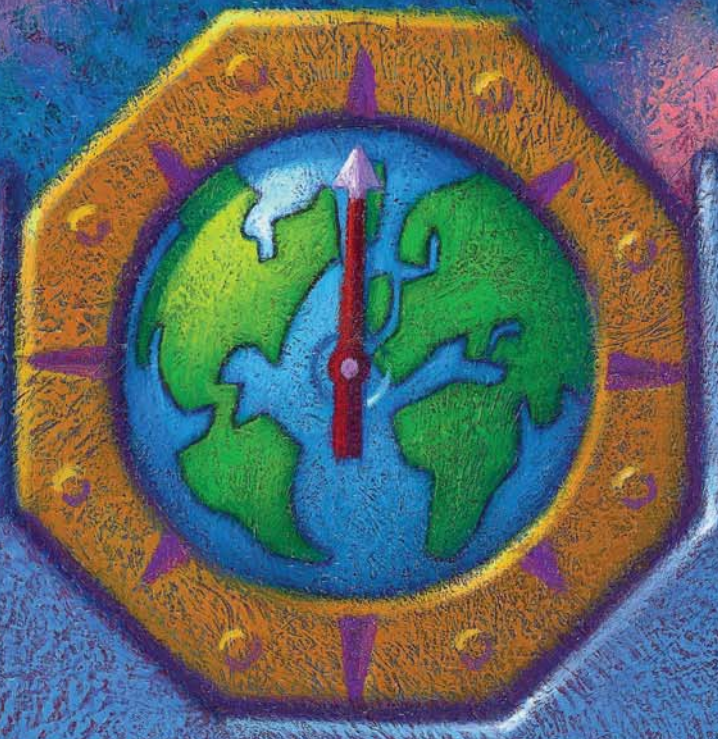
Air Force Logistics Management Agency
Air Mobility Warfare Center



Thinking About Logistics

Readings in the Issues and Concerns Facing Air Force Logistics in the 21st Century

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The Editors, Air Force Journal of Logistics

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January 2005

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Foreword

Thinking About Logistics is a collection of papers written by students taking the Advanced Logistics Readiness Officer Course (ALROC) at the Air Mobility Warfare Center, Fort Dix, New Jersey. ALROC came from a Corona decision to create highly skilled operational logistics readiness officers who are competent in Agile Combat Support (ACS) command and control and experts on Agile Combat Support and Expeditionary Combat Support. The course provides warfighting commanders with officers who possess special expertise in the application of expeditionary logistics and the ability to leverage effects-based logistics to improve combat capability. The course focuses on the ACS processes of Ready the Force, Prepare the Battlespace, Position the Force, Employ the Force, Sustain the Force, and Recover the Force. Students are selected from fully qualified logistics readiness officer captains with 6 to 8 years of service. Those completing this course are targeted for key positions in logistics readiness squadrons, wing combat support centers, A-4/A-5, air operations centers, regional supply squadrons, and other combat support command and control nodes. After completing this course, these officers will be highly skilled logisticians capable of not only providing combat support to air expeditionary forces and warfighting commanders but also instructing unit-level logistics officers and advising senior commanders.

The Air Mobility Warfare Center (AMWC) was activated at Ft Dix, New Jersey, on 1 May 1994. The brainchild of then Commander, Air Mobility Command, General Ronald R. Fogleman, it serves as the command's single focal point for advanced education, training, and testing. Acting on General Fogleman's vision, the center consolidated the functions of seven geographically separated units and located them adjacent to McGuire AFB, New Jersey, a major air mobility hub. The Center's Operations Division assumed the missions of the 1492^{d} Air Transportation Training Flight, Travis AFB, California; the Tanker Tactics Center, Ellsworth AFB, South Dakota; the Combat Aircrew Training School, Nellis AFB, Nevada; and the Air Mobility School, Scott AFB, Illinois, with its operating location center at Ft Eustis, Virginia. Additionally, AMWC's 421st Training Squadron took on the mission of the 314th Ground Combat Readiness Evaluation Squadron, Little Rock AFB,

Arkansas. The 421st was redesignated 421st Ground Combat Readiness Squadron on 1 December 1997. Since offering its first course in June 1994, the AMWC curriculum catalog has grown to include more than 55 in-residence courses and more than 85 exportable courses. The number of students completing these programs is fast approaching 7,000 per year. The 33d Flight Test Squadron was activated under the AMWC on 1 October 1994. It assumed the heritage of the 33d Troop Transport Squadron and the flight test mission of the Air Mobility Center at Charleston AFB. Today the 33d is AMC's only flight test organization, managing more than 85 ongoing tests. With the return of CONUS-based C-130s to Air Mobility Command in April 1997, AMWC also assumed responsibility for the Combat Air Delivery School, located at Little Rock AFB.

The latest addition to AMWC, the Air Mobility Battle Lab stood up on 4 May 98. One of seven battlelabs Air Force-wide, this new organization is tasked to explore innovative air mobility operations, command and control, logistics, and sensor fusion concepts for airlift, aerial refueling, aeromedical evacuation, and mobility support, and to rapidly measure their potential for advancing the global reach core competency. Utilizing modeling and simulation techniques, the Battle Lab champions the evaluation, development, and exploitation of doctrine, technology, defensive systems, and tactics to support the air mobility objectives of force mobility and combat delivery.

Air Force Logistics Management Agency
Air Mobility Warfare Center

Captain Maria C. Roberts, USAF
William McCambridge, ALROC

Future of Deployed Fuel Capability

Introduction

It is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is the most adaptable to change.

—Charles Darwin

The Air Force faces a serious deficiency in the area of mobile fuel distribution and distribution equipment. Most fuel mobility equipment in use today was designed, tested, and fielded in the 1960s. The current collection of equipment, referred to as fuels mobility support equipment (FMSE), successfully supports most of the Air Force's deployed fuel requirements. Specific and potentially serious shortfalls exist within the system and with the equipment. Over time, more problems inevitably will arise for not only the Air Force but also for the other services. However, this system requires a significant amount of resources to ensure the equipment works to meet mission requirements. Two particular questions need to be addressed to examine the current disposition of equipment and determine the future of FMSE. First, because of the number and severity of the shortfalls and limiting factors (LIMFACS) with FMSE, should the Air Force pursue new deployable equipment known as fuels operational readiness capability equipment (FORCE) or continue using FMSE? Second, if new equipment is required, have enough shortfalls and LIMFACS been identified to prevent similar problems with the new equipment?

The US military, arguably the best and most professional military the world has ever seen, uses technological advancements to maintain its leading edge. Yet, in the very critical logistical area of petroleum, oil, and lubricants (POL), the Air Force still uses a deployable system designed and built in the early 1960s. Aviation fuel is the second largest operation and maintenance (O&M) expenditure after personnel.[1] When deployed to remote locations without permanent POL facilities,

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The success of US deployed military forces depends largely on the distribution of bulk petroleum fuels to carry out its missions.

FMSE fulfills the requirement for storage and distribution. Since the end of the Cold War, this need grew substantially as US forces deployed to undeveloped nations without sufficient support facilities. Given the amount of fuel required to sustain aerial operations, FMSE represents a critical junction of the support and operations chain. Repeated lessons resulting from the Joint Universal Lessons Learned System (JULLS) indicated that the Air Force should acquire better refueling equipment because of the number of problems encountered with the existing equipment. One specific shortcoming of the old equipment relates to fuel-level floats and switches that frequently preventing trucks from being fully fueled, which directly impacts aircraft turnaround times.[2] Similar and equally crucial problems continue to plague FMSE and need to be addressed by all concerned parties. Many of these problems stem from the Air Force's choice of employment and management of FMSE.

Air Force employment of FMSE entailed distributing components throughout the major commands and geographic commands as war reserve materiel (WRM). In the absence of oversight and funding, each major command (MAJCOM) and combatant commander was forced to determine how to budget for the storage, upkeep, and use of the equipment. After initial deployment of the equipment Air Force-wide, funding slowly eroded to the point where depot-level maintenance ceased, replacement parts all but disappeared, and individual units were left to manage and maintain fuel equipment on their own. FMSE's continued existence lies in the ability of commanders to use alternative methods of funding and FMSE personnel to find unconventional solutions. For example, WRM managers encourage the use of WRM during exercises because those reconstitution costs can be recouped from O&M funds. All FMSE, associated readiness spares packages, and fuel vehicles were required to be reconstituted and inspected prior to their return to storage.[3] This allowed the equipment to receive inspection and maintenance without using WRM funds. Without O&M funds, commanders would have to draw on a much smaller allotment of WRM funds.

The success of US deployed military forces depends largely on the distribution of bulk petroleum fuels to carry out its missions. Continued success requires a large investment in fuel storage, distribution, and handling of fuel as we continue to deploy and operate out of austere locations. The Air Force Petroleum Office (AFPET), through contract with Radian, Inc, clearly identified that FMSE consistently fell short of operational plans (OPLAN) for Operation Iraqi Freedom. This study constitutes a deliberate effort on the part of the Air Force to identify shortfalls and limitations of the current equipment with an eye toward replacement equipment. Figure 1 details the massive operational requirements being tasked to FMSE throughout the world.

Since 11 September 2001, the US military has faced challenges never before faced. The requirement to open bare bases and convert them into main operating bases has increased significantly. Operation Enduring Freedom saw the creation of almost a third more bare bases to support the mission, and almost 50 percent of the bases

from Iraqi Freedom began as bare bases.[5] Fuel requirements increased in concert with increased mission requirements. The importance of deploying, setting up, and operating FMSE cannot be understated with regard to mission success. The requirement for FMSE exists in all phases of operations and locations. Figure 2, produced by the RAND Corporation in a study of support functions for aerospace forces, illustrates the need for fuel support from initial deployment through the long-term sustainment of forces.

As a result of the current operational requirements, the need to create a seamless, joint petroleum function throughout the Services looms dauntingly ahead for POL administrators and operators. Recent joint operations involving all the Services serve as a catalyst for improved doctrinal integration, as well as execution in the field. The major areas of integration include interoperability of equipment, operator training across the range of equipment, and varied maintenance training on all applicable systems.

Background

Because of my wartime experience, I am insistent on the point that logistics know-how must be maintained, that logistics is second to nothing in importance in warfare, that logistics training must be widespread and thorough.…

—Vice Admiral Robert B. Carney, USN

The Air Force categorizes and recognizes FMSE as a collection of components instead of a comprehensive system. This fundamental shortsightedness in understanding and maintaining the equipment lies at the heart of FMSE degradation because, in actuality, it is used as a system. This section divides the discussion of FMSE into four areas: management, equipment, training, and funding. These areas,

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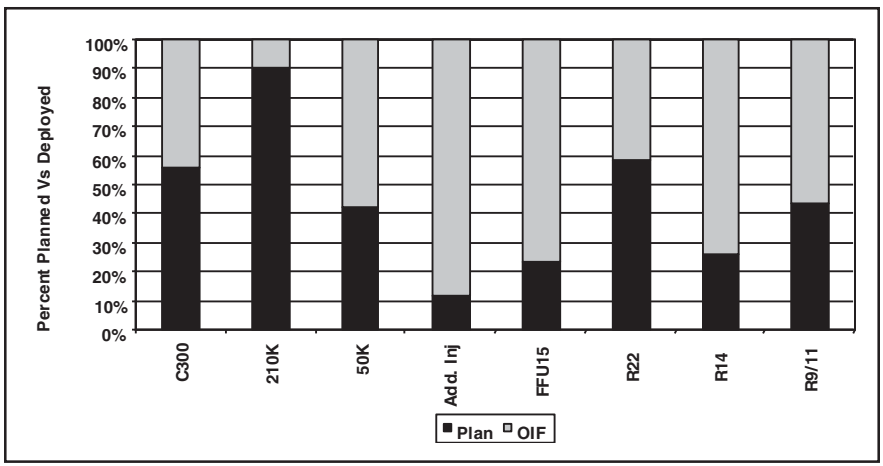

Figure 1. Percent of FMSE Required Above Deliberate OPLAN[4]

Future of Deployed Fuel Capability

when taken in concert, define the fundamental problems facing the Air Force with FMSE and the mobile fuels follow-on system.

