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IN THE CRUCIBLE OF BATTLE

An Analysis of the Split Air Operations Center and the Principles of War

by

Linda R. Medler
Major, United States Air Force

A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Maritime Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

Signature: Linda R. Medler

18 June 1999

Paper directed by:
Captain Edward F. Caffrey, Jr., USN
and
Colonel Lance Ferro, USA
Moderators, Seminar 12, Joint Maritime Operations Department

David M. Goodrich
Professor, Joint Maritime Operations Department
Faculty Advisor

David M. Goodrich 29 Jan 1999
Faculty Advisor Date

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Within the Air Force, one of the most controversial initiatives to enhance warfighting at the operational level is the "split Air Operations Center" (split AOC) concept being explored through Expeditionary Force Experiments (EFX) and Blue Flag exercises. But, EFX-98 and past Blue Flag exercises attempting to implement the split AOC have fallen far short of seamlessly integrating physically separated AOC elements.

Furthermore, how does the split AOC concept hold up when compared against the enduring principles of war? Additionally, before the split AOC becomes a reality, its impact on human interaction, future bandwidth issues, and stated operational requirements should also be considered. At best, when analyzed against the principles of war and these other factors, the split AOC does not appear to be the most effective way to enhance air operations.

Yet, there is a real requirement to improve the AOC's deployability and sustainability. However, a better solution is a three part approach to (1) redefine some of the functions of the Numbered Air Forces, (2) forward preposition additional AOC assets, and (3) modernize the AOC communications and computer equipment. Instituting these recommendations insures the AOCs are organized and equipped to meet the requirement for improved response time, reduced deployed footprint, and increased security.

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PREFACE

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IN THE CRUCIBLE OF BATTLE

An Analysis of the Split Air Operations Center and the Principles of War

Abstract

"Netcentric Warfare," "Information Superiority," "Battlespace Dominance," call it what you will, regardless of the color uniform you wear it's impossible not to recognize the impact technology is having on all aspects of war, but most visibly on the operational level.

Within the Air Force, one of the most controversial initiatives to enhance warfighting at the operational level is the "split Air Operations Center" (split AOC) concept being explored through Expeditionary Force Experiments (EFX) and Blue Flag exercises. But, EFX-98 and past Blue Flag exercises attempting to implement the split AOC have fallen far short of seamlessly integrating physically separated AOC elements.

Furthermore, how does the split AOC concept hold up when compared against the enduring principles of war? Additionally, before the split AOC becomes a reality, its impact on human interaction, future bandwidth issues, and stated operational requirements should also be considered. At best, when analyzed against the principles of war and these other factors, the split AOC does not appear to be the most effective way to enhance air operations planning and execution.

Yet, there is a real requirement to improve the AOC's deployability and sustainability. However, a better solution is a three part approach to (1) redefine some of the functions of the Numbered Air Forces, (2) forward preposition additional AOC assets, and (3) modernize the AOC communications and computer equipment. Instituting these recommendations insures the AOCs are organized and equipped to meet the requirement for improved response time, reduced deployed footprint, and increased security.

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IN THE CRUCIBLE OF BATTLE

An Analysis of the Split Air Operations Center and the Principles of War

The Quest for Information Superiority

"Netcentric Warfare," "Information Superiority," "Battlespace Dominance," call it what you will, regardless of the color uniform you wear it's impossible not to recognize the impact technology is having on all aspects of war, but most visibly on the operational level. Joint Vision 2010 explicitly tasks the Services to find ways to achieve "information superiority." With this added impetus, the Service components continue their quest to best exploit technology to answer the 21st Century command and control challenge.

Within the Air Force, one of the most controversial initiatives to enhance planning and warfighting at the operational level is the "split Air Operations Center" (split AOC) concept being explored through Expeditionary Force Experiments (EFX) and Blue Flag exercises. Indeed, Expeditionary Force Experiment 98 (EFX-98) was designed to investigate the new USAF Air Expeditionary Force (AEF) quick reaction structure, and to see if, by deploying a small AOC forward, linked electronically to a larger AOC in the rear, air operations could be initiated within 24 hours after arrival in the theater. To this end, a specific goal of EFX-98 was splitting the AOC into two geographically separated elements, and linking them electronically in order to plan, disseminate, and execute the Air Tasking Order (ATO) in a "virtual" AOC environment. But, EFX-98 and past Blue Flag exercises attempting to implement the split AOC have fallen far short of seamlessly integrating physically separated AOC elements.

Furthermore, how does the split AOC concept hold up when compared against the enduring principles of war? This paper will prove, when examined against the principles of economy of force, security, simplicity, and unity of command, the split AOC does not fulfill some of the necessary conditions to fight and win America's wars. Additionally, before the split AOC

becomes a reality, its impact on human interaction, future bandwidth issues, and stated operational requirements should also be considered. As you will see, when analyzed against the principles of war and these other factors, the split AOC does not appear to be the most effective way to enhance air operations planning and execution.

Yet, there is a valid requirement to improve the deployability of this crucial command and control (C2) node, and the Air Force sees a smaller AOC in the theater as a means to increase its survivability and decrease airlift requirements in the crucial first few days of a conflict. However, in order to reduce the forward footprint of the AOC, rather than splitting it along artificial lines, perhaps a better solution is to modernize its equipment. Additionally, to meet the 24 hour stated response requirement for the USAF Aerospace Expeditionary Force, rather than splitting the AOC, the Air Force should redefine the warfighting functions of Eighth Air Force to fulfill the functional need of a Joint Force Air Component Commander (JFACC) when America chooses to intervene in humanitarian and peacekeeping operations, such as Somalia, Bosnia, and Haiti.

For the purposes of this paper, the split AOC concept will be analyzed as it is used to prosecute a major regional conflict (MRC) that threatens a vital national interest. Thus, the term AOC will be used interchangeably with Joint AOC (JAOC) and Combined (CAOC). This approach recognizes that current doctrine, and fiscal and political realities, dictate that we will fight jointly, and in most cases with coalition partners.[1]

For those unfamiliar with the AOC, a brief introduction is offered to explain the "typical" functions of this key command and control structure. However, the AOC is a tailorable entity, and depending on the conflict, not all its elements may be necessary. Thus, this paper can only serve as a crash course on the complex interworkings of the Air Operations Center.[2]

What is the AOC and Why Do We "Split" It?

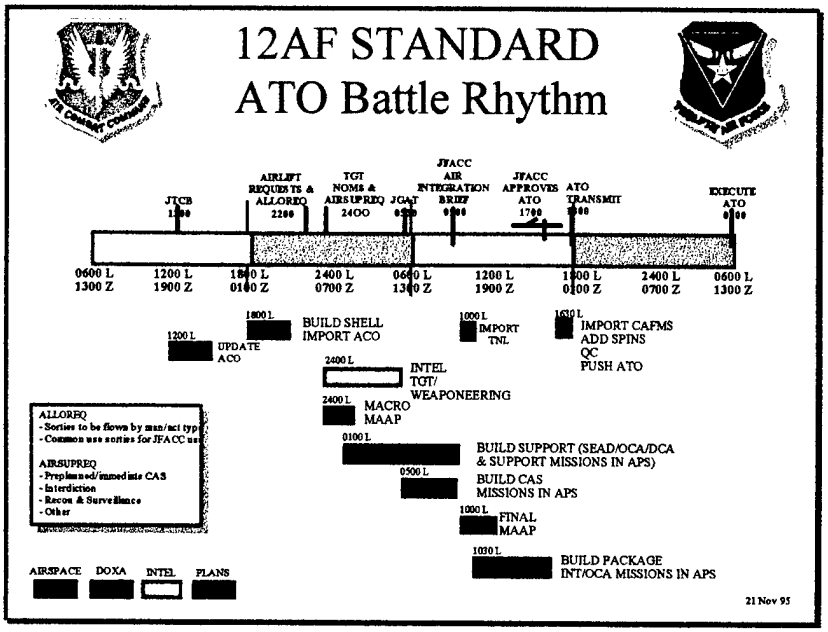
AOC 101—A PRIMER

In a joint task force structure, the Commander Air Force Forces (COMAFFOR) controls Air Force operations in the theater of war through the Air Operations Center. When the Air Force has the preponderance of theater air assets ***and*** the command and control (C2) systems necessary to execute air operations throughout the theater, the COMAFFOR will normally be designated the JFACC.[3] However, the Joint Force Commander can designate an individual from a service other than the Air Force to fill the JFACC role, if that component meets the same requirements cited above (e.g. has the preponderance of air assets in theater and the C2 systems necessary to prosecute joint air operations).[4] When a JFACC is designated, the AOC becomes a Joint and/or Combined AOC (JAOC/CAOC) and assumes the central role in the air operations C2 structure.

There is a misconception that the only mission of the JAOC is to plan, disseminate, and execute the Air Tasking Order.[5] While the ATO is certainly the focus of this effort, it is by no means the sole purpose of the JAOC. Before ATO planning can begin, the JAOC must develop the overall strategy for the air portion of the combined arms campaign, to include recommending and gaining approval from the Joint Force Commander for the apportionment of effort for air missions,[6] recommending target priorities, establishing rules of engagement, and developing the Intelligence, Surveillance and Reconnaissance (ISR) plan. Once the campaign strategy is documented in the Master Air Attack Plan, it forms the basis for developing the daily Target Nomination List that is approved by the Joint Force Commander. Only after these functions are complete does the ATO process begin[7]. (Appendix 1 illustrates the ATO process and timeline, and Appendix 2 outlines the AOC processes in detail.) Figure I depicts the standard "battle rhythm" followed in a typical JAOC. The point herein is to emphasize that in order to produce the

ATO, many related functions are accomplished that require continuous liaison with other Service components, and in many cases, coalition partners.

Figure I[8]
AOC TIMELINE



Typically, the JFACC is also designated as the Area Air Defense Commander (AADC), the Airspace Control Authority (ACA), and the Intelligence, Surveillance, and Reconnaissance (ISR) Coordinator. As the AADC, the JFACC is responsible for directing air defense efforts, including Theater Missile Defense (TMD). When the JFACC is the ACA, his JAOC develops airspace control procedures, coordinates all airspace control activities, ensures airspace deconfliction among all flying assets, and plans and publishes the Airspace Control Order. Additionally, as the ISR Coordinator, the JFACC, through his JAOC staff, plans, tasks and executes the theater ISR mission. Finally, the JAOC must also integrate into the ATO all air mobility missions (air refueling and airlift) supporting the Joint Task Force.

