational-level communications degradation, disruption, or denial on the JFACC's ability to centrally control taskings to tactical units. Additionally, in the two historical cases, this study has reviewed and assessed the actions taken to mitigate ATO dissemination challenges during the Persian Gulf War and OAF. Finally, in each case, this study has answered the primary research question: how prepared is (was) the joint air operations team to mitigate the effects of operational-level communications degradation, disruption, or denial on the JFACC's ability to centrally control taskings to tactical units? This chapter presents several final conclusions and recommendations based on the primary research question.

Historical Conclusions

During the Persian Gulf War, the joint air operations team experienced significant interoperability challenges that plagued ATO dissemination throughout Desert Shield and the opening days of Desert Storm. Ultimately, no sorties were lost due to a tactical unit not receiving the ATO from the TACC, but not because doctrine or training prepared the team for such a situation. Air Force and Navy communications personnel worked diligently to solve the interoperability problems of four services and numerous coalition partners—each with their own interoperability challenges—and innovatively created

more than seven methods for ATO dissemination. Therefore, ATO dissemination during the Persian Gulf War was successful due to problem-solving and innovation.

Similarly, interoperability issues plagued ATO dissemination eight years later in OAF. Although, with CTAPS established as the joint standard for ATO production and dissemination, the Navy was fully interoperable; the European NATO allies, however, were not. Even though neither doctrine nor training fully applied the lessons from the Persian Gulf War, the NATO air campaign did not lose a single sortie due to a tactical unit not receiving the ATO from the CAOC in Vincenza, Italy. Initially, after the limited bandwidth of LOCE was overwhelmed, the CAOC resorted to delivering the ATO by hand to the European NATO allies. Due to the innovative solutions and problem-solving ability to work through numerous security policy challenges, the USAFE communications and intelligence teams enabled the CAOC to disseminate the ATO to European NATO allies using a community of interest network within SIPR. Therefore, ATO dissemination during OAF was successful due to problem-solving and innovation.

In both cases, the U.S. and NATO allies were able to solve their interoperability issues with impunity from the enemy. Saddam Hussein either had no capability to disrupt the United States' fragile operational-level communications network or chose not to act.²⁸⁷ Had he jammed the highly susceptible UHF satellite communications, Navy TACC liaisons would not have been able to pass along ATO information in advance of the S-3 Viking courier flight scheduled to arrive a mere three hours before ATO execution. Likewise, if Slobodan Milošević attempted to disrupt NATO's operational-

²⁸⁷ "U.S. Navy Seeks to Bolster Communications Weak Link," *Signal* (August 1991): 69.

level communications, he was ineffectual in doing so. He did, however, take advantage of the NATO interoperability challenges by exploiting their unsecured information.

Looking forward to 2020, the “long-term strategic competitors” outlined in the 2018 NDS, China and Russia, each have the capability to degrade, disrupt, or deny U.S. operational-level communications. The 2019 Office of the Secretary of Defense Annual Report to Congress on Military and Security Developments in China states that:

The PLA [People’s Liberation Army] considers electronic warfare (EW) an integral component of modern warfare. Its EW strategy emphasizes suppressing, degrading, disrupting, or deceiving enemy electronic equipment. Potential EW victims include adversary systems operating in radio, radar, microwave, infrared, and optical frequency ranges, as well as adversary computer and information systems . . . PLA EW units routinely train to conduct jamming and anti-jamming operations against multiple communication and radar systems or GPS satellite systems in force-on-force exercises.²⁸⁸

Additionally, the PLA possesses and continues to develop “multiple counter-space capabilities designed to degrade and deny adversary use of space-based assets during a crisis or conflict.”²⁸⁹ Similar statements can be made about Russia’s capabilities:

Russia’s world-class electronic warfare forces support denial and deception operations and allow identification, interception, disruption, and, in combination with traditional fires, destruction of adversary command, control, communications, and intelligence capabilities . . . Further, military academics have suggested that electronic warfare fuse with cyber operations, allowing electronic warfare forces to corrupt and disable computers and networked systems as well as disrupt use of the electromagnetic spectrum.²⁹⁰

²⁸⁸ Office of the Secretary of Defense, *Annual Report to Congress: Military and Security Developments Involving the People’s Republic of China 2019* (Washington, DC: Office of the Secretary of Defense, May 2, 2019), 64.