Management

The lack of centralized management for FMSE inevitably led to additional problems because, if it were a system, it would have received its own annual budget to cover critical responsibilities such as replacement parts, regular maintenance, upgrades, and so on. Another problem directly related to FMSE's long-term upkeep arises from the fact that a program manager does not exist. A program manager provides critical care to the life cycle of a product. The Air Force describes a program manager as one who:

A program manager provides critical care to the life cycle of a product.

> Performs program management functions. Manages tasks associated with engineering, program control, configuration management, test, manufacturing and quality assurance, and integrated logistics support. Responsive to user environment, concerns, and requirements. Coordinates with users to translate operational requirements and system design into definitive subsystem and equipment acquisition programs. Manages program progress to ensure availability of operable and supportable subsystems and equipment. Makes changes to acquisition program to achieve desired outcomes.[7]

The lack of this position critically impacted the life cycle of FMSE. As a system, the program manager uses the annual budget to ensure regular maintenance on the equipment. Without a program manager or categorization as a system, depot-level maintenance never materialized. Periodic updates and modernization based on

	Forward operating location	Forward support location	CONUS
48 hours	Bombs (IOR) Fuel FMSE Shelter Vehicles	Missiles (IOR & FOR) Bombs (FOR) Repair: avionics and engines	Unit equipment
96 hours	Bombs (IOR) Fuel Shelter Vehicles	Bombs (FOR), FMSE Repair: avionics and engines	Unit equipment Missiles (IOR & FOR)
144 hours	Fuel	Bombs (IOR & FOR) Repair: avionics and engines Shelter Vehicles	Unit equipment Missiles (IOR & FOR) FMSE

Deployment times and distances are based on Southwest Asia. FOLs are assumed to have adequate runway and ramp space. FMSE = Fuel Mobility Support Equipment.

Figure 2. Supporting Expeditionary Forces[6]

technology from the civilian sector rarely occurred because neither the funding nor the impetus for modernization existed. The AFPET study specifically identifies Iraqi Freedom as an example of poor management's creating the need for emergency buys.

> In summarizing the FMSE life-cycle sustainment program during the last 35 years, it has been a reactionary, shot-in-the-arm approach with emphasis on buying individual components without consideration for a system approach of improving capability or ensuring all components remain compatible with each other.[8]

Since there is no single manager of the equipment, functional and geographical commands determine their own method of handling and maintaining the equipment. The management of FMSE varies widely among commands. These differences are attributed to the diverse missions of each command and their dynamic environments. To make funding available for FMSE, the commands categorize it as WRM. Therefore, WRM budgets fund the maintenance of the equipment. Unfortunately, over the last several years, the Air Force chose to cut WRM funding significantly. For example, the Air Force reduced United States Air Forces in Europe's (USAFE) WRM budget for fiscal year (FY) 2003 initially by 50 percent from the previous fiscal year. These cutbacks forced each base within USAFE to reallocate funds or cancel scheduled projects funded with WRM funds. Royal Air Force (RAF) Mildenhall is a specific example of how the WRM budgeting process impacted FMSE.

In FY03, RAF Mildenhall requested $20K for WRM maintenance. However, at the beginning of the year, the base received zero dollars because of budgeting curtailments. At the end of the year, the Air Force finally allocated to the USAFE WRM manager some money for WRM. RAF Mildenhall ended up receiving $12K of the original $20K calculated to fund its WRM programs. Although the base ended up with some WRM funds, the money came late in the fiscal year and prevented the base from conducting year-round maintenance. For FY04, RAF Mildenhall asked for $32K; however, its has received zero dollars and is not expected to receive any funding this fiscal year.[9] This type of budgetary process injects volatility into FMSE's upkeep and never guarantees the equipment will be ready when needed because maintenance funds are not a sure thing.

The shift of allocated funds provides the possessing command the ability to increase the dollar amount applied to the maintenance of the equipment.

In addition to WRM funding shortages, some commands, such as US Central Command (CENTCOM), experienced near continual real-world operations and, consequently, pulled its equipment out of WRM storage. Since the equipment supports contingency deployments, it now falls under a different fiscal category, and this allows the command to maintain the equipment with O&M funds.[10] The shift of allocated funds provides the possessing command the ability to increase the dollar amount applied to the maintenance of the equipment. While this is a definite boon for the sake of FMSE, its use of the equipment also increased significantly because of operation demands throughout the world.[11]

The increased use of FMSE inevitably led to system fatigue. Although no major overhauls have occurred on FMSE, over the years, users have made minor

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adjustments to the setup. These upgrades and improvements were made across the board, as well as by individual commands and by individual users. For example, during both Enduring Freedom and Iraqi Freedom, extra pumps added across the pipeline helped to overcome pressure difficulties over longer distances.[12] These improvements enhanced the short-term life and usability of the equipment but did not prolong the usable life of the entire system. Equipment also was added to meet mission requirements. This directly impacts the number of persons needed to work and maintain the equipment. Technological improvements on the system might lead to better components and require less manpower in the process. The improvements served as stopgap measures for particular requirements instead of long-term operational capability of the system as a whole.

FMSE remains the primary means of providing fuel support in the CENTCOM area of responsibility.

Equipment

The lack of an oversight responsibility led to unintended use, or at least a significantly different use, of FMSE. The Air Force originally intended FMSE to be used to support tactical field forces. Lessons learned from the Korean conflict and Cuban missile crisis demonstrated the need for tactical and mobile equipment for POL support.[13] The Air Force needed the ability to move into a location containing no or minimal POL facilities and equipment and support operations quickly. More specifically, the Cuban missile crisis demonstrated the need to provide POL support during a crisis situation and within a littoral area. This function epitomized the multiservice integration of POL equipment by providing POL support to Army and Marine units in coastal areas where robust Air Force fuel facilities might not be available.

During the beginning of the Vietnam conflict, the Air Force's first mobile fuels system directly supported operations in the sea echelon areas for the Army, Navy, and Marines. From these experiences, the specific requirements for FMSE evolved gradually to meet the tactical needs of the military. Over time, but particularly in the post-Cold War era, the requirement expanded into an operational need even though FMSE was designed to give tactical support and only minimal operational support.[14] The military needed POL equipment that supported long-term sustainment of forces and military operations. The US military continues to enter austere locations and tends to operate out of them for long periods. For example, FMSE remains the primary means of providing fuel support in the CENTCOM area of responsibility. FMSE, therefore, evolved into operational deployment equipment, not just tactical mobility equipment. The AFPET/Radian study specifically references Iraqi Freedom's extremely large fuel mission as proof of the increased demands placed on FMSE. Figure 3 represents a snapshot of March 2003 through April 2003, which coincided with the start of operations in Iraq.

The study asserts that FMSE was not designed to support such large sustained operational deployments. Unfortunately, modifications to the equipment were never made to accommodate this change of employment. Instead, the equipment continues to be used for long-term operations, despite its original design and purpose. This

change in employment procedures meant the equipment would be used more than it was designed to do and over a longer period.

Although the overall design of FMSE did not change to account for the mission change, some minor changes were made that incorporated technological advances as the Air Force moved toward an expeditionary force. For example, POL personnel initially stored bulk fuel in metal drums and tanks. Over the years, the Air Force transitioned from hard container storage to collapsible bladders made of heavy fabric rubber. Over time, fabric tanks replaced the rubber bladders because they weighed less and could be rolled up for transport.[16] This minimized the logistical footprint of POL equipment and allowed it to be taken to more locations, quickly and easily.

Training

The training philosophy for FMSE illustrates the piecemeal fashion with which the Air Force approaches the subject. Training on the Air Transportable Hydrant Refueling System (ATHRS) and Aerial Bulk Fuel Delivery System (ABFDS) is conducted through at a separate, advanced training course instead of being integrated during the technical training required of all POL troops. Senior Master Sergeant Robert McGonagle, Air Force Logistics Management Agency (AFLMA), led an indepth study of POL training issues.[17] The study found that the Air Force did not design the training course efficiently, resulting in more money being spent to train fewer students. It also pointed out that the physical location of the advanced course prevented training of more students. The two courses train 231 students on ATHRS and 49 students on ABFDS each year. These relatively few individuals then return to their units and are expected to provide supervision at home, as well as deployed locations. The lack of extensive training throughout the POL community means that operational requirements stretch trained experts very thin across the Air Force.

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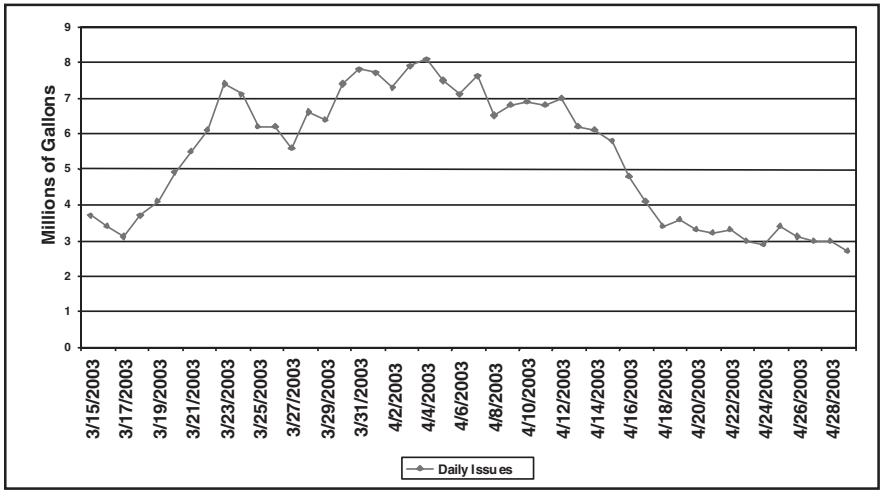

Figure 3. Daily Issues for Iraqi Freedom[15]

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Funding of FMSE equipment constitutes the largest problem area in the POL arena.

Air Force POL experts addressed this training deficiency recently by consolidating the advanced courses at a central location. The AFLMA study identified five training options.[18] One option recommended the relocation of the advanced POL courses. The ATHRS and ABFDS courses were located at MacDill AFB, Florida, and Yokota AB, Japan; however, they are being relocated to Sheppard AFB, Texas, to be collocated with the basic fuels apprentice school. The relocation of the courses should maximize training for more people and increase the aggregate skills of deployed POL troops. This was an important step as bases have increased in number, directly impacting the required number of skilled FMSE persons. As the number of nonpermanent bases increases, the requirement for FMSE-skilled personnel increases as well.

One significant training issue, frequently overlooked throughout the research, deals with the maintenance of FMSE equipment. Previously highlighted were the training deficiencies of POL troops, which is where all FMSE research is focused. One important aspect associated with FMSE upkeep relates to vehicle maintainers, who fall in a different functional area within the logistics community. Technical Sergeant William K. Tadlock, noncommissioned officer in charge of refueling maintenance at an undisclosed location in support of Enduring Freedom, stated "One of my mechanics, a young airman, has never seen an Oshkosh R-11 [a common FMSE fuel vehicle], as his home station has the new Kovatch R-11."[19] Staff Sergeant Carlos Simpson, 319th Vehicle Maintenance, further identified training issues on other FMSE equipment such as R-9s, R-14s, and R-22s because of age and almost exclusive use in a deployed environment.[20] While some may not think there are significant differences between trucks, many differences between the new and old systems exist, and it takes both time and training to learn the intricacies of a particular type of vehicle. These peripheral training issues need to be addressed throughout the Air Force as resources increasingly are stretched to their limits and there are fewer persons to do the job.

Funding

Funding of FMSE equipment constitutes the largest problem area in the POL arena. As the Air Force Fuels Policy Superintendent stated, "Unfortunately it's difficult to determine how much is spent on 'maintenance' of FMSE because the funding is not centralized and FMSE maintenance, in most cases, is rolled into a larger WRM maintenance contract."[21] Contemporary discussion of the issue by high-level administrators points to the importance of funding issues with regard to FMSE. Deputy Secretary of Defense Paul Wolfowitz, in a statement to the House Appropriations Committee, said:

> In sum, the urgency of wartime requirements necessitates greater flexibility than normal peacetime practices allow. Combatant commanders have broad flexibility in how they allocate fuel, spare parts, or ammunition. They can shift these resources rapidly between individual targets and entire missions as needed. We need to be as agile with funding as we are with combat assets.[22]

Such attention concentrated on funding issues bodes well for the future of FMSE. Without dedicated funding for FMSE, the future of the system's survival comes into doubt because of use beyond its original design. With increased use come increased costs. Currently, the MAJCOMs finance FMSE with a combination of WRM and O&M funds. While this enables the system to remain viable, it hampers system-wide improvements and shifts responsibility for the maintenance of components to the user instead of a central administrator. This encourages users to fund the program just enough to keep it going but offers no incentive to modernize or integrate components with the other services. This idea ties directly back to the mismanagement of the program through decentralized responsibility.