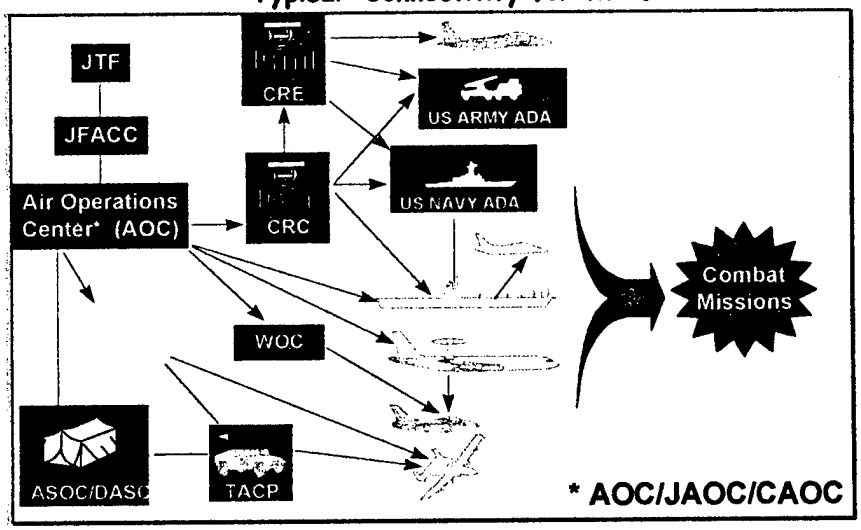
The system used to plan, disseminate, and monitor execution of the ATO is the Contingency Theater Automated Planning System (CTAPS), scheduled to be replaced by the Theater Battle Management Core Systems (TBMCS) in mid-1999. CTAPS, and the follow on

TBMCS, facilitate ATO dissemination and status updates to various other operation centers. The number of nodes connected to the JAOC depends on the scope of the campaign, but Figure II depicts a typical AOC, which normally has connectivity to these entities:

- ⇒ *All Air Force Wing Operations Centers in the theater of operations*
- ⇒ *Air Force Wing Operations Centers outside the theater tasked in the ATO*
- ⇒ *The Joint Task Force Headquarters if not collocated with the AOC*
- ⇒ *Other component headquarters if not collocated with the AOC*
- ⇒ *Carrier Battle Groups and Command Ships*
- ⇒ *Forward-based Control Centers*
- ⇒ *Numerous Army Liaison elements*
- ⇒ *Airborne platforms, as needed, such as AWACS, JSTARS, and ABCCC*
- ⇒ *Links to spacebased sensors and/or SPACECOM assets*

FIGURE II[9]

"Typical" Connectivity for the JAOC



Obviously, the AOC is a key element in the military's air C2 structure, and this is only a generalized overview for those unfamiliar with its multiple functions. In this context, it's clear that centralized control and decentralized execution of theater air assets is a monumental task.

WHAT IS THE "SPLIT" AOC CONCEPT?

The split AOC, virtual AOC, and distributed/collaborative AOC, all define the same basic idea. Thus, for simplicity, the term split AOC will be used throughout this paper. The Air Force is experimenting with splitting the AOC, locating a small forward AOC in theater and a larger rear element in the U.S., as a means to fulfill three basic requirements:

√ **Reduce AOC airlift requirements to the theater**
√ **Increase the security of the AOC**
√ **Reduce the forward footprint of the AOC in theater**

All three of these requirements are driven by the need to reduce deployment costs, decrease manpower requirements, and provide enhanced force protection.

To make the split AOC a reality, the Air Force recently activated two new organizations, both under its Air Combat Command: The Rear Operations Support Center at Langley Air Force Base, Virginia, to serve as a rear AOC[10], and the Command and Control Technology Innovation Center established at Hurlburt Field, Florida to standardize the AOC (both forward and rear elements) and develop the "Dynamic Aerospace Command" concept. The Dynamic Aerospace Command notion encompasses a "global grid" that exploits commercial and defense satellite communications links to establish a virtual AOC, using video teleconferencing (VTC), computer linked electronic white boards, and other collaborative planning tools.[11]

It's obvious that the split AOC concept is a fast moving train that may be hard to reroute. But, how well does it stand up against the enduring principles of war? Joint Publication 3-0 defines the principles of war as "guiding warfighting at the strategic, operational, and tactical levels. They are the enduring bedrock of U.S. military doctrine."[13] Thus, whenever a radical change is made to the nation's C2 structure, planners should consider whether or not the change reflects the lessons of war the Services have learned throughout history.

> ***"Still I believe there are some enduring principles to military operations that should be considered as you plan, train or fight..."[12]***
>
> ***Charles A. Horner, General, USAF (Retired)***

The Split AOC and Four Key Principles of War

SIMPLICITY

> ***"The purpose of simplicity is to prepare clear, uncomplicated plans and concise orders to ensure thorough understanding."[14]***

Perhaps the principle of war the split AOC concept most violates is the principle of simplicity. Without a doubt, the AOC has evolved into a highly complex and intricate C2 structure. Moreover, AOC personnel are highly skilled people who understand the ATO processes, and are proficient in using automated systems to produce, disseminate, and execute each day's ATO. Lieutenant General Lansford Trapp, Twelfth Air Force Commander and JFACC during EFX-98, found that the AOC "is a complex weapon system that needs a caution panel and Dash 1."[15] Furthermore, the AOC is a highly tuned organization with many moving parts. Consequently, over the past 15 years a great deal of resources have been expended to making the processes within the AOC more effective, faster, and simpler. As discussed below, the split AOC concept appears to counter this positive trend.

Operating in a Joint and/or Coalition Environment

One of the most important responsibilities of the AOC is to efficiently conduct joint and coalition air operations. During last summer's Expeditionary Force Experiment (EFX-98), the joint and coalition equation was not introduced, despite the reality that "a U.S. only scenario is highly unlikely in any area of the world other than the Antarctic."[16] Thus, caution must be urged before drawing broad conclusions based on EFX-98.

Furthermore, Joint publications stress the importance of keeping things simple when operating with coalition partners.[17] Doctrine, language, culture, and equipment differences make conducting a coalition campaign inherently more difficult, and these difficulties are compounded when the AOC is split. Hence, the concept appears questionable for numerous reasons.

First, it is unrealistic to expect coalition partners to split their usually limited force and send some personnel to the U.S. (or wherever the rear AOC is located), when the war is a theater away. Additionally, when the CAOC is split, a portion of the coalition forces may be essentially disconnected from their national C2 structure. Thus, in addition to increasing the number of

communications links required for a split operation, it is now necessary to link coalition members in the United States with their national C2 structures back in their own countries. It is problematic to imagine that the Arab coalition partners during Desert Storm would have sent their key planners, intelligence analysts, communications experts, and other liaison personnel to Langley AFB, Virginia when the war was conducted in Kuwait, and their national command structure was in Saudi Arabia. Additionally, the requirement to sanitize intelligence at both AOCs would be another limiting factor.

Secondly, connecting to coalition partners via video teleconferencing is probably not a viable option either. Few nations have, or will have in the foreseeable future, the capability to operate in a virtual environment. Furthermore, the Air Force could not afford to configure virtual operation centers for multiple prospective coalition nations. Yet, joint guidance specifically states "Joint and multinational C4 systems require standardization and procedures to enhance compatibility and interoperability."[18] The reality is that it would be nearly impossible to require coalition members to communicate through collaborative planning tools. Indeed, if the Air Force is required to deploy communications experts and equipment to all coalition partners, what was accomplished by splitting the CAOC?

Increased Network Complexity

As previously noted, a typical AOC will have multiple communications links. During Desert Storm, a rear operations center at Langley AFB, Virginia, was established as a focal point for requests for logistics and personnel. Conversely, in EFX-98, the rear AOC was tasked to ***actively*** plan and execute combat operations. Initially, this was believed possible because all players were operating in a "virtual" environment linked by VTCs, electronic white boards, and collaborative planning tools. However, General Horner, an observer for EFX-98, (and JFACC during Desert Storm) found that "...as the experiment went on, the role of the rear operations

center became more closely aligned to the roles exercised during the Gulf War, than was intended when EFX was first designed."[19] This was due to many factors, but most importantly, a result of the difficulty in maintaining stable communications, and conducting planning and execution operations from two physically separated locations. If effectively linking Air Force-only forces in a virtual environment was largely unsuccessful in EFX-98, success seems unlikely when the network is further complicated with joint and coalition forces.

Additionally, a collocated AOC pools manpower and equipment resources to accomplish the mission. When the AOC is split, it requires certain functions, such as weather, legal, intelligence, and air defense, that served several divisions in the AOC, must now be duplicated, which results in ***increasing*** personnel and communications requirements.[20]

From a communications perspective, the increased number of circuits, data replication, and maintenance of numerous databases and data integrity, makes keeping the network stable and communications "up" inherently much more difficult. Furthermore, network complexity more than doubles, it increases exponentially when the AOC is split into forward and rear operations. A standard statistical equation demonstrates the point. For example, if a collocated AOC has links to five other nodes with three circuits each, information is shared among all these entities. Thus, statistically, the level of complexity of the collocated AOC network is 2^{15}. Therefore, in this collocated AOC with five external nodes, there are 32,768 different possibilities for the network to experience an outage. However, since the databases are all maintained and controlled internally, an outage would not necessarily have a catastrophic affect since planning and execution could still continue.

Now, consider a split AOC environment with the same five external nodes. Between the AOC forward and the AOC rear, constant synchronization is required to ensure both entities are planning with the same data. When a communications outage occurs between the AOC forward and the AOC rear, it could have a catastrophic effect, because the AOC rear would be planning with data that was not synchronized with the data in the forward AOC. Compounding this, in addition to the hypothetical five nodes with three circuits each, linked to the forward AOC, the five nodes must also be connected to the rear AOC. Additionally, there is now, as a minimum, a large communications link (e.g a 1.544 megabyte line divided into 8 circuits) linking the forward and rear AOCs. Using this oversimplified scenario for a split AOC, the statistical equation is now 2^{38}. This means there are over ***2½ billion*** ways the network could have an outage, or to put it in perspective, communications experts now have to deal with ***over 8 millions times*** the network complexity for a split AOC as they did for a collocated AOC![21] As if this weren't complicated enough, each time the link goes down between the forward and rear AOCs, planning must stop while the databases are resynchronized.

> *"Everything in war is very simple, but the simplest thing is difficult."*
>
> *Clausewitz, On War*

Network complexity is further compounded as functions that were routinely handled internally within a collocated AOC, now must rely on external communications. In other words, the split AOC must rely on external communications ***just to talk to itself***!

ECONOMY OF FORCE

> ***"The purpose of economy of force is to allocate minimum essential combat power to secondary efforts."***[22]

Traditionally, economy of force was thought of as the "judicious employment and distribution of combat forces"[23] to ensure combat power is not wasted on secondary efforts. But today, the amount of support required to sustain this combat power dictates ***all*** efforts must be

focused on the objective. While at first glance it appears the split AOC embodies the Economy of Force principle, closer examination shows this is not the case.