²⁸⁹ *Ibid.*, 49.

²⁹⁰ Defense Intelligence Agency, *Russia Military Power: Building a Military to Support Great Power Aspirations* (Washington, DC: Defense Intelligence Agency, 2017), 42.

Thus, the “principal priorities” that the United States has reoriented towards—China and Russia—possess the capability to degrade, disrupt, or deny U.S. operational-level communications and have recognized the importance of doing so.²⁹¹

If the Persian Gulf War and OAF provide any one lesson to the command and control of joint air operations, it is that inadequate doctrine and training add to the inherent fog and friction of warfare that can plague the link between the operational and tactical levels of war. This fog and friction, in whatever form it takes, combined with the enemy’s ability and will to impose operational-level communications degradation, disruption, or denial, will halt air campaign planning and execution. Therefore, in a future war with China or Russia, problem-solving and innovation will not be enough. There is no question that American innovation and problem-solving can resolve any challenge it is faced with. However, it would be negligent in deferring the burden of solving internal challenges that are known today to the joint air operations team of tomorrow. Further subsections in this chapter will identify such known challenges that can be solved today.

In a future conflict with China or Russia, these nations will leverage advanced capabilities to degrade, disrupt, or deny U.S. operational-level communications. One of three scenarios will occur. In the first and most unlikely scenario, the enemy will be ineffectual in their attempts to degrade, disrupt, or deny U.S. operational-level communications; thus, the joint air operations process will continue as it has for the last three decades. In the second scenario, the enemy will be effective in *degrading* or *disrupting* operational-level communications, forcing an alternate or contingency method

²⁹¹ SecDef, NDS, 4.

of ATO dissemination within the existing joint air operations process. Finally, in the third scenario, the enemy will be effective in *denying* operational-level communications, cutting off the JAOC from tactical units, and forcing the joint air operations team to operate based on commander's intent, MTO, and CBA.

The highly refined joint air operations process is well suited for scenario one, as it is the scenario the U.S. has operated within since the Persian Gulf War. Most ongoing efforts within the Air Force address scenario three, while there is still no viable solution for scenario two. This chapter addresses the challenges and recommendations for scenario two first.

Scenario 2: Operational-Level Communications Degradation or Disruption

The key factor in mitigating the degraded and disrupted operational-level communications in scenario two is an ATO dissemination PACE plan. In assessing the doctrine from the present-day case, the JAOC *likely* has an ATO dissemination PACE plan. The word *likely* is used because while joint and Air Force operational doctrine speaks of anticipating “the need for communications in a degraded environment,” and that plans should include considerations for “alternate routing” and “redundant systems,” it does not explicitly establish an ATO dissemination PACE plan as a requirement. Likewise, Air Force tactical doctrine lists “ATO dissemination options” but does not prioritize one over the other and does not explicitly discuss an ATO dissemination PACE plan. Such details are likely, and appropriately, located in classified documents.

Thus, while the author initially sought to assess the efficacy of the presumptive ATO dissemination PACE plan, due to classification, such an assessment cannot be made. Training on the PACE plan, however, can be assessed. In the analysis, the author

determined that the operational level trains to several methods of ATO dissemination during Exercise Blue Flag; however, the training is not realistic for two reasons. First, the ATO production team disseminates the ATO to exercise controllers, not multiple tactical units. Second, while several ATO dissemination methods are utilized during Blue Flag, this is done for the sake of training rather than out of necessity, as Blue Flag typically does not disrupt dissemination with CDO injects. Additionally, the author determined that while tactical units are well adept at downloading the ATO from the JAOC portal or receiving it via secure e-mail, they are not aware of, nor trained to, “non-standard” ATO dissemination methods.²⁹² Therefore, the JAOC likely has an ATO dissemination PACE plan, but tactical units are not aware of it, and neither the operational level nor tactical level adequately trains to it.