Findings and Potential Solutions

My logisticians are a humorless lot...they know if my campaign fails, they are the first ones I will slay.

—Alexander the Great

FMSE faces three critical hurdles that must be addressed to ensure the long-term survivability of the system. First, experts alluded to the absence of a program manager as the root of larger systemic problems. Second, the lack of specific funding for equipment threatens the continued existence of FMSE as a viable mobile fuels capability. Third, the lack of widespread training limits the flexibility of leaders to use FMSE fully and ensure maintenance is first-rate for equipment survivability.

The lack of a program manager is at the root of FMSE's problems. The establishment of a program manager serves as a starting point for the resolution of the rest of FMSE's problems. A program manager provides oversight for the entire system at a macrolevel instead of leaving maintenance and improvements to the user. The consolidation of control and responsibility means funding and training will be addressed across the commands and will, in turn, benefit all the users and bring about FMSE's much-needed replacement.

The consolidation of control and responsibility means funding and training will be addressed across the commands and will, in turn, benefit all the users and bring about FMSE's much-needed replacement.

The Air Force needs to upgrade its FSME capability, and this only will happen with a dedicated budget to FMSE's replacement. Restructuring the budgetary process of FMSE means dedicated maintenance, modernization, and replacement funds will be used to ensure long-term productivity and future mobile fuels capability. This further ensures that the United States is able to maintain its technological edge. Only a few design and technological changes were made to FMSE equipment despite changes in the overall use of FMSE from a tactical level to an operational level. Large advancements in technology were made within the civilian POL community, but few of these improvements ever showed up in the Air Force POL community. The other services continue to make extensive advances as well. For example, the Army, in conjunction with the National Automotive Center, recently began pursuing synthetic fuel to get cleaner and cheaper energy that meets JP-8 specifications. In an effort to move toward a single fuel source at deployed locations, they are researching the impact of JP-8 on equipment because of its high

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sulfur content. These examples describe only a small fraction of the innovations occurring in the POL community.[23] Taking advantage of civilian and the other service's improvements minimizes the Air Force's initial investment costs and maximizes capability. Historically, the Air Force has failed to capitalize on the others' advancements. Taking advantage of these improvements provides a secondary benefit by facilitating interoperability and integration among the Services.

With increased interoperability comes the need for better and more diverse training. Current training practices separate FMSE training from basic POL functions. Fortunately, the Air Force chose to relocate the courses to place the advanced FMSE training with the basic courses. Depending on the ability of the courses to handle more students, this relocation makes FMSE training accessible to more people. With more trained individuals available, leaders enjoy more flexibility and resources with which to manage their FMSE. Widespread training means a more varied range of experience and capability exists at both deployed locations and home station. The Air Force is evaluating the type of training, balanced between classroom and hands-on training, to determine the most efficient and effective training.[24] With better training comes increased ability for personnel to operate under a variety of environments and with increased adaptability. This increase in abilities benefits all the Services because well-trained, experienced POL troops can facilitate interoperability by maximizing the capabilities of the system. Increased training requires increased funding as well. The establishment of a program manager initiates the bureaucratic process of increased funding and subsequent training for more persons.

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Conclusions and Recommendations

If there is one attitude more dangerous than to assume that a future war will be just like the last one, it is to imagine that it will be so utterly different that we can afford to ignore all the lessons of the last one.

—MRAF Sir John C. Slessor

Given the findings of the research, the Air Force should pursue new deployable fuels equipment. It also should evaluate, in detail, costs and benefits associated with the current FMSE to ensure the new equipment meets the combatant commanders' and MAJCOMs' requirements.

There should be a central program manager for FMSE. The Defense Energy Supply Center (DESC) seems the logical choice for FMSE oversight because it already has responsibility for overseeing the allocation of energy resources within the DoD. DESC's expanded charter should include, as a minimum, the development of FMSE improvements and an eventual replacement; tracking lessons learned; directing the use of FMSE at the tactical, operational, and training levels; and promoting interoperability among the services. DESC has all the necessary regulatory and bureaucratic authority because its mission is to:

> …build an energy program aimed at moving the Department of Defense out of the management of energy infrastructure and into the management of energy products…DESC, despite changes in organization structure and expanded mission, continues its basic mission to support the warfighter and manage the energy sources of the future.[25]

DESC already covers the entire DoD spectrum and allows us to become integrated at the joint level, not just at the Air Force level. If DESC fails to accept the responsibility for standardizing fuels equipment and procedures to ensure interdependence across the services, AFPET should accept the task. AFPET could, at a minimum, ensure clear and consistent guidance across the Air Force. It also should take a step further and be the single voice of the Air Force and closely coordinate with the other services to ensure all are working toward the same goals. By formally designating DESC as the chief FMSE manager, the components become a de facto system. FMSE as a whole should not be considered as solely WRM equipment. Instead, it should be viewed as an equipment system and categorized as WRM when it is required to be stored and prepositioned to support OPLANS.

Several key steps need to be taken, in addition to the commitment of revamping outdated equipment. First, FMSE must be identified as a critical element in the Air Force's expeditionary requirements and, thus, identify it as its own system. Its status as a WRM asset relegates FMSE to component status because it theoretically remains in storage until needed and then returns to storage. In actuality, this has not happened. The equipment has been deployed and set up in permanent fashion around the world.

AFPET could, at a minimum, ensure clear and consistent guidance across the Air Force.

Although it is DESC's overall responsibility to oversee all phases of POL planning and delivery, there are instances where DESC will not be able to deliver fuel, in particular, to remote and austere locations. However, joint petroleum doctrine dictates that service POL will be interdependent. The following excerpt articulates the need for increased capability on the part of POL personnel and equipment:

> In many cases, DESC can have fuel delivered to the point of end use. But in some cases, such as extremely austere environments, delivery this far forward may not be possible. It is very unlikely that contractors will be able to provide JP8 or JP5 to an operational area during the earliest stages of an inland-based operation. Therefore, it is imperative that services participating in land-based operations (primarily Air Force and Army) have the capability to inject needed additives into commercial jet fuels until DESC can arrange delivery of JP8, JP5, or contract support for additive injection.[26]

The military needs to maintain the ability to fill in when this situation arises. Specifically, the Air Force, Army, Marine Corps, and Navy POL communities must work hand in hand during the initial stages of a deployment. Joint Publication 4-03 specifically states that the Army needs to be responsible for nondivisional supply units, the Marine Corps for bulk fuel companies, the Air Force for base fuels flight capability, and the Navy for the construction force (Figure 4).[27]

The Air Force must be able to move into an environment that contains minimal or no POL facilities and equipment and support operations quickly. More

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The Air Force must be able to move into an environment that contains minimal or no POL facilities and equipment and support operations quickly.

specifically, the Cuban missile crisis demonstrated the need for providing POL support during a crisis situation and within a littoral area.

As stated earlier, these situations have increased dramatically since 11 September 2001. These scenarios only highlight the need of the Services to ensure seamless interdependence. Any change in equipment must be coordinated closely with the other services. Continued interdependence is not the sole reason. While the initial desire is to ensure continued support to the combatant commander, we should also ensure that we are making the best product for not only today's environment but also tomorrow's environment. This prevents two things. The first is possibly not supporting or meeting the combatant commander's requirements. If we design and build equipment that would later hinder our ability to work productively in a joint environment, we could be creating a detrimental effect on our joint ability to provide POL support and, thus, impact the overall mission success. The second is mismanagement of funds. If our design does not allow interdependence with the other services, more funds will have to be allocated to fix the problem at a later date.

This demonstrates the need to provide critical oversight and management of an essential agile combat support (ACS) requirement. Any new equipment must take into consideration all the variables that could affect the ACS capability. Some key factors that should be considered are:

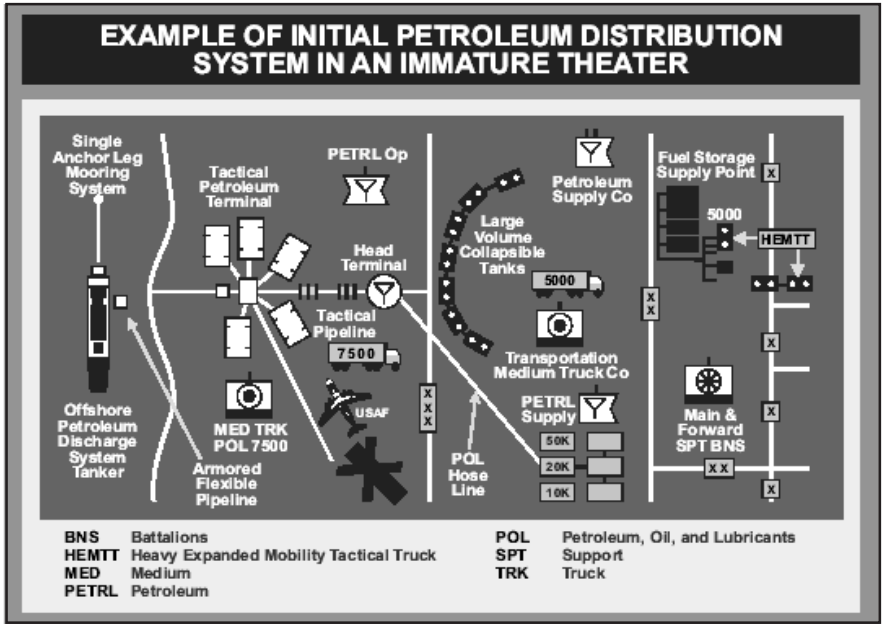

Figure 4. Example of Joint Interdependence[28]

- Operational options for force composition, employment time line, and operational tempo to achieve the desired effects;
- Forward operating location capabilities, including infrastructure and resources, as well as the political and military risks associated with prepositioning resources at specific locations;
- Technology options affecting performance, weight, and size of test equipment, munitions, support equipment, and other support resources and processes;
- Resupply time, particularly as it affects initial operating requirements and follow-on operating requirements;
- Alternative support policies, such as conducting repair operations at deployed or consolidated support locations; and
- Strategic and tactical airlift capacity.[29]

Future leaders must take into consideration the overall objectives of ACS and determine what advances to invest in POL expeditionary support. Designers and developers must ensure the new equipment addresses the large movement and footprint status of the FMSE. During the design phase of FORCE, the size and weight of the equipment should be considered. Radian already identified a comparison between FMSE's airlift footprint and FORCE's potential airlift footprint (Figure 5). Reduced airlift footprint can be supported further by ensuring FORCE is designed under a modular concept.

Future leaders must take into consideration the overall objectives of ACS and determine what advances to invest in POL expeditionary support.

Modularity provides leaders and logisticians with key capabilities such as adaptability and flexibility. Adaptability provides decisionmakers with more options. The dictionary defines adaptability as "capable of being adapted" and as an adjective "capable of adapting (of becoming or being made suitable) to a particular situation or use."[31] Adaptable equipment responds to the user's needs during a wide range of situations and scenarios. Adaptable equipment allows matching and modification to components and situations without making any actual alterations to the equipment, while still meeting the original goal or mission. Adaptability goes hand in hand with flexibility, although there is a slight and important distinction. Flexibility refers to the degree in which a system responds to change.[32] It is vital that adaptability and flexibility be incorporated into the equipment design early on in the process to promote greater variety and possibilities. The Army used adaptability and flexibility successfully when it realigned its supply and fuel units:

> An innovative approach to getting the fuel to the hospital's power units involved removing the drain-off valve from the bottom of the 10,000-gallon tank and replacing it with a 4-inch elbow outlet. This simple modification permitted the feeding of the fuel through a 4-inch hose line by gravity to the power units. The use of hose lines in that manner can be accomplished in a produce manner with aviation units.[33]

More options are provided to logisticians with equipment that provides few restrictions. A design based on modular concept further supports the concept of

Future of Deployed Fuel Capability

Standardization reduces unforeseen problems if all players know exactly what they are dealing with.

increasing mobility capability by increasing airlift options because modular design goes hand in hand with smaller parts, which means logisticians have more options for shipping the equipment to the warfighter.