The ATO System

As discussed under "Simplicity", the split AOC makes an already complicated process exponentially more difficult. Consequently, more effort must be focused on keeping the system running instead of planning and executing air operations. In fact, this exact argument was a major criticism of early software tools, and not until CTAPS version 5.2 appeared was the automated ATO system stable enough to be considered an asset to the process.

When the Air Force deployed the JAOC for Uphold Democracy (Haiti) in 1994, its cadre of planners, operators, intelligence personnel, and system administrators were confident in their ability to not only have the AOC fully configured and operational in 48 hours, but to be well into the planning of the first day's ATO. This goal was met with hours to spare. The point is that a full AOC was airlifted, deployed, set up ***and*** operational in under 48 hours. Currently, it seems unlikely this could be accomplished in a split AOC environment. In reality, experts at Numbered Air Forces Headquarters estimate the time to configure a split AOC, including communications connectivity and networking, is ***three times*** longer than it is for a collocated AOC.[24] Thus, while this argument makes it clear that the split AOC violates the simplicity principle, it also violates the principle of economy of force because a great deal of manpower and secondary effort is expended on tasks that would be avoided if the AOC was deployed as a single entity.

Success In Spite of Technology

Using the Uphold Democracy example again, because operators did not need to "work around the system," they could focus their efforts on the objective, and plan a difficult force insertion ATO that was not a typical air war plan. The lesson here is that the operators were able to quickly adapt to unusual circumstances.

To make the operation even more challenging, no airborne assets were available to assist with airspace deconfliction and control. Nevertheless, the JAOC successfully and safely recalled critical sorties midway into execution. Under the current split AOC methodology, it is doubtful this could have been accomplished with the same level of effort. If the AOC Execution cell was split, would time permit generating a video teleconference to coordinate recalling the aircraft? Even if these procedures were worked out ahead of time, what if the link between the two AOCs dropped just when operators needed to communicate?

> ***"We have to be careful not to get so enamored with technology that we forget what its all about, to fight and win America's wars."***[25]
>
> ***LtGen Lansford Trapp***
> ***JFACC, EFX-98***

Thus, the split AOC violates the principle of economy of force because it requires a great deal of secondary effort to achieve the primary objective. During a recent Twelfth Air Force Blue Flag Exercise, ***three*** VTC's were required to do what is routinely done internally between the JFACC and his JAOC staff.[26] With the fog of war and today's reduced force structure, technology should not be implemented if it requires more time and effort to accomplish routine tasks. And, perhaps more importantly, is the focus now more on a secondary task than the primary objective? This certainly appears to be counterproductive when, in a collocated AOC, a planner can simply look across a desk and ask, for example, "Hey Joe, didn't the JFACC say target XX was deleted this morning?"

The point is that, in the split AOC, an objective becomes working within the constraints of the system instead of focusing upon prosecution of the air war. When technology interrupts rather than enhances the smooth flow of information, perhaps its not the right solution.

SECURITY

> ***"The purpose of security is to never permit the enemy to acquire unexpected advantage."***[27]

Enhanced security is a key driving force in the Air Force's quest to reduce the forward footprint of the AOC. However, splitting the AOC, and requiring a large wartime presence in the rear, may actually decrease the security of the nation.

Who Are We Protecting?

When a large contingent of warfighters remains in the United States to actively prosecute a conflict, the war is brought directly to the American people. The reason, of course, is that the enemy now has a host of asymmetric options available to hit the operational ***and*** strategic centers of gravity (COG). Joint Vision 2010 specifically addresses this type of vulnerability and warns:

> ***"Our most vexing future adversary may be one who can use technology to make rapid improvements in its military capabilities that provide asymmetrical counters to U.S. military strengths, including information technologies."***[28]

American is an "open" society, and a rear AOC is susceptible to attack or sabotage, probably killing many noncombatants in the process. In fact, war in the information age is making the distinction between civilian and military targets invisible.[29] In the theater of war, all military personnel know they are exposed to danger—that's the business they are in—and steps are taken to protect the forces. By planning and executing air operations from the United States during wartime, the enemy can now directly attack a potential operational center of gravity. Additionally, by attacking on U.S. soil, he can bring the war directly to the American people, in essence hitting not only an operational center of gravity, but perhaps striking a strategic COG as well—America's willingness to stay in the fight. Whereas, during Vietnam, this took the enemy 15 years, in a split AOC environment it would only take one UHaul truck filled with explosives ***or*** one interruption of the link between the forward and rear AOC at a crucial time. Regardless of how it was achieved, it wouldn't take much effort on the part of the enemy to disrupt air operations planning and execution in a split AOC environment.

With America's advantage in battlefield dominance, precision guided munitions and weapons of mass destruction, a future adversary may conclude the only way to defeat the U.S. is not to play by the rules. Future enemies may see public opinion as America's center of gravity, and thus may seek to produce casualties among civilians or the civilian employees the armed forces now count on to keep its high tech military operating.[30] An asymmetric attack on a rear AOC in the United States would have a devastating effect, not only impacting the ability to continue planning and executing the air war, but potentially undermining American's confidence in their military to protect them on their own shores.

Guarding the Information and the Network

In addition to directly attacking the rear AOC, the enemy can attack the information flowing between the rear and forward AOCs. Using a variety of tools, enemies could use information warfare to change planning data in the ATO while it is being exchanged between the forward and rear AOC elements. Although information warfare is a current worry in a collocated AOC, the vulnerabilities increase significantly when the AOC is split, simply because of the need to synchronize the data between both organizations.

One of the most limiting influences on planning in a split environment is the need for data replication across the network. Utilizing TBMCS in a split AOC operation, two or more sites are designated as "hosts," thus an independent site can overwrite key operational databases. In a split AOC, the initial database replication is destructive, meaning it overwrites all data across the entire network. After initial database replication, AOC personnel rely on ***trust*** among all the players, regardless of location, not to tamper with key databases such as "theater data set-up" (which includes such critical information as force beddown, logistics, and weaponeering options) and enemy and friendly orders of battle.[31] Therefore, a split AOC presents the enemy with more options to conduct information warfare operations.

While the military maintains it has an edge over its adversaries in information warfare capabilities, in reality low-cost technology substantially narrows that advantage. Moreover, because of the increased ability for enemies to conduct asymmetric information warfare, the President issued two directives to implement a new security doctrine aimed at protecting sensitive data. This security doctrine directs the armed forces to build a cyber homeland defense to deter and protect against terrorists or hostile nations who attempt to inflict attacks on computer systems and networks.

> ***"As we approach the 21st Century, our foes have extended the fields of battle—from physical to cyberspace...Rather than invading our beaches or launching bombers...adversaries may attempt cyber attacks against our critical military systems and our economic base."***[32]

Reliance on Commercial Satellites

Because of proposed future reductions in the radio spectrum available for military use, the Air Force is relying on commercial systems to implement the split AOC concept. However, commercial satellite links are a potential vulnerability, and the Air Force seems to be betting that any future adversary won't be willing to "take down the economy of the world"[33] This hardly seems a safe assumption when future adversaries may not have the same value system.

UNITY OF COMMAND

> ***"The purpose of unity of command is to ensure unity of effort under one responsible commander for every objective."***[34]

Unity of command is an important principle of war, and one must consider the impact of the split AOC on the joint force command structure. If air operations for a major regional conflict were planned and executed from Langley AFB, it is likely the Commander of Air Combat Command would be involved. Although he's not a combatant commander, Langley AFB is his installation, and in many instances the JFACC would be one of his Numbered Air Force

Commanders. Thus, it is unrealistic to expect him not to be involved, even though in the warfighting command structure, he has no formal role. Additionally, the close proximity of the Army's Training and Doctrine Command at Ft. Monroe, and the Commander in Chief, Atlantic in Norfolk, would make it nearly impossible to exclude these flag officers from involvement. Thus, a clear and time-tested command structure would get muddy very quickly, further hampering the ability to make quick decisions and prosecute an effective air war.

Secondly, there is considerable potential for, if not the reality of, the highest levels of the government being connected directly to the warfighter in the field. With the improved connectivity of the Global Command and Control System, the NCA will have the ability to see literally the entire battlefield. The potential exists for those far removed from the scene to micromanage air operations in near realtime—will leaders be able to resist the temptation to direct the war from Washington?

The Human Dimension And Other Related Factors

In addition to analyzing the split AOC against the principles of war, there are a number of other factors that should be examined before this concept is used in a real world situation. One of the most worrisome aspects of the split AOC concept is the disparity it causes in operations tempo between the forward and rear AOCs. Additionally, the increased bandwidth required for the split AOC, coupled with the continuing reduction in available bandwidth, is not a winning equation either. Finally, it should be remembered that the combatant commanders (CINCs) are responsible for determining their warfighting requirements, not the Services. Thus, whether or not there is a valid operational requirement for a split AOC is debatable. See Appendix 3 for an in-depth discussion of these issues.

Alternatives to the Split AOC

Notwithstanding the fact that the split AOC is a problematic innovation, an answer to the three questions cited earlier must be addressed. In reality, a combination of changes will improve the responsiveness of the AOC without physically splitting it.

REDEFINE EIGHTH AIR FORCE'S ROLE

One of the principle justifications for the split AOC is the rapid deployment requirement to support the new Aerospace Expeditionary Force (AEF) concept. The Numbered Air Forces (NAF) are the warfighting elements of the Air Force, and are responsible for deploying, setting up, and running the AOCs. Thus, one way to fulfill the air operations center requirement for the AEF when conducting military operations other than war, is to reconfigure the functions of Eighth Air Force. Under this proposal, Eighth Air Force would be designated as the Air Component (and AOC) for all AEF operations that deploy to an area where an AOC structure is not already in place. Since its inception as the Air Component for Atlantic Command (ACOM), Eighth Air Force has not deployed its' AOC for a real world conflict. Furthermore, since ACOM's area of responsibility currently encompasses the Atlantic, it seems unlikely Eighth Air Force would be used in the near future to prosecute a MRC. Using an AOC sized to plan and execute 500 sorties a day (this is termed a "Quick Reaction Package" or QRP), Eighth Air Force could deploy the AOC for AEF operations with just two C-5 loads.

Additionally, Eighth Air Force personnel could be assigned to support different AEFs; for example, each planner, intelligence specialist, operator, and system administrator, would be assigned three AEF's. These individuals would train and deploy with their AEF, when needed. Furthermore, Eighth Air Force's AOC equipment should be divided up into three QRP sized packages. This would necessitate some redesign of its structure, and some increase in equipment, but the idea is to have designated and trained personnel and equipment to support each AEF.