This conclusion drives four recommendations. First, squadron MPC chiefs should receive formal training on the ATO dissemination PACE plan. This training should place MPC chiefs face-to-face with their ATO production team counterparts so they can discuss, and train to, specific methods of ATO dissemination. As ACC is the force provider and the 505th Command and Control Wing conducts AOC formal training, this organization is ideal for conducting such training. Second, the Chief of ATO production at JAOC’s should hold annual, in-person meetings with squadron MPC chiefs. This face-to-face meeting would provide a forum to establish important relationships and discuss systems, processes, and procedures as each relates to linking the operational and tactical levels. Third, for clarity and emphasis, joint doctrine should include explicit language

²⁹² Leavitt et al., interview.

which establishes the requirement for an ATO dissemination PACE plan, discusses considerations in building such a plan, and directs both the JAOC and tactical units train to such a plan.

Finally, *AOCs* should reassess, test, promulgate, and regularly and realistically train to their ATO dissemination PACE plan. Major Ryan Allen, chief of tactics at the 613th AOC, stated that “if AOCs reassess their ATO dissemination PACE plan, they should ensure their P-A-C-E plan is not a P-P-P-E plan.”²⁹³ Utilizing the PACE plans that emerged out of the Persian Gulf War and OAF, as well as Figure 10 from AFTTP 3-3.AOC, the author created an example ATO dissemination PACE plan shown in Figure 11, below.

²⁹³ Ryan Allen, interview by author, February 13, 2020. The P-P-P-E plan stands for Primary-Primary-Primary-Emergency plan, emphasizing the fact that the alternate and contingency methods should not rely on the same communications architecture as the primary method.

Example ATO Dissemination PACE Plan			
PACE	Method	Options (in no particular order)	Source
Primary	Primary Electronic Methods	AOC Portal	3-3.AOC
		Secure Email	Interviews
		Appropriate Theater Battle Management System (TBMCS / IRIS)	3-3.AOC
Alternate	Alternate Electronic Methods	File Transfer Protocol (FTP)	3-3.AOC
		Global Command and Control System (GCCS)	3-3.AOC
		Theater-Unique C2 Systems	3-3.AOC
		PC-PC File Transfer via secure telecommunications	3-3.AOC and Persian Gulf War (MADS)
		Automatic Message Handling System (AMHS)	3-3.AOC
		Pass via Secure Voice	3-3.AOC and Persian Gulf War
Contingency	Physical Methods	Hand-deliver	3-3.AOC and Operation Allied Force
		Courier Flight	3-3.AOC and Persian Gulf War
Emergency	ATO Dissemination not Viable	Pre-Disseminated JFACC Intent, Mission-type orders, Conditions-Based Authorities	Annex 3-30

Figure 11. Example ATO Dissemination PACE Plan

Source: Author.

Once reassessed, AOCs should rigorously test the efficacy of each dissemination method on their PACE plan. The 705th Training Squadron LL (705 TRS/OSK LL) team recently released their Operational C2 Bulletin, which addresses testing PACE plans:

PACE plans have atrophied over the last 20 years of conducting Counter-insurgency in areas of Air Supremacy with neither peer nor near-peer threats. Because of this, Alternate, Contingency, nor Emergency communication plans have been tested. In most cases, a viable PACE plan does not exist at any of the Air Components that 705 TRS/OSK LL personnel have visited and observed in

the last two years. The PACE plans that have been in place were attempted during ACE, and DFE [Dynamic Force Employment] events and the plans failed.²⁹⁴

Once testing is complete, CHATOs should conduct the previously recommended annual meeting with MPC chiefs to promulgate the plan and train MPC chiefs on their portion of the plan. Lastly, training and readiness exercises should incorporate ATO dissemination with CDO exercise injects, necessitating the ATO production team exercising their ATO dissemination PACE plan.