One consideration relates to the logistical footprint of the new system. Currently, the logistical movement, whether airlift or sealift and deployed footprint of FMSE, is significant. It should be designed so every single component could fit on a standard C-130 aircraft. This ensures that the equipment can be transported to virtually any location in the world. In addition, this standardization of cargo size will facilitate planning options should the equipment need to be transported by naval assets or over land with army assets. Standardization reduces unforeseen problems if all players know exactly what they are dealing with. Limiting the physical size of any one piece of equipment also reduces the footprint should the equipment need to be moved from one location to another.

The next design consideration should take into account the lessons learned from FMSE. One item might be to overdesign the system to be used constantly in an operational environment instead of tactically. The benefits of an operational, versus a tactical, design far outweigh the costs because the converse could mean the Air Force would have to get new equipment sooner. By designing equipment to last for a long time, the initial and most expensive cost of development and procurement is spread out over a longer timeframe. This minimizes the per unit cost over the life cycle of the product. Also, the Air Force should take full advantage of available technology to reduce the manpower required to operate the equipment. Manpower

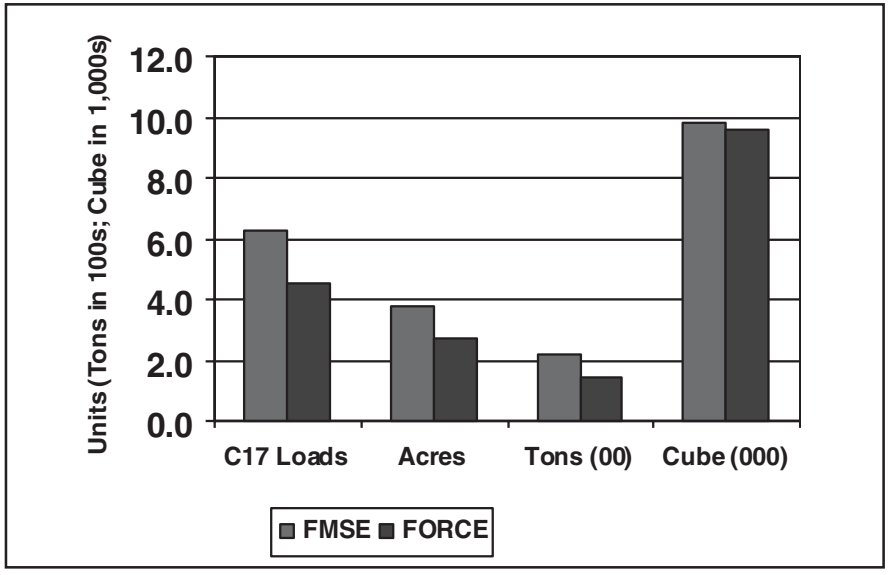

Figure 5. Airlift and Footprint Reductions[30]

constitutes the most expensive and resource-intensive element of any operation. Eliminating the need for more people means scarce resources can be devoted to other mission-critical areas.

A critical aspect of 21st century system development should be interoperability. Interoperability translates into jointness, and jointness is the future. Few, if any, operations are conducted under the auspices of a single service. In fact, operations are increasingly reliant on allied cooperation. For this reason, FORCE must include the capability to be made compatible with the other services and US allies. Any new equipment must take into account the Air Force's role within the joint and coalition deployed community.

Looking to the systems of the North Atlantic Treaty Organization (NATO) partners is probably the most reasonable level of interallied interoperability. The core components of the system should be based on a design that ensures a long lifespan for the equipment. However, components at the ultimate point down the line should be modular to facilitate integration. For example, receptacles should be made to accept lots of various adapters to fit any fuel equipment in the NATO inventory. It is imperative that modular design be used to ensure interoperability, as well as pave the road for future upgrades. Modular designs allow upgrades to come incrementally and at a smaller cost than replacement parts would. With the prevalence and reliance on technology, modular design may mean increased capability at only the cost of a software upgrade, when, in the past, it would have required a new piece of replacement equipment. It is this type of conceptual thinking that the Air Force must demand from its next generation of mobile fuels equipment as the Air Force moves to become an expeditionary force. As the Air Force becomes a lighter and more mobile force, interdependence on the other services and US allies becomes a must. Their reliance on us also increases. That is why equipment must be adaptable to a variety of environments and customers.

As the Air Force becomes a lighter and more mobile force, interdependence on the other services and US allies becomes a must.

A problem area that must be avoided is the use of a single supplier for FORCE components. The Air Force must insist on multiple suppliers' being used to preclude the bottleneck of goods should a supplier encounter problems or be unable to provide the prescribed products. Frequently, the Air Force finds itself waiting on goods because the supplier cannot produce them fast enough. Procuring goods that already exist on the market or designing goods easily produced with current technology is the best way to ensure the constant flow of goods and greatest chance of innovation. If the components are used on the open market as well, the impetus of profit will drive innovation. This allows the Air Force to capitalize on improvements without the cost of internal research and development.

There is an obvious balance that must occur in order to achieve the right balance of logistics footprint, survivability of FORCE, and capability. Figure 6, produced by RAND, which discusses the strategic and long-term planning for the ACS and mobility system, illustrates notional tradeoffs that should be considered between capability and technology.

Future of Deployed Fuel Capability

Although jungle environments greatly influenced the original design of FMSE, desert environments constitute the preponderance of the operational environments today.

Multiple issues must be considered to determine the best balance of requirements for the final product. In addition to movement requirement and logistical footprint, a few other items that must be taken into consideration are expeditionary time-line requirement, cost, impact to support requirements, and repositioning costs. Another issue that must be decided is what terrain should the equipment be built for? For example, FMSE was designed to be used in the terrains of Vietnam, yet the majority of FMSE today is used in Southwest Asia. Therefore, although jungle environments greatly influenced the original design of FMSE, desert environments constitute the preponderance of the operational environments today. This dramatically impacted the maintenance of the equipment and its use. A decision must be made on which terrain to base the design for the vehicles, based on where leadership thinks future deployments will be. Decisionmakers will need to determine which criteria are most important and strike the proper balance.

The demand and requirement to replace FMSE is evident. The Air Force needs to ensure it addresses all the LIMFACS and shortfalls that it faces. In order for the Air Force to produce the best new fuels mobility equipment possible, it must take a few steps. Assigning a central manager and viewing the equipment as a system will provide much needed focus and leadership. It will ensure that the Air Force and equipment support interoperability and interdependence with the other services. New equipment allows the Air Force to take advantage of the many technological

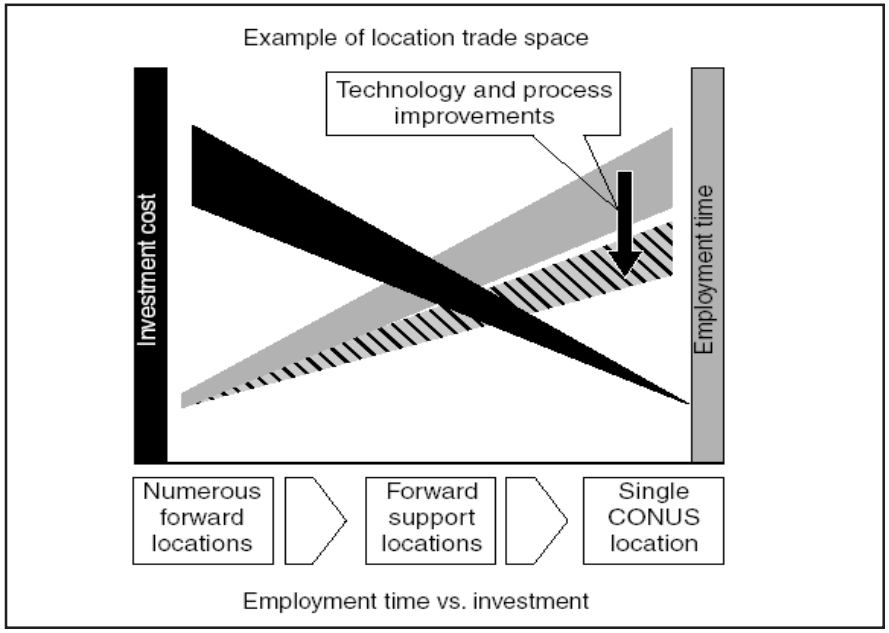

Figure 6. Notional Tradeoff Analysis[34]

advances available in the POL community. These advances would, in turn, support the requirement for a smaller logistical footprint, modularity, and survivability in harsh environments and during prolonged use. The advantages of investing in new mobile fuels equipment cannot be understated when compared to replacement costs and, even more important, when compared to the necessity that dependable, capable fuel equipment be available around the world.

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The Failings of Steady-State Base-Support Planning in Sub-Saharan Africa

Introduction

I need to bed my forces down, and I need to know all this stuff about it.... I don't want to arrive to find my tent city where my bombs have to go.

—General John P. Jumper

With the changing global realities of the 21st century, particularly the disappearance of a multipolar environment in which spans of control (United States versus the Soviet Union) could be relatively assured and the perpetuation of nonstate actors such as Al-Qaeda and Hezbollah, the Department of Defense is faced with a new challenge in meeting national security objectives. Among those objectives, the desire to promote regional security is of particular interest and a great challenge in the unstable political and social environments of Africa. The security challenges faced in Africa range from defeating the emergence of terrorist factions in West Africa and the Pan-Sahel Region as part of the Global War on Terrorism to the destabilizing effects of rapid population growth and epidemic HIV/AIDS infection rates in Southern Africa to the 5-decade trend of political tyranny and instability that has ensued since the end of European Colonial rule in the 1960s and 1970s.[1]

While, historically, US military operations in Africa have been confined largely to noncombatant evacuation operations and humanitarian operations such as Operation Support Hope (Rwanda, 1994) and Operation Atlas Response (Mozambique, 2000), that approach has matured to include increased focus on security assistance matters in the form of multilateral training and operations such as Exercise MedFlag (Uganda, 2002), the Pan-Sahel Initiative (Mali, Chad, and Niger, 2003-4), and Joint Task Force—Liberia (West Africa, 2003). The desire to

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From the perspective of effective global mobility, the challenge of accessibility is at the forefront of planning considerations when preparing for deployment to and subsequent employment of air assets in Africa.

promote regional security has ignited new interest in Africa-based operations and promises an array of new challenges.[2]

From the perspective of effective global mobility, the challenge of accessibility is at the forefront of planning considerations when preparing for deployment to and subsequent employment of air assets in Africa. Despite the vastness of a combined 56 nations, quality operating locations are few and far between, limited in capability, and often inaccessible as a result of political considerations. Among those political considerations is a lack of democratically elected governments; abysmal human rights records; and more recently, failure on the part of many African nations to sign Article 98 Agreements, legally waiving their right to grant International Criminal Court jurisdiction over US citizens.[3] Further complicating the use of accessible airports is degraded or absent infrastructure in the form of usable roads, hospitals, hotels, and other forms of subsistence. Finally and of great significance is an unpredictable security situation. All told, 23 African nations are engaged in some sort of armed conflict, and two have no central government.[4] Thus, accessibility and usability hamper both deliberate and crisis-action planning.

Despite the regional instability in Sub-Saharan Africa, the European Command (EUCOM) is aggressively engaged in battlespace preparation in that area of responsibility (AOR). As directed in the EUCOM Theater Engagement Strategy, base-support planning is the preferred method of identifying and assessing operating locations for future engagements. Base-support planning is a multifaceted capability evaluation executed by a team of US military personnel. Among the areas evaluated during the process, runway/taxiway/parking ramp condition and usability are of primary importance. The operation's surface assessment is complemented by evaluations of fuels, crash, and fire rescue; air traffic control; facilities; and security capabilities inherent in the location. Assessment requires significant coordination and assistance from both the host-nation authority and the US Diplomatic Mission (to include the Defense Attache Office). Completed assessments are reviewed and stored for future use. Each assessment currently has a period of 2 years, but resources and accessibility often limit the frequency with which these assessments can be updated. Nevertheless, EUCOM and its service components (principally, Headquarters United States Air Forces in Europe [USAFE]) maintain the base-support plans for nearly indefinite periods of time. Base-support plans, when not conducted in conjunction with a specific operation, will be referred to as off-the-shelf base-support plans.