Perhaps more than anything else, this concept insures that the JFACC is an AOC experienced senior officer. It is not realistic to expect the AEF commander, normally a Wing Commander, to become the JFACC. Wing Commanders, in most cases, have little or no AOC experience. Furthermore, while they certainly understand air operations, it would be difficult for them to simultaneously learn AOC processes and ATO production, while fulfilling their combat role as the AEF commander. The JFACC for any joint force must be an officer who is experienced in joint or coalition air operations and understands AOC functions. Within the Air Force, these individuals are assigned to the Numbered Air Forces. Consequently, NAF senior officers must continue as the Air Force's AOC experts and JFACCs.

Although peacetime efficiencies are in constant demand, they can be self-defeating if they hinder rapid and effective transition from peace to war.
AFM 1-1

Finally, Air Force doctrine states, "Air Force elements should be organized for wartime effectiveness rather than peacetime efficiency."[35] Thus, while the AOC may appear to be an "inefficient" structure to prosecute discretionary conflicts, or Military Operations Other Than War, the criticality of the full AOC capability must be recognized when it comes to waging a major regional conflict. Consequently, the AOCs at Ninth and Twelfth Air Forces, United States Air Force Europe and Pacific Air Force should be left untouched and their warfighting functions unchanged.

REDUCED AIRLIFT

While there is a real requirement to reduce airlift, unfortunately, the large AOC deployment for Desert Storm is being used as the justification for splitting the AOC. More than anything else, since 1990, great strides have been made in downsizing the AOC, and it no longer takes 25 C-5 loads to get it into the theater of war.[36] In fact, just two C-5's were needed to deploy the entire AOC for Uphold Democracy—the ***same*** amount of airlift needed to deploy the forward

AOC for EFX-98. Although the capability was not needed, the AOC deployed to conduct the Haiti operation could have planned and executed a 1,000 sortie ATO. Thus, it is a bit misleading to continue to use airlift comparisons from Desert Storm to justify the need to "split" the AOC.

Nevertheless, it appears airlift will continue to be at a premium. To this end, Eighth Air Force's equipment not needed for the three QRP sized AOCs should be forward prepositioned, in a manner similar to what the Marine Corps uses to support its expeditionary concept. The prepositioned assets should include enough equipment to expand a QRP sized AOC (e.g. 500 sorties a day) into an AOC capable of planning and executing a 2,000 sortie ATO required to prosecute a major regional conflict (e.g. a Theater Response Package)[37] Following the Marine Corps model, this equipment would need to be exercised and tested frequently.

MODERNIZE THE AOC EQUIPMENT

Last, and perhaps most important, the existing communications and computer equipment in the AOC must be modernized. Currently, the Theater Deployable Communications (TDC) program is scheduled to replace bulky switching and network management components of the Air Force Tri-Service Tactical Communications system, and corrects some operational deficiencies noted during Desert Storm.[38] But this isn't sufficient, and there is no follow-on program to comprehensively field modern technology for the AOCs. Equipment such as flat screen monitors, laptops, and smaller CPUs would significantly reduce both the airlift requirements and the forward footprint of the AOC. Currently, the AOCs are operating with old computer equipment that is not only inefficient, but heavy and cumbersome to deploy and set up.[39] (Appendix D details current airlift and equipment requirements for the AOC.)

Using this three part approach, the collocated AOC meets the requirements for improved response time, reduced footprint, and increased security.

The Cautious Revolutionaries

These days it may be potentially career threatening to voice skepticism about the "Revolution in Military Affairs." However, while the military must be willing to exploit technology, it must not pin its hopes on technology as a means to achieve a bloodless victory over future adversaries. Technology exploitation must still pass the logic test, and in the case of the split AOC, its' grade isn't yet a "C". Now, more than ever before, it seems the military is often exploring the use of advanced technology rather than determining ***what needs*** to be done and then deriving technological solutions from those requirements.[40] In other words, because something is technically ***doable*** doesn't necessarily mean it should be ***done***! Perhaps the split AOC concept is only ahead of its time, not unlike early air power theory in the beginning of this century. But, the current state of the art and the implementation concept for the split AOC violates four very key principles of war. On the other hand, the alternatives cited here present a way to meet the demand for quicker deployments, reduced airlift, and a smaller AOC footprint, without splitting the AOC into forward and rear elements. Not until the split AOC can be seamlessly and securely implemented should the Air Force consider fighting a MRC using this methodology. Effective air command and control of the joint battlefield is just too important to gamble on commercial satellites, VTC's, and adversaries who may (or may not) play by the rules.

No amount of technology can replace face to face exchange of information between commanders.

JOINT PUB 6-0

NOTES

[1]Joint Chiefs of Staff, National Military Strategy of the United States of America: A Strategy of Flexible and Selective Engagement, (Washington: GPO, 1995), p. 9. The National Military Strategy is specific about the need to conduct multinational operations: "While we maintain the unilateral capability to wage decisive campaigns to protect U.S. and multinational security interests, our armed forces ***will most often*** fight in concert with regional allies and friends, as coalitions can decisively increase combat power and lead to a more rapid and favorable outcome to the conflict." (emphasis added)

[2] For readers interested in gaining a deeper understanding of the AOC, AF-13-109 (draft) is an excellent reference. This draft instruction provides a good understanding of the AOC functions and its' role in the nation's command and control structure.

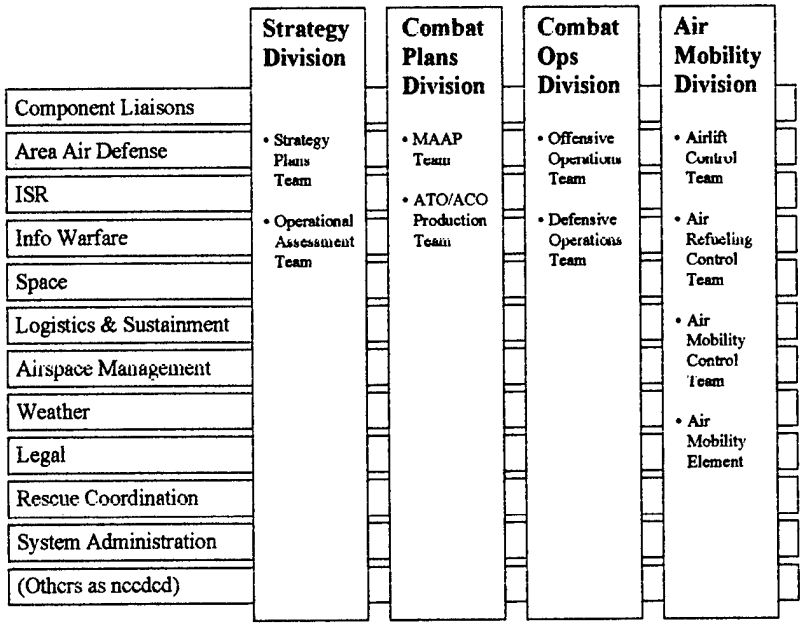
[3] United States Air Force Department, Operational Procedures—Aerospace Operations Center, Air Force Instruction 13-109 (AFI 13-109) Volume 3 (Washington: June 1998), p. 2. Hereafter AFI 13-109.

[4]Joint Chiefs of Staff, Doctrine for Joint Operations, Joint Pub 3-0 (Washington: 1 February 1995), p. II-15. Hereafter Joint Pub 3-0.

[5] The Air Tasking Order (ATO) establishes the tasking for all air assets in the theater. The ATO process flowchart and timeline can be found at Appendix 1 .

[6] AFI 13-109: "Air apportionment is the determination and assignment of the total expected effort designating the priority that should be devoted to the various air operations or geographic areas for a period of time." For example, in the first few days of a campaign, the majority of missions may be devoted to achieve air superiority. After air superiority is gained, typical apportionment guidance may change to strategic attack and air interdiction. When ground troops are engaged, the JFC may decide to place a priority on Close Air Support missions. Thus, throughout a campaign, the JFACC must continually reassess the enemy order of battle and recommend apportionment guidance to the JFC for his approval before planning the next day's ATO.

[7] AFI 13-109 contains an in-depth discussion of the AOC processes. The chart below depicts the main processes and the divisions in the AOC that are responsible for their accomplishment. Additionally, a more detailed discussion of AOC processes can be found in Appendix 2.



[8] Twelfth Air Force, United States Air Force, 12th Air Force, Air Force Forces Air Operations Center, Standard Operating Procedures, 4th Edition (12 AF AFFOR AOC SOPs), (Davis-Monthan AFB Arizona: 31 August 1998), p. 58.

[9]Twelfth Air Force "How We Fight" Briefing, Theater Battle Management Core Systems Program Office, Directorate of Operations, Twelfth Air Force, (Davis-Monthan AFB Arizona: 23 November 1998), slide 6.

[10] Wall, Robert, "Expeditionary Nerve Center," Air Force Magazine, Vol 81, No.8, August 1998, (http://www.afa.org/magazine/0898exp.html).

[11]Air Force Command and Control Agency, Command and Control Technology and Innovation Center, "Dynamic Aerospace Command: The 21st Century AF C2 Weapon System Concept," Contract #GS-35F-4657G (n.p: n.p. 1 October 1998), p. 3.

[12]Letter from Charles A. Horner, General, USAF (Retired) to Colonel Marc H. Lindsley, 23 Sep 1998.

[13] Joint Pub 3-0, p. A-1.

[14] Joint Pub 3-0, p. A-2.

[15] John Hawley, "Expeditionary Force Experiment 98," Briefing, Command and Control General Officers' Steering Group, United States Air Force, (Washington: 10 December 1998). For us non-flyers, a caution panel contains all the warning lights on an aircraft, and a "Dash 1" contains all information on a particular aircraft, similar to an automobile owner's manual.

[16] Charles A. Horner, "Comments on Expeditionary Force Experiment 98," unpublished research paper, (Shalimar, Florida: 23 Sep 98), p. 4.

[17] Joint Pub 3-0 specifically spells out the need for simplicity "Complex or unclear command relationships and organizations can be counterproductive to developing synergy among multinational forces. ***Simplicity*** and clarity of expression are critical." (emphasis added)

[18] Joint Chiefs of Staff, Doctrine for Command, Control, Communications, and Computer (C4) Systems Support to Joint Operations, Joint Pub 6-0 (Washington: 30 May 1995), p. xii. Hereafter Joint Pub 6-0.

[19]Charles A. Horner, p. 4.

[20] Telephone interview with Peter F. Garcia, HTI Consultant to Twelfth Air Force, and James Bradshaw, HTI Consultant to Ninth Air Force, Davis-Monthan Air Force Base, Arizona, 7 Jan 99.

[21] My thanks to Dr. Victor Lux Tonn, Salve Regina University, Newport, Rhode Island for his assistance in calculating these complexity equations. In reality, the AOC would have a great deal more communication circuits to more than five nodes. However, for simplicity's sake, this example serves to prove the network complexity increases *exponentially* when the AOC is split. The statistical computations to derive this answer were:

Collocated AOC: $(2^3)^5 = 2^{15} = 37{,}278$

Split AOC: $(2^3 \times 2^3)^5 \times 2^8 = 2^{38} = 274{,}877{,}906{,}944$

[22] Joint Pub 3.0, page A-1.