Once properly addressed in doctrine and, more importantly, properly trained to at the operational and tactical levels, the joint air operations team will be well prepared when faced with Scenario 2—operational-level communications *degradation* or *disruption*. If, however, the enemy is successful at operational-level communications *denial*—effectively cutting off the JAOC from tactical units—the joint air operations team faces a different challenge altogether.

Scenario 3: Operational-Level Communications Denial

The Air Force currently has no solution for scenario three—operational-level communications *denial* resulting in a JAOC disconnected from tactical units. Fortunately, the problem has been identified, and the ACE concept—currently in the experimentation phase—is designed to solve the problem. It is not the intent of this study to assess the efficacy of ACE; certainly, any conclusions drawn from this ongoing effort would prove premature. Rather, through the analysis of each of the three cases, the logical conclusion of this study supports the need for a concept such as ACE: the joint air operations team

²⁹⁴ Mayo Spooner Charles Charamut, Ken Crain, David Hetzler, Michael Steinkraus, and Eric Sheldon, *Operational C2 Bulletin* (January-March 2020): 3.

requires a non-ATO option to maintain momentum while disconnected from the JAOC.

The resulting analysis from the present-day case study offers two reasons for such a conclusion. First—and already discussed in this chapter—China and Russia both possess the capability to deny U.S. operational-level communications. In this case, the only viable ATO dissemination option is hand-delivery through courier flights, as was accomplished in both the Persian Gulf War and OAF. Second, the other capabilities China and Russia bring—long-range precision fires, for example—drive the joint air operations team to disperse. No longer can multiple squadrons operate from long-standing, built-up bases. Rather, subcomponents of tactical units (perhaps down to the flight echelon) will operate from many forward locations; thus, courier flights to every forward location are not feasible.

Since multiple MAJCOMs are already experimenting with the ACE concept and Annex 3-30 addresses preliminary considerations for air operations in a contested environment, one might find the previous conclusion painstakingly obvious. One critical word sets this conclusion apart: joint. The Persian Gulf War was the operational debut for two concepts that have formed the basis of our current joint air operations paradigm: the JFACC and the ATO. Before Desert Shield, however, the rest of the joint community was training and operating to the previous paradigm. Once Lt Gen Horner, in his role as USCinCCENT Forward, directed that all carrier air operations be placed on the ATO unless in “direct support of the carrier,” the Navy was forcefully met with the new paradigm. Due to a lack of understanding and familiarity, the Navy officers were “ill-prepared to help [the] JFACC use naval aircraft as effectively as possible. They did not ignore [the] JFACC deliberately; they just did not know what it was, had not been trained

in it, and were far away from anyone who might have explained it.”²⁹⁵ Thus, the paradigm shift from service-separated route packages to the JFACC and ATO demonstrates that revolutionary concepts that will affect joint and coalition partners should include adequate joint and coalition participation during concept development.

Applying this conclusion to today, the Air Force is developing the ACE concept, which utilizes commander’s intent, MTO, and CBA to fulfill the JFACC’s responsibility to task capabilities and forces made available to him. As the concept of operation and associated TTPs have not been released, no JAOC or tactical unit from any service—aside from individuals participating in ACE experimentation—is familiar with or trained to execute such methodology for joint air operations. The command and control of joint air operations portion of the ACE concept represents a paradigm shift that will affect all members of the *joint* air operations team. Thus, this study recommends that once the ACE concept moves beyond the experimentation phase, further planning should include joint participation, future exercises should include joint involvement, and ultimately the concept should be codified in JP 3-30.