Ironically, for the very same reasons that EUCOM is actively involved in Sub-Saharan Africa planning (that is, rampant political instability, degraded economies, epidemic humanitarian need, a growing terrorist network, and general unpredictability), the off-the-shelf base-support plan quickly loses operational endurance, or more frequently, there is no base-support plan to complement that particular planning requirement.

This article evaluates EUCOM strategy, specific to base-support plans, in Sub-Saharan Africa. Specifically, the research seeks to identify pertinent trends of

operational endurance (focusing specifically on Joint Task Force-Liberia [JTFL]) and determine how well (or poorly) off-the-shelf base-support plans have supplemented planning efforts in this AOR. Further to that effect, this research was focused on how site selection assessment (focusing specifically on JTF-L) in this dynamic political and social environment has helped or hindered planning efforts. A broader (continental) study of political and social demographics has been conducted to complement the research to specific cases of site selection.

This research was conducted to chart a future course for Expeditionary Site Planning Concepts of Operation, *with particular focus on the timing of base-support planning operations in concert with physical site selection*. The outcome of this study supports presentation of factually based recommendations as to whether or not it is advantageous to select and assess operating sites in advance when there are strong indications that the site will be used in a military operation. Simply stated, the culmination of this research defines a recommendation to EUCOM on the *when and where* of future site assessments in the AOR.

As there has been no authority-directed study of the usable endurance of the off-the-shelf base-support plan, conclusions must be drawn from the actual facts surrounding the JTF-L operation and the study of Pan-African trends.

Part I—Joint Task Force-Liberia

Background

On 9 June 2003, French military units evacuated 543 persons from Monrovia, Liberia, as violence threatened to consume the capitol city.

On 9 June 2003, French military units evacuated 543 persons from Monrovia, Liberia, as violence threatened to consume the capitol city. While essential personnel remained in the US Embassy, EUCOM prepared to assist the Economic Community of West African States (ECOWAS) in deploying United Nations (UN)-mandated peacekeeping units into Liberia. Initial deployments placed assets in Freetown, Sierra Leone, and Dakar, Senegal, for the purpose of evacuating the Embassy and remaining American citizens should the situation degenerate further. As the *USS Iwo Jima* and 26th Marine Expeditionary Unit made way from the Mediterranean Sea to a location off the Liberian Coast, additional US military members were dispatched to Dakar to establish an airlift hub to provide support to ongoing operations.[5]

The concept of operations required Air Force units under the 398th Air Expeditionary Group to support Special Operations Command, Europe assessment teams in evaluating and preparing peacekeepers from the countries of Gambia, Guinea-Bissau, Sierra Leone, Ghana, Togo, Benin, Nigeria, and Mali for deployment. The charter of these teams was to ascertain the ability of the host military units to conduct peacekeeping in Liberia and the host nation's ability to support deployment operations. Four C-130 Hercules from the 86th Airlift Wing were deployed to Dakar to ferry the Special Operations Forces to the various contributing countries and to support US evacuation forces in Freetown (Figures 1 and 2).[6]

The Failings of Steady-State Base-Support Planning in Sub-Saharan Africa

Taxiway Golf was the single means of entry and exit for the operation's allocated parking areas and, thus, of tremendous importance in supporting operations at Dakar.

Figure 1. West Africa

Dakar International Airport, Senegal

Mission planning for the operation was hindered by a lack of reliable base-support planning information. Although the mission critical Dakar International Airport had been surveyed in December 2002, conditions were not found to be as expected. Required portions of Taxiway Golf on the Joint Senegalese and French side of the airport were reported to be in *good condition* in EUCOM's April 2002 base-support plan (and *operational* in Air Mobility Command's 2003 assessment). However, a complete pavement analysis has never been conducted. Required maintenance parking stands on Taxiway Golf were described as in *good* condition in the 2002 base-support plan. However, when a modified tanker/airlift control element (TALCE) from the 86th Contingency Response Group (CRG) arrived at Dakar on 30 July, they

issued the following assessment: "Taxiway Golf at Dakar requires survey. Estimate $200K (expenditure) to bring taxiway up to operational use with an 8-centimeter overlay and subbase work."[7] Unfortunately, Taxiway Golf was the single means of entry and exit for the operation's allocated parking areas and, thus, of tremendous importance in supporting operations at Dakar.[8]

Foreign object damage (FOD) hazard for the deployed C-9 aeromedical evacuation aircraft was of particular concern to mission planners, considering the degraded state of asphalt overlay on the taxiway and allocated parking stands. This condition was contrary to the 2002 base-support plans depiction of the airport as "very clean, with little to no garbage (FOD material) observed." Despite diplomatic efforts to secure the French Air Force's parking ramp (in excellent condition and not assessed in the 2002 base-support plan), the FOD hazard would force absolutely emergency-essential use of the C-9 aircraft for the duration of the operation, limiting its potential use as a channel aircraft. Following the deployment of two airfield assessment specialists from the 86th CRG to Dakar, C-130s operations were allowed to proceed, but the FOD hazard to the C-9's jet was considered too great for significant operations.[9]

Figure 2. Senegal

Despite diplomatic efforts to secure the French Air Force's parking ramp, the FOD hazard would force absolutely emergency-essential use of the C-9 aircraft for the duration of the operation, limiting its potential use as a channel aircraft.

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The lack of an inspected source of liquid oxygen at the airport or anywhere in the capitol region would force the deployment of a 400-gallon LOX cart and supplement the unexpected need for C-130 channel missions for the purpose of resupply.

Another example of inaccurate base-support plan information relates to cargo-handling personnel and materiel-handling equipment. Despite the 2002 base-support plan's description to the contrary, aircraft servicing and materiel-handling capabilities were unpredictable and largely unavailable at Dakar and would force the deployment of a modified TALCE from the 86th CRG at Ramstein AB, Germany, to support cargo operations. A further example of failed planning information includes the 2002 base-support plan's estimate of host-nation security as *adequate*. This information would prove to be incorrect and drive the deployment of another high-demand asset, 30 Air Force Security Forces persons, to conduct flight-line security operations.[10]

The last and, perhaps, most critical example of failed base-support planning at the airlift hub in Dakar was the failure of the base-support plan to provide any information about availability of liquid oxygen (LOX).[11] The lack of an inspected source of liquid oxygen at the airport or anywhere in the capitol region would force the deployment of a 400-gallon LOX cart and supplement the unexpected need for C-130 channel missions for the purpose of resupply. While the advent of channel missions was likely a forgone conclusion as the serious nature of the crisis in Liberia became evident, LOX was not an expected shortfall.[12]

In total, the inaccuracies and confusion generated by the 2002 base-support plan created significant impact on the mission. The impact was not just felt in the unexpected requirement to supplement manpower at Dakar with some 45 persons (15 TALCE and 30 Security Forces) and requisite equipment but also in the need to schedule crucial airlift sorties and space-block cargo for the movement of those personnel and equipment, plus regular LOX shipments. Those same inaccuracies also created challenges for planners in terms of beddown of aircraft (particularly jet aircraft) and initially increased (prior to Security Forces arrival) the risk of operations at Dakar.

ECOWAS Peacekeeper Insertion

Further challenges in operations would be encountered by Special Operations Forces on assessment missions in and around West Africa in preparation for deployment of peacekeeping forces. Unlike planning for Operation Aspiring Falcon, the proposed US logistical support for ECOWAS Peacekeeper insertion in Cote D'Ivoire in November 2002, JTF-L assessment operations did not call for the completion of assessments of ports of embarkation for peacekeepers along with mandated training and deployment preparation assistance.[13] In this case, Special Operation Forces assessment teams would simply depart Dakar International Airport (IAP) for ports of embarkation in Gambia, Guinea-Bissau, Sierra Leone, Ghana, Togo, Benin, Nigeria, and Mali with a single pallet of communications and training equipment. Only upon arrival did the assessment teams request and receive off-the-shelf base-support plans for locations where they existed: Bissau IAP, Guinea-Bissau (1997); Accra IAP, Ghana (2001); Abuja IAP, Nigeria (1998); and Bamako IAP, Mali (2002). For the remaining ports of embarkation (Gambia, Sierra Leone, Togo, and Benin), no base-support plan existed.[14]

In either case, lack of timely planning guidance, maps, infrastructure information, and points of contact would limit the ability of assessment teams to engage actively with host-nation military forces and communicate requirements to the JTF in advance of deployment. According to the JTF-L Joint After Action Report (JAAR), lack of mission-oriented information of various kinds hindered capabilities of planners and liaison teams. Further, the available data were outdated. The JTF-L JAAR calls for information to be current, as data older than several months proved to be of negligible value.[15] ECOWAS peacekeepers ultimately were inserted into Monrovia, Liberia, aboard both organic and contracted airlift, and UN authorities assumed control over the operation on 1 October 2003, ending JTF-L. No US airlift was used to insert peacekeepers for the mission.

Although the concept plan for Aspiring Falcon was never executed, it was used as one of the source documents for JTF-L operations. It is not clear why the decision was made to not survey (or resurvey) airfields at the ports of embarkation at the outset of operations.

Summary

The failure of the off-the-shelf base-support plan to enhance planning and operations during JTF-L, in and of itself, calls into question the decision to continue with this program. Further, the complications created by the existing base-support plan have degraded operational planning.

Part II—Operational Settings in Africa

EUCOM Base-Support Planning

In March 2004, the Deputy Under Secretary of Defense for African Affairs briefed the EUCOM Theater Security Cooperation Conference on DoD priorities for engagement in Africa. Among the priorities mentioned in the high-level briefing were the need to "prevent establishment of/disrupt/destroy terrorist groups; stop the spread of weapons of mass destruction; perform evacuations of US citizens in danger; *assure access to strategic resources, lines of communication and refueling/forward sites*" in Africa.[16]

The concept of primary and alternate intermediate staging bases are most crucial to the selection of site for assessment.

EUCOM has addressed this crucial primary mission[17] with the use of five categories or concepts: PISB-Primary Intermediate Staging Base, AISB-Alternate Intermediate Staging Base, PSI-Pan-Sahel Initiative; AFI-Africa Fuel Initiative, and FCC-Focus Country Concept.[18] Based on these concepts, sites are selected by EUCOM and tasked to the service components for survey.[19]

The concept of primary and alternate intermediate staging bases are most crucial to the selection of site for assessment. To qualify as a PISB or AISB, the host nation must be on friendly terms with the US Government, be an Article 98 signatory, and possess airfield capabilities that complement airlift operations. Some consideration also is paid to the locations of these countries with respect to *hot spots* in Africa.[20]

Unfortunately, EUCOM's steady-state base-support plan program failed to account for instability that leads to lowered or negligible operational endurance of base-support plans (Table 1).

The Failings of Steady-State Base-Support Planning in Sub-Saharan Africa

The advantage of the crisis-action survey is the fact that it is both tailored to specific mission requirements and has maximum operational endurance.

Crisis-Action Site Assessment

Despite EUCOM's desire to accomplish base-support plans as part of a steady-state program, there are regular occurrences of crisis-action assessments being used to support real-world operations. Oftentimes, surveyed locations are either too far from the proposed operation location or unavailable for political or operational reasons. While these surveys are time-sensitive and often accomplished in uncertain environments, they yield a viable survey, nonetheless. The advantage of the crisis-action survey is the fact that it is both tailored to specific mission requirements and has maximum operational endurance. Maximum endurance is paramount in crisis-action planning, and EUCOM possesses the assets (86th CRG, 352d Special Operations Group, Southern European Task Force, and 86th Airlift Wing) to provide this capability at a moment's notice. Crisis-action surveys give the planner and warfighter excellent informational fidelity and greatly reduce the chance of encountering unexpected shortfalls.