[23] Joint Pub 3.0, page A-1.

[24] Telephone interview with Peter F. Garcia and James Bradshaw.

[25] United States Air Force, Air Combat Command Public Affairs, "Commander for EFX '98 Visits Training Center," ACC News Service, 23 Jul 1998, (http://www.acc.af.mil/news/jul98/980212.html).

[26] Telephone Interview with Peter F. Garcia and James Bradshaw.

[27] Joint Pub 3-0, p. A-2.

[28] Chairman of the Joint Chiefs of Staff, Joint Vision 2010, (Washington: n.d.) p. 10.

[29] Alan D. Campen, "Information War Techniques Supersede Kinetic Weapons," Signal Magazine, May 1998, p. 1, (http://www.us.net/signal/Archieve/May98/information-may.html).

[30] Charles J. Dunlap, Jr., "Joint Vision 2010: A Red Team Assessment," Joint Force Quarterly, Autumn/Winter 1997-98, p. 48.

[31] Telephone interview with Peter F. Garcia and James Bradshaw

[32] John J. Stanton, "White House Plans Cyber Homeland Defense Effort", National Defense, September 1998, p. 24.

[33] David Atkinson, "EFX to Test and Develop EAF Command and Control,"20 August 1998 (http://www.efx.acc.mil).

[34] Joint Pub 3-0, p. A-2.

[35] United States Air Force Department, Basic Aerospace Doctrine of the United States Air Force, Air Force Manual 1-1, Volume 1, Chapter 4, March 1992, p. 17.

[36] Appendix 4 details the equipment and airlift requirements to deploy the AOC. Twelfth Air force estimates it deploys 158 short tons of equipment and needs 10 C-141 (not C-5) loads for a QRP. A Theater Response Package, the size AOC used for Desert Storm, would be approximately 310 short tons of equipment and 20 C-141 loads (for the equivalent of 5 C-5's). To put this in perspective, it takes 93 C-17 sorties to deploy an Army Light Infantry Brigade. Additionally, AFI 13-109 Attachment 3 contains is a listing of the equipment required for the AOCs.

[37] See Appendix 4 for the differences in equipment and personnel required for a QRP and TRP.

[38] Al Zelenak, "Background Paper on Theater Deployable Communications (TDC), unpublished paper, Air Force C4 Agency, Washington, 5 January 1999.

[39] An excellent example of how modern technology can reduce the airlift and footprint of the AOC is the current use of 20 inch standard computer monitors. If these monitors were replaced with 20 inch flat screen monitors, it would take one pallet rather than four pallets to pack and deploy the 60 monitors needs for a QRP. Additionally, flat screen monitors take about one third the workspace, thus they would either increase the tabletop workspace for the operators, or permit more systems in the same area. This is just one simple example of how fielding modernized hardware would have a positive impact on the ability to mobilize, deploy, and set up the AOC.

[40] Charles A. Horner, p. 4.

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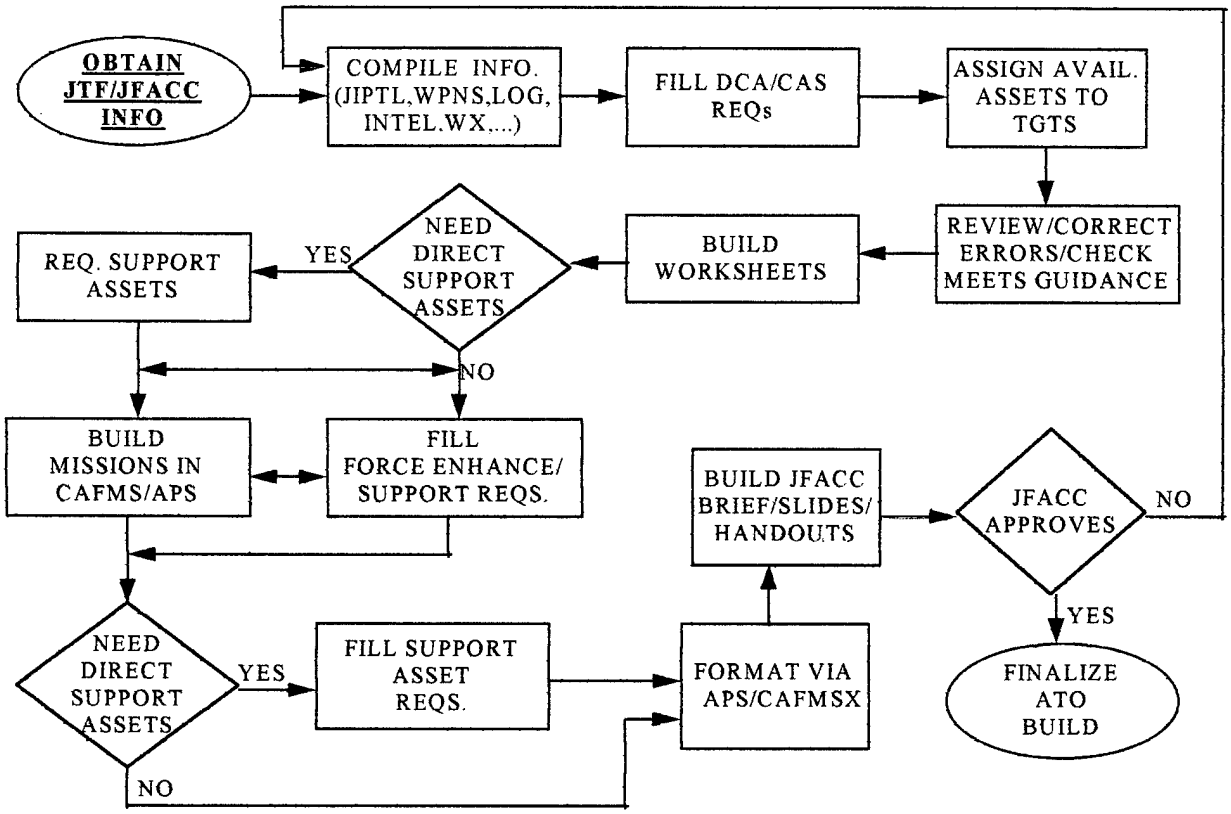
APPENDIX 1

ATO PROCESS AND TIMELINE

ATO PROCESS FLOWCHART



Flowchart is courtesy of 12th Air Force, Davis Monthan AFB, Arizona: 12th Air Force, Air Force Forces Air Operations Center, Standard Operating Procedures, 4th Edition (12 AF AFFOR AOC SOPs), 31 August 1998.

Typical ATO Planning Process[1]

Time	Event
	Day 1 (48 hours prior to ATO "X" execution)
0800	JFACC Strategy/Guidance Meeting
	- GAT covers near-term guidance, apportionment, and targeting
	-- Weather forecast, threat outlook, and ground picture for ATO "X"
	-- Review JFC guidance provided by previous day's Joint Targeting Coordination Board (JTCB)
	-- JFACC objectives/prioritized tasks for ATO "X"
	-- Review progress toward achieving current phase objectives
	-- In operational terms, review JFACC air strategy for ATO "X"
	--- Key objectives by mission and geographic area (CA, AI, CAS, SA)
	--- Sorties available to JFACC (by component)
	--- Sortie allocation recommendation for ATO "X"
	--- JFACC signs Apportionment Recommendation letter
	-- Proposed JFACC Guidance Letter presented for JFACC approval
	--- ATO "X" planning guidance (2 days out)
	--- Targeting guidance (3 days and beyond)
	- Strategy Division covers long-range air strategy and targeting priorities for 3 days out
	-- Recommended JFACC inputs to JTCB
1000	Strategy Team Meeting
	- Discuss/refine air strategy for 3-4 days out
	- Refine proposed JFACC Targeting Priorities for 3-4 days out
1100	Component fixed target nominations due to Joint Targeting Working Group (JTWG) (41 hours prior to ATO "X" execution)
	- Produce proposed target nomination list (TNL) to present to JGAT
1300	JTWG. Chaired by Chief, Targets team, and composed of component targeting representatives
	- Prioritize component target nominations based on JFC targeting guidance and JFACC prioritized tasks
1500	JGAT Meeting. Chaired by Deputy Director, Combat Plans, and composed of O4/5 level component planners/targeteers
	- JTWG presents proposed TNL and Strategy Team presents long-range air strategy for discussion/refinement prior to presenting to JFACC for approval
1700	JFACC Afternoon Update
	Combat Operations and Intelligence provide JFACC:
	An update on today's air war
	Weather forecast, threat outlook, and ground picture for next 2-3 days
	JGAT presents ATO "X" TNL for JFACC approval
	Strategy Division presents "draft" air strategy/targeting priorities for 3-4 days out
1900	Component mobile target nominations due (33 hours prior to ATO "X" execution)
2000-0200	Night GAT develops ATO "X" Master Air Attack Plan (MAAP)
2200-0600	ATO Development begins MAAP inputs into AUTOMATED COMPUTER SYSTEMS
	Day 2 (24 hours prior to ATO "X" execution)
0600	All MAAP inputs into AUTOMATED COMPUTER SYSTEMS
0700	JFACC Morning Update (21 hours prior to ATO "X" execution)
	Combat Operations and Intelligence cover yesterday's results and today's plan
	Night GAT briefs tomorrow's Master Air Attack Plan for JFACC approval
1400	All support asset inputs into AUTOMATED COMPUTER SYSTEMS for final QC
1800	Transmit ATO "X" (minimum of 10 hours prior to ATO "X" execution

[1] AFI 13-109 Volume 3 (Draft),Table 6-1, page 37.