Finally, one conclusion underpins scenarios two and three, the joint air operations team does not adequately train to bridge the gap between the operational and tactical levels of war. As discussed in both scenarios, some form of centralized control connects the operational level and tactical levels. In scenario 2, the ATO, by way of the ATO dissemination PACE plan, connects the two levels of war. In scenario 3, commander’s intent, MTO, and CBA connect the two levels of war. Neither scenario, however, is

²⁹⁵ Pokrant, *Desert Shield at Sea*, 70.

trained to at any Air Force-level training exercise, including Blue Flag and Red Flag. Thus, this study recommends that ACC direct realistic, operational to tactical level training that focuses on operating in a CDO environment across all echelons.

This exercise would begin at the Joint Planning Process for Air and end at the tactical mission debrief. The depth and breadth of CDO would be scalable and tailorable to achieve particular training objectives. One iteration of the exercise might induce operational-level communications degradation, forcing the ATO production team to use an alternate electronic ATO dissemination method. Another iteration of the exercise might induce operational-level communications denial, forcing tactical units to operate off commander's intent, MTO, and CBA. Following the mission, the JFACC that authored these documents could conduct a face-to-face debrief with the subordinate commanders that executed his guidance. Such a debrief would be beneficial to the JFACC in writing future guidance and to subordinate commanders in seizing the initiative while considering risk.

Chapter Conclusion

Utilizing the lessons from the ATO dissemination challenges during the Persian Gulf War and OAF, combined with a thorough assessment of three decades of joint and Air Force air operations doctrine and training, this thesis has answered the primary research question. This thesis has shown that since the Persian Gulf War, the joint air operations team has not been adequately prepared to mitigate the effects of operational-level communications degradation, disruption, or denial on the JFACC's ability to centrally control taskings to tactical units. Only through problem-solving and innovation,

not through doctrine or training, have the joint air operations teams mitigated ATO dissemination challenges.

The problem-solving and innovation that the U.S. and NATO air operations teams used during the Persian Gulf War and OAF will not be sufficient in the future. With an enemy capable of degrading, disrupting, or denying U.S. operational-level communications, an ATO dissemination PACE plan is essential, and training to such a plan is a necessity. The author's initial hypothesis was that the joint air operations team did not have such a plan. Although classification has hindered a definitive conclusion, a thorough study of doctrine has proven this hypothesis *likely* incorrect. The joint air operations team *likely* has an ATO dissemination plan; however, that plan is not realistically trained to by the operational level. Furthermore, the tactical level is neither aware of this plan, nor do they train to it. Thus, the joint air operations team must regularly and realistically train to execute the ATO dissemination PACE plan to connect the seam between the operational and tactical levels of war. Failure to do so will risk isolating tactical units and force them to conduct decentralized execution to a scale that current Air Force doctrine has only recently introduced.

As a result of the U.S.' strategic refocus, multiple MAJCOMs and wings across the Air Force are focusing their efforts on developing the ACE concept. The command and control portion of this concept is revolutionary because, while the concept still utilizes centralized control—through commander's intent, MTO, and CBA—decentralized control is heavily relied upon when the JAOC is disconnected from tactical units. A significant lesson from the Persian Gulf War is that revolutionary concepts that affect the joint community must have adequate joint participation during concept

development; otherwise, only the concept's service proponent will be prepared when the time comes. This was the case in the Persian Gulf War with the JFACC and ATO concept, and this will be the case with the ACE concept if the Air Force does not include adequate joint participation in concept design. As previously stated, problem-solving and innovation will not be enough.

With the interwar period that the U.S. is currently in, now is the time to reassess, test, promulgate, and regularly and realistically train to the ATO dissemination PACE plan across the operational and tactical levels of war. This will ensure the U.S. is postured and well prepared to adapt and respond to communications *degradation* and *disruption* in future, highly contested environments. Additionally, once the ACE concept leaves the experimentation phase, the concept must be incorporated into joint doctrine and regularly and realistically trained to by the joint air operations team. This will ensure that when faced with operational-level communications *denial* resulting in a disconnected JAOC, tactical units will be well prepared to maintain pressure and deliver overwhelming airpower to the enemy.

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