An example of the success of a crisis-action survey occurred in June 2002, less than 3 months before the beginning of Exercise MedFlag 02 in Uganda. Personnel were dispatched to a remote airfield in Soroti, Uganda, to survey that operating location as a proposed forward staging base for the exercise. During that assessment, the capabilities of that location were determined, and it was learned that there was no operational materiel-handling equipment in place. This time-sensitive information was leveraged to ensure that all cargo to be moved into Soroti was packed in a triwall container so it could be downloaded by hand.[22]

Furthermore, often it is deemed necessary to resurvey sites (at considerable cost and risk) to ensure they are usable, even when a current off-the-shelf base-support plan exists. Findings often dictate that information in the base-support plan is incorrect or confusing, as was the case in Dakar during JTF-L. Unfortunately, aircraft began arriving in Dakar before an assessment could be completed and a more suitable alternate location sourced for use.

A second example of a successful crisis-action survey occurred in Libreville, Gabon, West Africa, in June 2002. As a Third Air Force exercise planning team returned from South Africa, it was determined that a reassessment of Libreville should

Primary Intermediate Staging Bases	Alternate Intermediate Staging Bases
Libreville, Gabon	Luanda, Angola
Entebbe, Uganda	Yaoundé, Cameroon
Lusaka, Zambia	N'Djamera, Chad
Dakar, Senegal	Gabaronne, Botswana
Accra, Ghana	Maputo, Mozambique
Abuja, Nigeria	Bamako, Mali

Table 1. Primary and Alternate Intermediate EUCOM Staging Bases[21]

be made (in conjunction with an overnight fuel stop) to determine the operational endurance of the base-support plan that had been written in 2001. Libreville had been identified as an ISB for aircraft transiting from Europe to South Africa in support of Exercise Southern Comfort. It was fortuitous that this reassessment occurred. Upon completion of a rudimentary surface assessment, it was determined that parking areas allocated to US aircraft were incapable of supporting operations.[23] At the microlevel, this sort of unpredictability is likely the result of poor maintenance and misuse of resources by the host nation. However, when taken in conjunction with the overall unpredictability of governmental and societal trends in Africa, the greater issue of lack of endurance is highlighted.

Political and Social Instability

Sub-Saharan Africa remains one of the most politically instable regions on the planet. Paramount to understanding the challenges facing the region is the knowledge that most of the subcontinent gained independence from colonial rule less than 50 years ago. In concert with that independence have been an almost constant string of wars, revolutions, and humanitarian crisis. Democratic reforms have taken root in many African nations, but movement toward transparent, multiparty government, a free and open press, and protected human rights remains a slow process. Some of the consistent problems are religious, ethnic, and tribal divisions, along with widespread poverty and economic decline.[24]

Sub-Saharan Africa remains one of the most politically instable regions on the planet.

Primary among Africa's stability issues is the continent-wide threat of internal and external conflict. Potential armed conflict ranges in severity for ongoing civil or cross-border conflict to a potential for violent political or social unrest. In total, 19 of the 38 countries in Sub-Saharan Africa are detailed in EUCOM's WATCHCON as having the potential for crisis. Listed in WATCHCON II (Probable Crisis) are Liberia, Burundi, Cote D'Ivoire, Sierra Leone, Democratic Republic of the Congo (formerly Zaire), and Uganda (EUCOM-designated host PISB).[25] Entebbe IAP, Uganda, hosted a base-support plan operation in 2002 and is scheduled to host another one in April 2005.[26] On 12 April 2004, it was put on USTRANSCOM's list of locations where Air Mobility Command aircraft are not permitted to remain overnight.[27] This threat level calls into question whether Entebbe can be considered a primary staging base for operations. Listed in WATCHCON III (Potential Crisis) are Guinea-Bissau, Central African Republic, Nigeria (EUCOM-designated host PISB), Zimbabwe, and Chad (EUCOM-designated host AISB). Northern Nigeria (near Abuja) has seen recent, massive unrest in the northern regions resulting from Islamic militancy and is under a government-declared state of emergency.[28] The Government of Chad is engaged in an armed struggle with insurgents.[29] A base-support plan operation was scheduled in N'Djamera, Chad, for May 2004.[30] The threat levels in Nigeria and Chad call into question whether they realistically can be considered a primary or alternate staging base for operations. Listed in WATCHCON IV (Environment for Crisis) are Mauritania, Rwanda, Sao Tome, and Principe, Guinea, The Congo, Cameroon (EUCOM-designated host AISB), and Angola (EUCOM-

The Failings of Steady-State Base-Support Planning in Sub-Saharan Africa

The unpredictable nature of terrorism and appealing nature of these unstable regions further complicate the establishment of intermediate staging bases as part of a steady-state program.

designated host AISB). Cameroon is engaged in a cross-border conflict with Nigeria over oil rights and is scheduled for a base-support plan operation in December 2004. Angola's central government is limited in its ability to control the military and police.[31] Angola is scheduled for a base-support plan operation in April 2006.[32] This threat level calls into question whether Angola and Cameroon can be considered alternate staging bases for operations.

A classic example of the instability's effect on airfield usability is Harare, Zimbabwe. During the 1990s, the United States conducted five assessments of the airport in Harare. However, with President Mugabe's decision to allow his political followers to seize white-owned farms in the country, the United States has cut all but the most essential diplomatic ties and ceased all security assistance to the regime.[33] Harare, although a modern operational platform and in close proximity to the flood-effected regions of Mozambique and Zambia, was not available to US forces during Operation Atlas Response 2000.

In total, 5 of 12 EUCOM-designated staging bases are in violently, or potentially violently, unstable nations. Compounding that concern is the fact that the remaining PISB and AISB hosts (Gabon, Zambia, Senegal, Ghana, Botswana, and Mozambique) have significant economic, criminal, and infrastructure maintenance issues.[34] A culture of instability and conflict pervade the continent.

The Threat of Terror

Compounding an already dangerous and unpredictable operational environment in Africa is the maturing threat of nonstate terrorist organizations and the dramatic increase of Islamic fundamentalism. Poverty, poor border control, and political instability continue to contribute to an environment that both supports transnational terrorist groups and breeds fundamentalism among minority groups.[35]

Of particular concern are the Pan-Sahel nations of Mali, Chad, and Niger, all extremely poor and lacking in resources to confront and control transnational terrorism and Islamic fundamentalism.[36] Of likewise concern and closer to the political and economic interests of the United States (particularly massive oil reserves off the coast of Nigeria and Cameroon) are the West African nations. Islamic fundamentalism breeds on the political instability of this region. Hezbollah and Al-Qaeda are known to operate in these areas.[37]

The unpredictable nature of terrorism and appealing nature of these unstable regions further complicate the establishment of intermediate staging bases as part of a steady-state program.

The International Criminal Court

The International Criminal Court was established by the Rome Statutes for the International Criminal Court in July 1998. The statute has been ratified by 60 member states. The United States has not ratified the statute that allows the court, based in The Hague, Netherlands, to exercise jurisdiction over persons accused of a variety of crimes, including war crimes. Nations that ratify the statute are bound by the provisions of the court under international law.[38]

The US decision not to ratify the Rome Statute was based on concerns that nations and individuals would seek to gain jurisdiction over US military members engaged in operations around the world. Furthermore, the United States continues to seek *waivers* from security assistance partners around the world. The waivers, known as Article 98 Agreements, provide US citizens with immunity from jurisdiction of the ICC within the party nations. To date, 27 nations have signed Article 98 Agreements with the United States. Of those 27, only 5 Sub-Saharan African nations have entered into that agreement (Gambia, Sierra Leone, Rwanda, Mauritania, and the Democratic Republic of Congo).[39]

One of the benefits of entering into the Article 98 Agreement is the continued provision of US Security Assistance (military aid). Nations that had failed to sign an agreement by 1 October 2003 or did not sign the Rome Statutes in the first place will have their security assistance funds cut off, regardless of whether or not there is a standing status of forces agreement in place with that nation. To date, none of the EUCOM PISB or AISB countries have entered into an Article 98 Agreement.[40]

While no decision has been made to halt base-support plan operations in nations not in agreement with Article 98, the ability to engage in future exercises or operations (to include Global War on Terrorism operations) is in doubt.

Summary

Rampant political instability, unpredictable security environments, the threat of terror and tenuous diplomatic relationships define the battlespace that the United States faces when operating in Sub-Saharan Africa. Nineteen countries are being monitored for potential outbreaks of violence or are engaged in conflict. Islamic fundamentalism and terror are pervasive through the oil-rich regions of West Africa and the Sahelian Region, and only 5 of the 39 Sub-Saharan states have engaged in a treaty that allows the United States to continue military engagements on their soil. The future of military operations in Africa is unpredictable.

Rampant political instability, unpredictable security environments, the threat of terror and tenuous diplomatic relationships define the battlespace that the United States faces when operating in Sub-Saharan Africa.

Findings and Potential Solutions

Findings

In response to a growing need to operate effectively on the African Subcontinent, research has been undertaken to determine if EUCOM's steady-state base-support plan program is an effective tool in identifying and assessing locations for future operations. The findings of this research are divided into two categories: operational endurance of selected sites and usability of those sites based on current trends and future predictability of political and social instability in that AOR.

It has been demonstrated in analysis of the JTF-L operations from June to October 2003 that off-the-shelf base-support plans lack in operational endurance. The findings have demonstrated two root problems. First, off-the-shelf base-support plans do not stand the test of time in Africa, and they often leave the planner and the warfighter facing unexpected shortfalls and limiting factors at the moment of

The Failings of Steady-State Base-Support Planning in Sub-Saharan Africa

There is no debating the need to pre-identify potential operating locations as a planning tool.

execution. The failure of pavement, cargo handling, and security estimates are crucial shortfalls and drive inefficient and costly changes to operations planning. Of note, operations in Dakar (the airlift hub for the operation) were principally effected. The second root problem with off-the-shelf base-support plans is that they often are unavailable for locations where they are required. It is well-understood that EUCOM has neither the time nor the resources to survey every major port facility in Africa, but at the moment of execution, personnel find themselves without usable planning data. In either case (with outdated base-support plans or no base-support plans on hand), assessments must be conducted (or reconducted) on the spot *and unexpectedly*.

Furthermore, an unexpected trend observed in the findings indicates that even when base-support plans are in existence, they are not readily available to fielded forces, as was the case with the ECOWAS assessment teams. This lack of availability should be addressed with further research.

The second category of finding relates to the overall trends that influence the findings in the first category. Africa is a fundamentally unpredictable AOR. Research vividly demonstrates that the subcontinent is rife with political and social unrest and is plagued with the threat of terror. Of the 12 pre-identified staging bases in Sub-Saharan Africa, 5 are located in countries that are being monitored or experiencing destabilizing conflict. The remaining seven nations face security challenges of their own. Of the remaining nations in Africa, the balance faces civil or political unrest in some form or another. The question of preselecting operational sites seems more a question of *where to* than *where not to* conduct operations.

Potential Solutions

There is no debating the need to pre-identify potential operating locations as a planning tool. The question that now faces EUCOM leadership is whether or not assessments need to be conducted in these locations in advance of strong indications that a local intervention may be necessary. Unpredictability in requirements (the location of the forward area) is only compounded by the unpredictability of the availability and usability of the potential staging bases (that is, Harare IAP). The solution to operational shortfalls in Africa does not exist in continued conduct of assessments in locations that may or may not be available (or usable) at execution. This continued planning is a waste of resources and endangerment of personnel and resources.

EUCOM's most viable countermeasure to instability and unpredictability is the use of the crisis-action survey. Based on EUCOM's outstanding short-notice, crisis-action survey capability, paired with the aggressive use of intelligence assets (to determine survey need), this change in course offers maximum operational usability, improved proximity to the forward area of operations, and ensured availability of planning and execution data.

It is conceivable that steady-state assessments can be made *by exception* in states that are shown to be stable and predictable at the national level.

Conclusions and Recommendations

Based on the analysis of these findings, it can be concluded that EUCOM's current steady-state base-support plan program is not a viable tool for preparing the battlespace in Sub-Saharan Africa and must be redirected. The current program offers neither operational endurance nor predictable guarantees of use. The program is further hindered by lack of availability of that data.

Therefore, it is recommended that EUCOM change the base-support plan concept of operations and related guidance to a policy of engagement through crisis-action assessment. Locations should be selected based on proximity to the forward area of operations in conjunction with other mission requirements. The concept for the physical survey of a location need not change in most respects. In keeping with the new concept of Expeditionary Site Survey, teams should be trained and postured to conduct extremely short-notice surveys in a spectrum of conditions, from permissive to hostile, and be capable of reporting those findings to planners in near real time.