APPENDIX 2

AOC PROCESSES

ATTACHMENT 2

AOC PROCESSES

PROCESS		PRODUCTS			MECHANISMS	
#	Major Function, Task, & Subtask	Product Name	Input	Output	ORG & OFFICE	ADPE SYSTEM
1	**STRATEGY DEVELOPMENT**				Rx-Strat Div Tx-JFC	JPT, GCCS
1.1	Review and Interpret Draft JFC's Guidance and Current ATO Apportionment	Draft JFC's Guidance and Current ATO Apportionment	Draft JFC's Guidance and Current ATO Apportionment		OPR: Strat Div Tx-JFC Rx-Strat Div	JPT
1.2	Forward Comments on Draft JFC's Guidance and Current ATO Apportionment	Comments on Guidance and Apportionment		Comments on Guidance and Apportionment	OPR: Strat Div Tx-JFC Rx-Strat Div	JPT, GCCS
1.3	Obtain JFC's approved Guidance and Apportionment	JFC's Guidance and Apportionment	JFC's Guidance and Apportionment		OPR: Strat Div Tx-JFC Rx-Strat Div	GCCS Voice
1.4	Develop JFACC Strategy	JFACC Strategy	JFC Guidance IPB, OER COA's Combat Assessment	JFACC Strategy	OPR: Strat Div Tx-Strat Div Rx-GAT CELL, CPD, COD	JPT
1.5	Implement JFC Guidance and ATO Apportionment	JFC Guidance and ATO Apportionment		JFC Guidance and ATO Apportionment	OPR: Strat Div Rx-	
1.5.1	Develop Joint Air and Space Operations Plan (JASOP)	Joint Air and Space Operations Plan (JASOP)		Joint Air and Space Operations Plan (JASOP)	Tx-GAT Cell Rx-	JPT, PC GCCS
1.5.1.1	Define JFACC's Mission	JFACC's Mission	CJTF /CINC Guidance	JFACC's Mission Statement	Tx-Strat Div Rx-GAT Cell, CPD, COD	JPT
1.5.1.2	Define JFACC's Air and Space Objectives	JFACC's Air and Space Objectives	JTF objectives/ tasks	JFACC's Air and Space Objectives	Tx-Strat Div Rx-GAT Cell, CPD, COD	JPT
1.5.1.3	Define JFACC's Air and Space Tasks	JFACC's Air and Space Tasks	JFACC Objectives	JFACC's Air and Space Tasks	Tx-Strat Div Rx-GAT Cell, CPD, COD	JPT
1.5.1.4	Define JFACC's Air and Space Measures of Merit (MoM)	JFACC's Air and Space MoM	JTF MoM JFACC Tasks Intel Data bases	JFACC's Air and Space MoM	Tx-Strat Div Rx-GAT Cell, CPD, COD	JPT/ CIS
1.5.1.5	Establish Target Priorities	Target Priorities	JFACC objectives, component target noms	Target Nomination list	Tx-GAT Cell Rx - COD	

1.5.2	Recommend Rules of Engagement (ROEs)	Recommended Rules of Engagement (ROE)	U.S./coalition standing ROE, CINC ROE, JTF proposed ROE	Recommended Rules of Engagement (ROE)	OPR: Strat Div/ JA Tx-Strat Div	
1.6	Distribute CINC Guidance	JFC Guidance		JFC Guidance	Tx-Strat Div Rx-	JAMPS
1.7	Provide Inputs to the development of an ISR plan for JTF	ISR Plan	Collection Requirements	Intelligence Surveillance Reconnaissance Plan	OPR: Collection Manager Tx - AOC Intelligence Cmbt Analysis Rx- J2	
2	**DETAILED PLANNING**		RAAP Database		OPR: GAT Cell	RAAP
2.1	Assimilate Draft JIPTL information	JIPTL information	RAAP Database		OPR: GAT Cell	JPT, APS
2.1.1	Acquire Air Power Asset Availability	TPFDD Update	TPFDD Update		Tx-CPD Rx-GAT Cell	JPT
2.1.2	Confirm Current Day's Apportionment	Current Day's Apportionment	Current Day's Apportionment		Tx-Strat Div Rx-GAT Cell	JPT
2.1.3	Update GAT Cell Briefing	GAT Cell Briefing		GAT Cell Briefing	OPR: GAT Cell	PC
2.2	Convene GAT Cell meeting		Draft JIPTL		OPR: GAT Cell	PC
2.2.1	Share Information with all GAT Cell members				OPR: GAT Cell	PC
2.2.1.1	Obtain Component Target Nominations	Component Target Nominations	Component Target Nominations		Tx-Each Component Rx-GAT Cell	CIS JDISS PC JAMPS
2.2.1.2	Obtain Combat assessment	Combat assessment	Battle Damage Assessment (BDA)	Combat assessment	Tx-Combat Assessment Rx-GAT Cell	TIBS JDISS JAMPS RAAP
2.2.1.3	Obtain JFACC's Guidance	JFACC's Guidance	JFACC's Guidance		Tx-Strat Div Rx-GAT Cell	JPT
2.2.1.4	Obtain JFACC's Missions	JFACC's Missions	JFACC's Missions		Tx-Strat Div Rx-GAT Cell	JPT
2.2.1.5	Obtain JFACC's Tasks	JFACC's Tasks	JFACC's Tasks		Tx-Strat Div Rx-GAT Cell	JPT
2.2.1.6	Obtain JFACC's Objectives	JFACC's Objectives	JFACC's Objectives		Tx-Strat Div Rx-GAT Cell	JPT
2.2.1.7	Obtain JFACC's Measures of Merit	JFACC's Measures of Merit	JFACC's Measures of Merit		Tx-Strat Div Rx-GAT Cell	JPT
2.2.1.8	Obtain Apportionment Recommendation for next day	Apportionment Recommendation for next day	Apportionment Recommendati on for next day		Tx-Strat Div Rx-GAT Cell	JPT

2.2.2	Receive "Preparation of the Battlefield" Briefing	"Preparation of the Battlefield" Briefing	"Preparation of the Battlefield" Briefing		Tx-BCD, Intel Rx-GAT Cell	CIS PC
2.2.3	Review Target Nomination List	Target Nomination List	Target Nomination List		OPR: GAT Cell	RAAP
2.2.3.1	Identify Geographic Locations	Target Geographic Locations		Target Geographic Locations	OPR: GAT Cell	RAAP
2.2.3.2	Identify Target Groups	Target Groups		Target Groups	OPR: GAT Cell	RAAP, CIS
2.3	Draft Joint Integrated Prioritized Target List (JIPTL)	Draft JIPTL		Draft JIPTL	OPR: GAT Cell	JPT RAAP
2.3.1	Obtain the cut line on yesterday's JIPTL and review any significant information from Operational Assessment	Draft JIPTL	Previous targets not selected and CA on hit targets	Draft JIPTL	OPR: GAT Cell	RAAP
2.3.2	Draft Interdiction (INT)/Strategic Attack (SA) JIPTL	Draft INT/SA JIPTL		Draft INT/SA JIPTL	OPR: GAT Cell	RAAP
2.3.3	Draft Offensive Counter Air (OCA) JIPTL (after INT/SA)	Draft OCA JIPTL		Draft OCA JIPTL	OPR: GAT Cell	RAAP
2.3.4	Ensure OCA nominated targets support INT gameplan and other JFACC missions		OCA nominated targets & INT gameplan & other JFACC missions		OPR: GAT Cell	
2.4	Obtain JIPTL approval for JFACC	Approved JIPTL	Draft JIPTL	Approved JIPTL	OPR: GAT Cell	PC
2.4.1	Prepare JIPTL part of JFACC Briefing	JIPTL Briefing		JIPTL Briefing	OPR: GAT Cell Rx-JFACC	PC
2.4.1.1	Confirm next day's apportionment recommendation	Recommended Apportionment for next day			OPR: GAT Cell	
2.4.1.2.	Check target relevancy to JFC/JFACC directions				OPR: GAT Cell	PC
2.4.1.2.1	Finalize briefing and import component slides for JIPTL Brief	JIPTL Briefing	JIPTL Briefing		OPR: GAT Cell	
2.4.2	Brief Joint Target Coordination Board (JTCB)			JTCB consensus on synchronized game plans for the JTF and each component	OPR: GAT Cell Rx-JTCB	PC

2.4.2.1	Present Strat Div Briefing with JFC/JFACC directions	Strat Div Briefing w/JFC/JFACC Directions	Strat Div Briefing w/JFC/JFACC Directions	Strat Div Briefing w/JFC/JFACC Directions	Tx-Strat Div Rx-JTCB	PC
2.4.2.2	Finalize next day's apportionment recommendation	Next day's recommended Apportionment			Tx-GAT Cell Rx-JFC/J3	NA
2.4.2.3	Brief Component Target Nominations	Component Target Nominations Briefing	Component Target Nominations	Component Target Nominations Briefing	Tx-GAT Cell Rx-	PC
2.4.2.4	Obtain JIPTL approval for INT/SA & OCA	JIPTL Approval		JIPTL Approval	Tx-JFACC Rx-GAT Cell	PC
2.5	Transfer JIPTL (TNL) to MAAP Cell	JIPTL	JIPTL		Tx-GAT Cell Rx-CPD	JPT,RAAP XFER to APS/CTEM (Conventional Targeting Evaluation Module)
2.5.1	Assist CPD develop Master Air Attack Plan (MAAP)	Master Air Attack Plan (MAAP)		Master Air Attack Plan (MAAP)	OPR: GAT Cell Cor-CPD	APS
2.5.2	Ensure Target Nomination List (TNL) is forwarded	Target Nomination List (TNL)		Target Nomination List (TNL)	Tx-GAT Cell Rx-CPD	RAAP
3	**ATO PRODUCTION**					
3.1	Develop and Distribute Air Tasking Order (ATO)				OPR: CPD	APS
3.1.1	Create APS ATO Shell	APS ATO Shell		APS ATO Shell	OPR: CPD	APS
3.1.1.1	Confirm/Update APS Database information				OPR: CPD	APS
3.1.1.1.1	Access execution APS Database information				OPR: CPD	GCCS CTAPS
3.1.2	Update/Import Target Nomination List (TNL)	Updated TNL	Updated TNL		Cor-Intel Rx-CPD	APS
3.1.3	Produce Airspace Control Order (ACO)	Airspace Control Order (ACO)		Airspace Control Order (ACO)	OPR: CPD	ADS
3.1.3.1	Acquire all airspace user's inputs		Assimilate Airspace Control Measure Requests		OPR: CPD	
3.1.3.2	Create, modify, delete, and review Air Control Measures (ACM)'s				OPR: CPD	ADS