As the concept of Expeditionary Site Survey matures, these findings should be used to robust the planning and methods of employment. Additional research should be conducted, in conjunction with intelligence planning, to further explore timing and location of prospective surveys. It is the opportune occasion to robust and refine our expeditionary capabilities, not just in Africa, but in the face of a new world environment.

It is the opportune occasion to robust and refine our expeditionary capabilities, not just in Africa, but in the face of a new world environment.

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Creating More Effective Reception Capability During Initial Bare-Base Operations

Introduction

We are focused always on programs, always on platforms. We are going to change that. So that the first thing we talk about is the concept of operations. How we fight. Not only with ourselves but how we…join with the other services, with coalition partners.

—General John P. Jumper[1]

Twenty years ago, the Air Force had the infrastructure and size to allow for a massive response to a significant world event. The premise of this structure relied on airframe-based capabilities, able to carry out a wide variety of missions from fixed locations around the world. In the last decade, the Air Force has seen a massive reduction in manning end strength and in the number and locations of oversees main operating bases. For these reasons, the Air Force had to transform the way it conducted business; presented forces; and organized, trained, and equipped forces to maximize the resources at its disposal. One of the ways this was achieved was with air expeditionary force (AEF) rotations, which are capability-based versus airframe-based. One of the most recent developments, building on the AEF concept, is the development of the air expeditionary task force (AETF) modules.

The concept of force modules (FM) has been around since the inception of the Joint Operation Planning and Execution System (JOPES) and is defined in Chairman of the Joint Chiefs of Staff Manual 3122.01A, *Planning Policies and Procedures.*

Creating More Effective Reception Capability During Initial Bare-Base Operations

One issue that TALCEs deal with immediately upon arrival at a new airfield is determining who they will be supporting (user) and how the user plans to perform its reception process.

JOPES, Volume 1, has a planning and execution tool that provides a means of logically grouping records, which facilitates planning, analysis, and monitoring. Force modules may include requirements for both personnel and equipment. The elements of force modules are linked or uniquely identified so that they may be extracted from an existing plan or adjusted as an entity in the JOPES databases to enhance flexibility and usefulness of the operations planning and execution process.[2]

The Air Force has established five standardized force modules: Open the Airbase (OTB or FM 1), Command and Control (C2 or FM 2), Establish the Airbase (ETB or FM 3), Generate the Mission (FM 4), and Operate the Airbase (FM 5). These force modules are designed to provide a consistent means of presenting Air Force capabilities that universally meet requirements of any combatant commander. What makes these modules universal is that they build on each other like building blocks (Figure 1).[3] Theoretically, when going into an austere location with no capability, regardless of location, you will need the capabilities embedded in the first force module, Open the Airbase. When going into a location with an existing capability and not in a hostile environment, you would start with the second or third force modules, Command and Control or Establish the Airbase. The modules are designed to represent the minimum required unit type codes (UTC) to perform these functions but can be bolstered when a requirement outside the scope of the force module exists.

The Air Staff AETF force module briefing shows what the intended capabilities are for the OTB force module and how it is employed (Tables 1 and 2).[4] The capabilities shown in Table 2 are performed by 32 UTCs; 25 fall under the control of the tanker airlift control element (TALCE), including all materiel-handling equipment (MHE). Seven UTCs that do not fall under the TALCE account for only 14 people. This represents a problem, because according to the Department of Defense (DoD) and Air Force guidance, the TALCE is organized to support all air mobility operations at a location, not just Air Force operations. The FM concept is designed with the understanding that the TALCE will provide initial cargo reception capability. Herein lies the problem.

One issue that TALCEs deal with immediately upon arrival at a new airfield is determining who they will be supporting (user) and how the user plans to perform its reception process.

If the TALCE is supporting an Army unit, then there will be an arrival/departure airfield control group (A/DACG) to act as the reception force for the deploying unit. The A/DACG provides many capabilities; one of its primary functions is transferring equipment and passengers from the runway to the user. Considering the number of installations and locations that opened in the last 2-1/2 years, this process is well-exercised and finely honed. If a TALCE supports a Marine move, it also will have an A/DACG function that will liaise between the user and the TALCE. However, there is one service where this relationship is not as easily identified—the Air Force. Even though Tables 2 and 3[5] show that there are two *ground trans* people attached

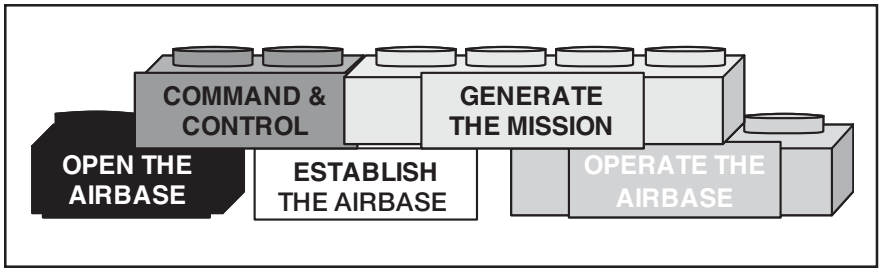

Figure 1. Force Module Building Blocks

• Provides the capabilities to open an airbase, regardless of the follow-on mission or aircraft type. These forces will arrive first (possibly before the deployment order) to survey and assess the airbase and address host-nation issues, then relay specific requirements for follow-on forces.
• Provides the initial capabilities for command and control, communications, force protection, cargo and PAX handling, logistics, airfield operations, reception and beddown of forces, and follow-on modules. These forces open a base that may support any service or nation.
• Transitions to the follow-on Command and Control and Establish the Airbase modules. Once transitions occur, this module moves on to another location or reconstitutes, leaving behind only BEAR assets.

Table 1. Open-the-Airbase Concept

Functional Area	PAX	STONS
Special Tactics (SOF)	9	27.0
Assessment Tm/C2	8	
SF	31	16.8
Mobility (TALCE/MARC/WX)	17	36.8
OSI/Intel	5	7.0
Aerial Port	17	25.1
Quick Turn Mx	13	34.3
Ground Trans	2	0
Comp/Contr	2	0.1
Medical	4	2.0
BEAR Supports	0	55.7
Comm/Info	3	0
Fuels	1	2.0
Supply	1	0

Table 2. Open-the-Airbase Capabilities

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In the Open-the-Airbase force module, the TALCE is the only Air Force unit at an austere location with the capability to handle cargo movement

to this force module, those positions are assigned to the TALCE and provide no equipment support, just vehicle maintenance.

In the Open-the-Airbase force module, the TALCE is the only Air Force unit at an austere location with the capability to handle cargo movement. Even if it is an Air Force unit, it is unable to move unit cargo off the airfield because its equipment and personnel are tied to support the flying mission, not the reception process. The Cargo Reception Function (CRF) and the Reception Control Center provide this capability for the Air Force;[6] however, these entities are not loaded into the Open-the-Airbase force module. This capability is loaded in the Establish-the-Airbase force module and may not arrive at the location for days or weeks. This delay in

Unit Move Functions	Responsible Unit	
	AMC Mobility Force	Services
Prepare cargo (weigh, mark, measure, load, secure, manifest, and compute center of gravity.		X
Prepare and transmit electronic passenger and cargo manifest.		X
Prepare and certify hazardous cargo		X
Prepare and certify load plans.		X
Provide load teams.		
Load, secure, and offload cargo.		X
Provide shoring, dunnage, and vehicle operators.		X
Establish and operate A/DACG		X
Validate load plans.	X	
Validate passenger manifests	X	
Supervise load teams	X	
Provide technical assistance.	X	
Provide aircraft control	X	
Provide control of load teams.	X	
Coordinate airflow information.	X	
Provide MHE and/or CHE.*	X	X
Provide MHE and/or CHE maintenance.*	X	X
Perform joint inspection.	X	X
Apply automatic identification technology to unit equipment.		X
*AMC will provide and operate Air Force-unique container handling equipment/MHE that is required but beyond the capability of user to provide; for example, K-loaders and wide-body loaders.		

Table 3. TALCE/User Responsibilities

capability provides an impetus for bottlenecks, resulting in loss of effective bare-base operations when you need them most—in the beginning.

The FM concept provides a firm foundation as the next step in an effort to present forces in the most efficient and effective manner. As we continue to pursue the requirements of the warfighter, it is imperative that capabilities are both defined and provided at a level and location that meets or exceeds mission requirements while remaining as flexible and adaptive as possible.

Overview

We cannot hope to win a future war on the basis of manpower and resources. We will win it only through superior technology and superior strategy.

—Major General Orvil Anderson, USAF

There is a very limited and focused scope for this research, with the intent of showing and comparing the worst case scenarios of how the Air Force might need or want to implement force modules in the future. Mindful of this, research was conducted around the following criteria:

- Locations under scrutiny were established during Iraqi Freedom with the Air Force having the preponderance of forces and solely responsible for providing its own transportation for people and cargo.
- If there was an A/DAGC in place, it did not support the Air Force.

Significance to Expeditionary Logistics

The Open-the-Airbase Force Module sets the battle rhythm for combat support in the most expeditionary of environments and terms.

The very nature of the FM concept is to expedite the planning and execution process, as well as to present forces in the most efficient and effective manner, consistent with the processes of expeditionary logistics. The Open-the-Airbase force module sets the battle rhythm for combat support in the most expeditionary of environments and terms; it places 113 people and 150 short tons of materiel-handling equipment and equipment in an austere location with the full expectation they will initialize airfield operations for a force that may reach into the thousands.[7] Because of the limited number of troops and equipment availability, it is essential to ensure that the capabilities of both people and equipment are capable of meeting the expectation of the mission. For example, it is counterproductive to have ground fuels capability if there is no materiel-handling equipment to move the fuel off the aircraft or that need to be refueled.

The time-phased force deployment data (TPFDD) for Iraqi Freedom was filtered for six specific unit type codes—UFBLA, UFBLB, UFBLT, UFBR5, UFTSB, and UFTSK—because of the impact they independently or cooperatively contain on cargo movement and ultimately reception efficiency. The UFBLx UTCs are all vehicles, and their description is included as part of Table 4. These vehicles are the primary means of moving 463L pallets and equipment. Without forklifts, there is

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Shaheed			
UTC	**Description**	**Quantity**	**RDD**
UFBLA	10K Standard Forklift	2	INP
UFBLB	10K Adverse-Terrain	4	INP
		1	0
		1	38
UFBLT	10K Tractor	6	INP
UFBR5	40 ft Trailer	3	INP
UFTSB	16 Enlisted Ops Element	1	6
UFTSK	5 Enlisted Ops Support	1	6
Tabuk			
UTC	**Description**	**Quantity**	**RDD**
UFBLA	10K Standard Forklift	1	38
UFBLB	10K Adverse-Terrain	1	0
UFBLT	10K Tractor	0	N/A
UFBR5	40-foot Trailer	0	N/A
UFTSB	16 Enlisted Ops Element	1	9
		2 pax	11
		1 pax	23
UFTSK	5 Enlisted Ops Support	1	11
Tallil			
UTC	**Description**	**Quantity**	**RDD**
UFBLA	10K Standard Forklift	2	INP
UFBLB	10K Adverse-Terrain	2	0
		1	97
UFBLT	10K Tractor	0	N/A
UFBR5	40-foot Trailer	0	N/A
UFTSB	16 Enlisted Ops Element	5	111
		3	231
UFTSK	5 Enlisted Ops Support	1	101
		1	226
		2	227

Table 4. TPFDD MHE and Personnel

zero capability to move cargo. The tractor and trailer play an important role when the variable of distance is put into the equation, and at these locations, it is. For Tallil, the distance from cargo yard to base camp was 1-1/2 miles, and Tabuk was 5 miles (surveys). This identifies the importance of ensuring the right people and cargo arrive at the right time.

UFTxx UTCs are personnel and, according to the MISCAP last reviewed January 2003, provide the following capabilities.

- UFTSB—16-person team provides the leadership module and basic support for a 12-hour base transportation operation, including vehicle dispatch, bus and tractor/trailer drivers, special purpose mechanics, traffic management passenger services and hazardous material qualification.
- UFTSK—5-person team provides vehicle driver support, qualified on 10K forklift both standard and adverse terrain (A/T), bus, and tractor trailer.