3.1.3.3	Create, modify, delete, and review ACM types				OPR: CPD	ADS
3.1.3.4	Generate ACO	ACO		ACO	OPR: CPD	ADS
3.1.3.5	Disseminate ACO	ACO		ACO	OPR: CPD	ADS
3.1.3.5.1	Input CAFMS-X Identifier	CAFMS-X Identifier	CAFMS-X Identifier		OPR: CPD	ADS
3.1.3.5.2	Transmit ACO into ATO Shell	ACO into ATO Shell		ACO into ATO Shell	OPR: CPD	ADS
3.1.4	Import ACO into ATO Shell	ACO into ATO Shell			OPR: CPD	APS
3.2	Build Apportionment/ Allocation Worksheets	Apportionment Allocation Worksheets			OPR: CPD Rx-	PC
3.2.1	Confirm units, aircraft numbers, UTE rates and total sorties per unit	Confirmed units, aircraft numbers, UTC rates, and total sorties per unit	Units, aircraft numbers, UTC rates, and total sorties per unit	Confirmed units, aircraft numbers, UTC rates, and total sorties per unit	OPR: CPD	APS
3.2.2	Allocate Sorties to mission categories for each unit	Sortie Allocation to mission categories	Apportionment percentages	AIRSUPREC	OPR: CPD	APS
3.3	Produce detailed theater and strategic Airlift Mission Schedule (AMS)	Theater and Strategic Airlift Mission Schedule (AMS)		Theater and Strategic Airlift Mission Schedule (AMS)	OPR: CPD	C2IPS
3.3.1	Acquire ATO worksheets	ATO Worksheets	ATO Worksheets		OPR: CPD	PC
3.3.2	Input itinerary into database to create Theater Air Movement Schedule (TAMS)	Airlift itineraries		Airlift itineraries	OPR: CPD	C2IPS
3.3.3	Input last minute planned changes/ additions to ATO missions	ATO Mission Changes/ Additions	Last Minute ATO Mission Changes/ Additions		OPR: CPD Tx-DOO Planners	C2IPS
3.3.4	Generate Flow	Airlift Flow	Use planned takeoff and enroute times	Airlift Flow	OPR: CPD	C2IPS
3.3.5	Edit TAMS flow	TAMS Airlift Flow		TAMS Airlift Flow	OPR: CPD	C2IPS
3.3.6	Generate final TAMS product for input into ATO				OPR: CPD	C2IPS
3.3.7	Push TAMS product				OPR: CPD	C2IPS manual interface
3.4	Begin mission planning and packaging		JIPTL/ Target folders	Draft MAAP	OPR: CPD	APS

3.4.1	Produce INT/XINT/OCA blank packaging sheets	INT/XINT/OCA blank packaging sheets		INT/XINT/OCA blank packaging sheets	OPR: CPD Rx-	APS
3.4.2	Build CAS flow sheets	CAS Flow		CAS Flow	OPR: CPD	PC
3.4.3	INT/XINT/OCA planners receive Campaign Focus Brief	Campaign Focus Brief	Campaign Focus Brief		OPR: CPD Tx-	APS, PC
3.4.4	INT/XINT/OCA planners construct MAAP	MAAP	JIPTL	MAAP	OPR: CPD	APS, RAAP
3.4.5	Load Air Plan Data	Air Plan Data		Air Plan Data	OPR: CPD	APS
3.4.5.1	Load DCA Mission first from worksheets	DCA Mission Data		DCA Mission Data	OPR: CPD	APS
3.4.5.2	Load INT/XINT/OCA data from worksheets	INT/XINT/OCA Mission Data	INT/XINT/OC A Worksheets	INT/XINT/OCA Mission Data	OPR: CPD	APS
3.4.5.3	Load AWACS/ ABCCC/JSTARS data	AWACS/ ABCCC/ JSTARS Mission Data		AWACS/ ABCCC/ JSTARS Mission Data	OPR: CPD	APS
3.4.5.4	Load reconnaissance (e.g., UAV) data	Reconnaissance Mission Data		Reconnaissance Mission Data	OPR: CPD	APS
3.4.5.5	Load Special operations Requests	Special operations Request Mission Data		Special operations Request Mission Data	OPR: CPD	APS
3.4.5.6	Load ATACMS data	ATACMs Data	AFATDS	ATACMs Data	OPR: CPD/BCD	APS
3.4.5.7	Tanker info/requests (Last to be loaded)	Tanker info/ requests	Request for Tanker support	Tanker support	OPR: CPD	APS
3.5	Review/Update SPINS	Updated SPINS	SPINS	Updated SPINS	OPR: CPD	APS
3.5.1	Copy previous SPINS	Previous SPINS	Previous SPINS		OPR: CPD	APS
3.5.1.1	Subdivide previous SPINS into separate directories for each OPR		Previous SPINS		OPR: CPD	APS
3.5.1.2	Copy section to respective directory and update				OPR: CPD	APS
3.5.1.3	Copy updated SPINS back into master copy	Updated SPINS		Updated SPINS	OPR: ATO Production	APS
3.5.1.4	Quality Check missions before transferring to CAFMS-X	Correct Mission Data	Mission Data		OPR: CPD	APS
3.6	Develop Communications Plan	Communications Plan			OPR: C2 Team	PC APS
3.6.1	Develop Codes for Frequencies	Codes & Frequencies			OPR: C2 Team	PC
3.6.2	Obtain/Coordinate Frequencies	Coordinated Frequencies	Frequencies	Coordinated Frequencies	OPR: C2 Team	PC

3.6.3	Develop Communications part of SPINS	Communications SPINS		Communications SPINS	OPR: C2 Team	PC
4	**ATO EXECUTION**				OPR: COD	
4.1	Receive ATO	ATO	ATO		OPR: COD	CAFMS-X
4.1.1	Review for general guidance and applicability				OPR: COD	CAFMS-X
4.1.2	Evaluate available assets ability to execute ATO		Status of Available Assets		OPR: COD	CAFMS-X
4.2	Receive additional guidance and information	JIPTL	Additional Guidance & Information		Tx-OIB Rx-COD	
4.2.1	Receive current day's ATO targets	Today's ATO targets	Today's ATO targets		Tx- OIB Rx-COD	CTAPS
4.2.2	Receive JFC's guidance for current ATO	JFC's guidance	JFC's guidance		OPR: COD	PC, VOICE
4.2.3	Receive JFACC's Tasks	JFACC's Tasks	JFACC's Tasks		OPR: COD	VOICE
4.2.4	Receive JFACC's Objectives	JFACC's Objectives	JFACC's Objectives		OPR: COD	VOICE
4.2.5	Receive JFACC's Measures of Merit	JFACC's Measures of Merit	JFACC's Measures of Merit		OPR: COD	VOICE
4.2.6	Receive Intelligence Update	Intelligence Update	Intelligence Update		OPR: COD	JDISS, TIBS, TRAP
4.2.6.1	Receive Updated Air Order of Battle	Updated Air Order of Battle	Updated Air Order of Battle		OPR: COD	VOICE, ADSI, GCCS TIBS, JDISS
4.2.6.2	Receive Updated Ground Order of Battle	Updated Ground Order of Battle	Updated Ground Order of Battle		OPR: BCD Tx - BCD Rx - COD	AGCCS, PC VOICE
4.2.7	Receive Updated Weather Briefing	Updated Weather Briefing	Updated Weather Briefing		OPR: COD Tx - Wx	PC, IWA, TFS, DAWS CAFWSP
4.2.8	Receive previous shift's summary	Previous Shift's Summary	Previous Shift's Summary		OPR: COD	VOICE PC
4.3	Direct ATO execution to achieve JFC objectives		ATO, ground/air/ maritime updates	ATO Execution	OPR: COD	CAFMS-X VOICE, GCCS ADSI
4.3.1	Manage JFACC's assets		JFACC's Assets		OPR: COD	CAFMS-X VOICE
4.3.2	Adjust assets to changes in plan				OPR: COD	CAFMS-X VOICE
4.4	Monitor ATO execution progress				OPR: COD	CAFMS-X VOICE
4.4.1	Receive Battle Damage Assessment (BDA)	Battle Damage Assessment (BDA)	BDA		OPR: IN	JDISS, TIBS, TRAP, JAMPS
4.4.2	Receive Pilot Reports	Pilot Reports	Pilot Reports		OPR: IN	VOICE

4.4.3	Receive Weather zf	Weather Reports	Weather Reports		OPR: WX	VOICE, GCCS
4.4.4	Receive flying unit status and ability to execute assigned missions	Flying unit status reports	Flying unit status reports		OPR: COD	GCCS CAFMS-X VOICE
4.4.4.1	Receive Wing Operations Center (WOC) feedback	Wing Operations Center (WOC) feedback	Wing Operations Center (WOC) feedback		OPR: COD	GCCS CAFMS-X VOICE
4.4.4.2	Receive Logistics Reports	Logistics Reports	Logistics Reports		OPR: COD	GCCS
4.5	Inform senior leaders of ATO progress and significant events	Verbal Update		Verbal Update	OPR: COD	GCCS, PC VOICE
4.6	React to contingencies		Information on contingencies	ATO Changes	OPR: COD	CAFMS-X VOICE
4.6.1	Receive Intelligence Updates	Intelligence Updates	Intelligence Updates		OPR: COD	TIBS, TRAP, CIS, JDISS
4.6.2	Receive Battle Damage Assessments (BDA)	Battle Damage Assessments	Battle Damage Assessments		OPR: IN and CA	CIS, 5D JDISS
4.6.3	Receive Enemy Order of Battle (EOB) Changes	Enemy Order of Battle Changes	Enemy Order of Battle Changes		OPR: BCD IN	JDISS ASAS
4.6.4	Receive Friendly Order of Battle (FOB) Changes	Friendly Order of Battle Changes	Friendly Order of Battle Changes		OPR: BCD, OPS Intel	AGCCS
4.6.5	Receive CINC/JFC Guidance Changes	CINC/JFC Guidance Changes	CINC/JFC Guidance Changes		OPR: AOC DIR	VOICE, GCCS, PC, JAMPS
4.6.6	Receive Field Unit Requests	Field Unit Requests	Field Unit Requests		OPR: COD	CAFMS-X VOICE
4.6.7	Receive Weather Changes	Weather Change Reports	Weather Change Reports		OPR: WX	IWA, TFS, TWOS, GCCS, PC, CAFWSP
4.6.8	Receive status on unit's capability to execute assigned missions	Unit's capability to execute assigned missions	Unit's capability to execute assigned missions		OPR: COD	GCCS, CAFMS-X, VOICE
4.7	Change Air Mission Tasking & coordinate with all appropriate duty officers and controlling agencies (WOCs, AWACS, ASOCs, etc.)	Change to the ATO		ATO Change	OPR: COD	CAFMS-X, VOICE JAMPS
4.7.1	Manage Air defense fighters, alert status, and CAP status				OPR: COD	ADSI, MCE, CAMFS-X
4.7.2	Scramble DCA assets		Valid Requirement	Scramble	OPR: COD	CAFMS-X VOICE

4.7.3	Scramble AEW assets		Valid Requirement	Scramble	OPR: COD	CAFMS-X VOICE
4.7.4	Scramble Offensive Assets		Valid Requirement	Scramble	OPR: COD	CAFMS-X VOICE
4.7.5	Scramble Support Assets		Valid Requirement	Scramble	OPR: COD	CAFMS-X VOICE
4.7.6	Monitor Close Air Support		ATO, Apportionment Guidance		OPR: COD, BCD	CAFMS-X VOICE
4.7.7	Retarget Missions when a target is no longer valid (already destroyed or weather prohibits attack)		BDA, Combat Assessment, WX	Retarget	OPR: COD	CAFMS-X VOICE
4.7.8	Prosecute a Time Critical Target		Valid Requirement JFACC/AOC DIR/CCO Direction	TCT	OPR: COD	CIC (ADSI, TCTA), JDISS, CAFMS-X
4.8	Monitor Scheduled Theater Air mobility missions			ATO change	OPR: AMD	CAFMS-X, C2PIS, VOICE
4.8.1	Direct Diverts when required			Diverts	OPR:AMD/TACS	VOICE
4.8.2	Plan and schedule immediate/urgent airlift missions			ATO Change	OPR: AMD	C2IPS
4.9	Control Theater Missile Defense efforts		TBM Alerts,	Patriot launch, impact advisories	OPR: COD, IN, BCD	GALE, TIBS, TRAP, GCCS, CIC (ADSI, TCTA), VOICE,
4.10	Execute AFATDS Fires		Nominated Target	ATACMS Fire	OPR: BCD	AFATDS
5	**ASSESSMENT & ANALYSIS**				Strat Div	
5.1	Assess Combat Operations		Indicators, BDA	JFACC Decision Brief	Strat Div	
5.2	Assess Campaign Effectiveness		Indicators	JFACC Decision Brief	Strat Div	

APPENDIX 3

THE SPLIT AOC'S IMPACT ON

THE HUMAN DIMENSON

AND

OTHER RELATED FACTORS

The Human Dimension and Other Factors

In addition to analyzing the split AOC against the principles of war, this paper would not be complete unless it touched on a few other key factors. Consequently, this Appendix will cover the impact of the split AOC on human interactions, the debate over bandwidth, and the operational requirement issue.

THE HUMAN DIMENSION

One of the most negative affects the split AOC has on human relationships is the difference in operations tempo it induces between forward and rear elements. During EFX-98, although the rear element was tasked to conduct major portions of the planning and execution, it became apparent there was a different appreciation of the situation between forward and rear AOC elements. Hence, the operations tempo and focus was markedly different depending on the location of the individual and his distance from the JFACC. General Horner, in his analysis of EFX-98, commented, "Whether or not human responses to computer generated environments can be altered to create synchronous tempos, equal loyalties, and a sense of oneness between two distance headquarters remains to be seen."[i]

> **C4 systems must be planned as extensions of human senses and processes to help people form perceptions, react, and make decisions.**
>
> **Joint Pub 6-0**

Perhaps an equally important issue, and one that doesn't seem to be under consideration, is the impact on performance evaluations and how senior officers will perceive those individuals who did not deploy against those who did. Some important questions must be answered before the split AOC is implemented in a real world situation:

? **Will the Air Force recognize those individuals who stay in the rear and those who deploy into the theater with the same decorations?**

? **What about the perception that those who stay in the rear weren't really involved and didn't fight the war? What about the "you had it easy" perception?**

? **How is an Officer Performance Report written with the same punch when the ratee operated from Langley Air Force Base, took the kids to soccer practice, and slept at home every night?**

These are not insignificant questions, as the split AOC has the potential to create a further chasm between rated and non-rated officers, and now between rated officers that deployed and rated officers who didn't.

Last, but certainly not least, the impact of information overload on our decisionmaking capability should also be considered. Are future military commanders being trained to only make decisions if they have "perfect" information on the battlefield? The ability of machines to manipulate and produce data far outpaces human capacity to comprehend and act on this data.[ii] As a consequence, regardless how much information is processed, the uncertainty of war will remain, and America must have leaders who are willing, and able, to make tough decisions in the midst of fog, friction and uncertainty.

BANDWIDTH ISN'T AN ISSUE?

Perhaps one of most debatable issues is the contention from split AOC proponents that "bandwidth isn't an issue." The split AOC concept relies on access to both commercial and military satellite systems to ensure the necessary communications links (e.g. bandwidth) are available to connect the two AOCs. When the entire AOC is deployed, reachback assets are also used for connectivity to CONUS intelligence sources

and organizations. However, when the AOC is split, this reachback requirement takes on greater significance and requires more bandwidth, as the entire prosecution of the ATO ***depends*** on uninterrupted communications between the rear and forward AOC. In the past, if the reachback links were interrupted, planning and execution could still continue. Under the split AOC concept this is not the case.

During EFX-98, bandwidth was a significant limiting factor with regard to data the Air Force was able process and pass across the network. In fact, all available bandwidth was used and only 40 to 50 percent of the data needed to fight a shooting war was passed through the EFX network. Additionally, during EFX only about a third of the networks were employed that were used during Desert Storm.[iii] Thus, although the network for EFX-98 was two-thirds smaller than what is needed for a MRC, there still was not enough bandwidth to pass all the required data.

Directly countering the argument that bandwidth isn't an issue is the proposal by the Defense Department to levy a "radio frequency tax" to force tactical information system designers to tighten bandwidth use. Imposing a financial penalty on new systems that use too much signal capacity would ensure planners use the spectrum more efficiently. According to the Joint Staff J-6, Lieutenant General Buchholz, "One major flaw in battlefield information systems emerges from burgeoning bandwidth challenges." Furthermore, he warns that new systems are being procured without sufficient thought given to the bandwidth needed for them to function.[iv] Therefore, the argument that it is irrelevant that the split AOC needs more bandwidth, is not in line with operational experience and guidance from the Joint Staff on new systems acquisition. In reality, one of the reasons the Joint Staff is so concerned about bandwidth usage is the ongoing

United States government program to auction off parts of the radio spectrum for commercial use. The Balanced Budget Agreement of 1997 required the government to sell off at least 200 megahertz of the spectrum. And while the sell-off is expected to bring billions of dollars to the United States Treasury, it would significantly hamper the military's ability to use the radio spectrum unless measures are taken to protect key military systems against interference from the increasing number of commercial users.[v]

WHAT IS THE REQUIREMENT?

It is important to understand the size of the JFACC headquarters and the determination of its location is not an Air Component function, but is driven by the Joint Force Commander's staff and other U.S. Service component staffs. As General Horner states, "The assumption that Headquarters size is a function of service doctrine or desires will not stand the test of reality..."[vi] Therefore, any move to split the AOC requires concurrence with future Joint Task Force Commanders.

Furthermore, the Goldwater Nichols Act of 1986 specifically made combatant commanders (CINCs) responsible for identifying their requirements for military capabilities. The act further directed that the Services ***were not*** to interpret, on their own, the CINC's requirements and base Service programs on the capabilities they determined as most important to the CINCs.[vii] Consequently, before the Air Force proceeds further with the split AOC, it is imperative that combatant commanders are on board with this new methodology, and if there is no requirement for a split the AOC from their perspective, the concept shouldn't be pursued.

NOTES TO APPENDIX 3

[i] Charles A. Horner, p. 5.

[ii] James R. FitzSimonds, "The Cultural Challenge of Information Technology," Naval War College Review, Summer 1998, p. 13.

[iii] David Atkinson, "EFX Wrap Up: Connections are good, bandwidth is still tight," Defense Daily, 25 September 1998, (http://www.efx.acc.mil).

[iv] Robert K. Ackerman, "Bandwidth Demands Portend Revolutionary Program Taxes", Signal Magazine, June 1998, p. 3 (http://www.us.net/signal/Archive/June98/bandwidth-june.html).

[v] David Bender, "Danger for Military Lurks Behind Sell-Off," Jane's Defense Weekly, 18 Mar 1998, p. 3.

[vi] Charles A. Horner, p. 4.

[vii] Douglas C. Lovelace, Jr., "Unification of the United States Armed Forces: Implementing the 1986 Department of Defense Reorganization Act," Unpublished Research Paper, reprint ed., The United States Naval War College, n.d., p. 15.

APPENDIX 4

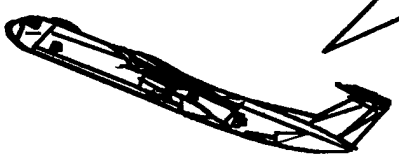
AOC

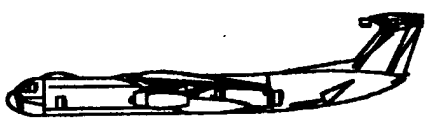
EQUIPMENT LOADS AND

AIRLIFT REQUIREMENTS

Mobilizing the AOC

- Continuity of Command
- Rapidly deployable packages
- Sized to situation
- AOC core augmented as required





Quick Response Package (QRP) (300-500 Msn)

Limited Response Package (LRP) (1000+Msn)

Theater Response Package (TRP) (2000+ Msn)

Package Highlights

	QRP	LRP	TRP*
MAOC Shelters	1	2	[illegible]
CTAPS	54	63	[illegible]
Major Comm pieces	2	6	6
Vehicles	4	8	2
Total Weight	153 ST	124 ST	43 ST
Airlift	10	7	[illegible]
Personnel	466	612	36[illegible]
MCE	1		

Notes: * Not at NAFs
Airlift is C-141

AOC BASELINE C2 EQUIPMENT LIST

EQUIPMENT	QRP #	LRP#	TOTAL
ADVERSARY	1	0	1
CTAPS WORKSTATIONS	80	40	120
CIS WORKSTATIONS	20	10	30
GCCS	8	2	10
C2IPS	8	4	12
EOI	1	0	1
GDSS	1	0	1
JDISS – SCI	15	0	15
JDISS - COLLATERAL	2	0	2
JSIPS	1	0	1
JPT	2	0	2
MSTS	1	0	1
OMEGA	1	0	1
PLGR	1	0	1
PC JMEM	3	1	4
RMS/JCMT	1	0	1
SENIOR TROUPE	1	0	1
TASDAC	1	0	1
SMAT	1	0	1
CIC	1	0	1
GALE	1	0	1
IBIS	2	0	2
TCTA	2	0	2
TDC	1	0	1
TCD	3	0	3
TEP/TDPS	1	0	1
TSOC	2	0	2
WOTS	1	0	1
WEATHER			
E-STT	1	0	1
ESK	1	0	1
TFS	1	0	1
AWDS	1	0	1

AOC BASELINE C2 EQUIPMENT LIST

AN/TSQ-146	0	1	1
AN/TAC-1	4	4	8
AN/FCC-100	4	4	8
RMC	10	0	10
TQG	8	10	18
TRE	2	0	2
TADIL A/B/J	1	0	1
AN/TSQ-165 MAOC	1	2	3
ADSI	2	0	2
AN/URC-119	4	0	4
TSSR	4	4	8
AN/TSC-85B	0	1	1
SB-3865 SWITCH	0	1	1
AN/TSQ-111	0	1	1
COMM WORKSTATIONS/SERV	18	0	18
AN/TSC-100A SATCOM	1	0	1
HVAC			
AN/TTC-39A SWITCH	1	0	1
PHOTO QUALITY COLOR IMAGERY PRINTER	1	0	1
PRINTER (HIGH SPEED)	3	2	5
PRINTER (TABLE TOP)	20	10	30
COPIER	3	2	5
FAX – SECURE	3	2	5
FAX – UNCLASS	4	3	7
SHREDDER	2	1	3

APPENDIX 5

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