The columns in Table 4 are marked by UTC, description of the UTC, the number or quantity of UTCs at that location and the required delivery date (RDD). The RDD does not reflect an actual flow based off the course of the war, rather the RDD is relative per installation. For example, at Tabuk, the 10K A/T forklift is the first piece of materiel-handling equipment at that location, and the other materiel-handling equipment arrived *X* number of days after the first piece or team. In the RDD column, INP means that the equipment was inpace war reserve materiel (WRM).

At each of the locations, the 10K A/T forklift is the first piece of materiel-handling equipment that the TALCE brought with it and is represented with an RDD of zero. At Shaheed, there are twelve vehicles and three 40-foot trailers that are prepositioned, creating more capacity than at the other locations, but there is no sign of drivers for those vehicles until 6 days after the arrival of the initial party. During this time, nearly 500 tons of equipment arrived at this location without vehicle drivers in place to operate the materiel-handling equipment. This could mean one of two things: either the equipment sat idle, or personnel who were qualified moved their own equipment.

Tabuk did not start with the same level of prepositioned support as Shaheed. According to the TPFDD, there was never a tractor/trailer combination at Tabuk, where the main base was 5 miles from the flight line with only one 10K A/T forklift and one 10K standard forklift. The personnel did not arrive until the 9-day point, after 525 tons of cargo had arrived.

Tallil had a few assets that were prepositioned; however, there is no record of any tractor/trailer capability or vehicle drivers for this location.

Although the TPFDD provided information for the initial arrival of forces and equipment, it is questionable how accurate the information is in relation to the execution of operations. There are several disparities between the TPFDD and the surveys that lead to fairly insignificant conclusions, while there is little, if any, record of replacement materiel-handling equipment arriving after the initial stocks. Also,

There are several disparities between the TPFDD and the surveys that lead to fairly insignificant conclusions, while there is little, if any, account of replacement materiel-handling equipment arriving after the initial stocks.

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Planning for an eventual swap is difficult to forecast, but the validity of the TPFDD is suspect if these moves are not accounted for.

without an accounting of the host-nation support that was received or provided, it is hard to know exactly how much support was not provided during the initial days at these locations.

Findings and Potential Solutions

Reception is the process of receiving, offloading, marshalling, and transporting of personnel, equipment, and materiel from strategic and/or intratheater deployment phase to a sea, air, or surface transportation point of debarkation to the marshalling area.

—JP 4-01.8

The data in Table 4 illustrate a few areas of concern in both the physical and planning aspect of austere base standup. The locations with WRM on site had potential for a significant advantage over the sites without; however, there were no vehicle operators assigned to those vehicles until 6 to 9 days after the initial personnel arrived. Because of WRM, only one location had tractor/trailer capability. Keep in mind that this does not account for any local leasing/contracting of support that may have happened, just for the equipment in the TPFDD. All the locations, without WRM, received their first materiel-handling equipment when the TALCE arrived, in the form of a 10K A/T forklift.

One recurring theme is the lack of swap-out planning. At all these locations, the TALCE and, most of the time, their equipment will forward or redeploy together and at none of the locations were vehicle backfills accounted for during that timeframe. Planning for an eventual swap is difficult to forecast, but the validity of the TPFDD is suspect if these moves are not accounted for.

Shaheed provides a stable bed of capability that would facilitate a large surge of operations. There is a diverse amount of equipment available, and a 21-person transportation team had an RDD of 6 days after initial forces arrived. Although 10 days provides a significant window with little or no transportation support, it still shows good planning and a need for those forces to be in place. Tabuk provides similar details for the personnel side, but there are no WRM assets at this location, so according to the TPFDD, there are only two forklifts at that location. The TPFDD for Tallil provides data for materiel-handling equipment and the replacement personnel, but there is no account for the initial personnel arriving.

Again, this information provides an unknown level of accuracy because of the possible errors on the TPFDD.

The data in Tables 5 and 6 provide a limited but relevant perspective on initial base-opening transportation capability and support. The TALCE commanders were solicited continually (daily) to provide deploying Air Force units with various support requirements, ranging from bolt cutters to materiel-handling equipment and personnel. The 10K A/T forklift proved to be a vital asset at every installation, and its absence placed a burden on all parties involved. The TALCEs needed their assets

Question	Answer
Deployment Experience	Each deployed to one location.
Who provided initial support on the flight line?	TALCE at both locations
Who was responsible for moving cargo to user area?	Initially the user. Eventually A/DACG assisted with cargo movement when able.
When did dedicated BOS MHE/drivers arrive?	Minimal BOS MHE/drivers arrived about the same time as the TALCE but were inadequate to handle download of convoys and transport of cargo from aircraft download. Primarily dedicated to convoy operations.

Table 5. Logistics Planner Survey Summary

Questions 1 and 2. Deployment experience?
Deployed with 11 TALCEs. Four were in support of Air Force units.
Question 4. What support does the TALCE provide to the installation?
10K A/Ts, 1008s, Iridiums, Intel Flyaway SIPRNET, TRC-176, LMRs, office space in Intel tent for meetings, SF to provide security, manpower to build tents and conduct FOD walks. Requests for TALCE equipment/support are constant while deployed. The real issue here is our ability to support the mobility mission, as well as the base standup requirements. Normally, the TALCE will support BOS issues when aircraft flow permits. This concept is not fully understood by some of the AEG/AEW leadership, and they consider TALCE assets their assets. Here is where the rubs occur. The TALCE does not lend out equipment. I normally help out the other organizations with equipment and drives (both) for a very specific mission and a very specific duration.
Question 5. Which service performs reception the best?
The Air Force, of course, is the best at this process when it is present (rarely), but the Army A/DACGs also have been very excellent at this when they are present. The Army comes equipped with the flatbeds, trucks, MHE, and personnel to move cargo and pax.
Question 6. Other comments?
The most valuable piece of equipment during Iraqi Freedom was not the F-117 or the B-2 bomber; it was the lowly 10K All-Terrain. Nothing moved without it. For some reason, the Air Force put 46 C-130s into Tabuk with no capability to support them. Our TALCE, with 2 x 10Ks and 12 aerial porters was expected to handle all the intertheater lift, mainly comprised of C-5s and wide-body commercial aircraft, and to handle the 46 C-130s. The wing also wanted us to take our 10Ks the 5 miles to its tent city and help offload trucks and build their tents. They had no MHE to handle the cargo moved into the base via truck. It also had no MHE to move Jersey barriers around.

Table 6. TALCE Commander Survey Summary

Creating More Effective Reception Capability During Initial Bare-Base Operations

Our collective Air Force transportation community is traveling down a new road with filling our sister service's requirements.

to work the flying mission, while the deploying units had little organic capability to support the movement of their own cargo. The TPFDD shows that there were 10K standard forklifts available at some sites, but these only provide capability when there is a suitable work surface (pavement); most bare-base operations do not take place in this environment. There is also considerable wear on forklifts if they are required to travel long distances, and as previously addressed, both Tallil and Tabuk were not collocated (1-1/2 miles and 5 miles respectively) with the TALCE.

There are five main areas that were addressed in the TPFDD and surveys that provide further evidence of missing capability when an airbase first opens.

First, there is a general lack of understanding of the TALCE's role in bare-base operations, ultimately resulting in user dependence on both materiel-handling equipment and manpower. It is convenient to look for the first thing that has Air Force on it when you arrive at a new location. Typically, Air Force units are there to support a common mission and, therefore, have a vested interest in supporting each other to the greatest extent possible. The TALCE is no different and is there to support the same mission, but at a different level—the mobility force. This role sets specific rules of engagement for both the user and TALCE (Table 3), but this is not considered in the Open-the-Base module. This module looks at the TALCE as *one of us* (Air Force) and accounts for the embedded capabilities and manpower in supporting the Air Force mission, when the Air Force may not be the only mission at that location. There always will be special operations or coalition forces that are competing for resources.

Another aspect of the TALCE is living arrangements. When a TALCE and requisite support organizations go to the field, their UTCs account for lodging, yet the Open-the-Base module contains BEAR assets to support 150 people. This is a disparity that has created problems on the road. The observations dealing with this specific issue during Exercise Eagle Flag 04-B can be found in Tables 7 and 8.[10]

Second, according to the surveys from both TALCE commanders and lead logistics planners, the inadequate and untimely arrival of 10K A/T forklift and, to a lesser level, other 463L materiel-handling equipment directly impacts opening operations and compounds the first issue addressed. As the user, the deploying Air Force units are required to bring their own equipment above and beyond that provided by the mobility force. Table 9 also addresses this issue and provides potential consequences. Materiel-handling equipment significantly increases the footprint of deploying units, but without it, the mission will not be accomplished according to schedule. During Global Mobility Exercise 03,[11] there were a number of classified observations pertaining to this issue, along with the issue in Number 3 that reiterate what has been stated. The response to TALCE commander survey, question 6 in Table 5 reiterates this lesson learned.

Third, there is a lack of dedicated MHE operators early in the process. Without the drivers, the materiel-handling equipment has no function. During initial base

operations, there is no room for error, and because of the minimal footprint required of an agile force, it is imperative to have the right mix of equipment and personnel on the ground. Trained vehicle operators are no less important than trained pilots. Currently, there are no vehicle operators tasked to enter the base until 240 other UTCs, equaling 380 pallets of cargo and 653 people, have already arrived.[12] This is a shortfall, if not a potential limiting factor.

Fourth, the increased role of convoy operations to support the supply and resupply pipeline is not considered in our planning. The research of published reception guidance did not discuss supporting convoy operations; this was a mission

During initial base operations, there is no room for error.

Objective	Reception and Beddown
Observation	Due to existing TALCE mission, TALCE could not dedicate full attention to establish 150 Swift Bear assets, objectives were eventually meet.
Discussion	The 150 swift bear package is a needed light and lean UTC for establishing initial airfield reception and operational capability. However, the existing TALCE mission and UTC manning does not permit the timely establishment of this UTC. TALCE focus is on the airfield in establishing the MOG and receiving/turning airflow for the AO. The 150 swift bear UTC is better phased in during FM2 where more personnel can be dedicated for establishing the package for FM3 force arrival. If 150 swift bear assets are to remain part of FM1 it is highly recommended a dedicated CE UTC consisting of five critical AFSCs (engineer, power, electric, HVAC, structures) be phased into the AO as part of FM1 or these same AFSCs be embedded as TALCE enablers.
Recommendation	Recommend to AF/ILE that CE UTCs be moved to FM1 for proper placement and set up of Swift BEAR assets.
Contents copied verbatim from EAGLE FLAG final report.	

Table 7. Eagle Flag Reception Observation

Objective	Handle cargo/PAX
Observation	Vehicle not reconfigured for operational use in a timely manner.
Discussion	Vehicle not operational until the third day. TO was not initially present, but once provided, another 48 hrs passed before the vehicle was ready for use. APS was detailed to build Swift BEAR tents hindering the preparation of the port.
Recommendation	APS priority should be based on operational capability not beddown procedures.

Table 8. Eagle Flag Aerial Port Observation

that was supported during Iraqi Freedom and could be supported in the future. This adds to the requirement for manning and vehicles to download trucks. Going back to the first issue, the role of the installation may—but most likely will not—be tied solely to air operations, but that is where the TALCE and related equipment must stay.

Fifth, the lack of TPFDD discipline in the planning and execution of the war is a valid concern but outside the scope of this article. From a strategic level, there needs to be thorough command and control of forces during the full spectrum of operations, and the TPFDD is a primary instrument, which seems to perform with minimal results.

From a strategic level, there needs to be thorough command and control of forces during the full spectrum of operations, and the TPFDD is a primary instrument, which seems to perform with minimal results.

Conclusions

Although the results of the individual surveys were lacking in depth, the combination of those surveys, with reference to other similar scenarios, shows that the field conditions are not isolated occurrences and that there is a trend that shows a lack of materiel-handling equipment and operator capability in the early stages of bare-base development. The TALCE does contain both of these capabilities, but they are dedicated to the mobility mission, regardless of the specific activity at a given location. Air Force Instruction (AFI) 10-403, *Deployment Planning and Execution*, spells out, in section 6.5.1.4, "For employment sites with TALCE…the CRF process is provided by the provisional wing/group," yet in terms of the support provided, the Air Force still considers the TALCE as part of the initial Air Force provisional unit, when it really is part of the mobility force, separate from any unit at that location.

Recommendations

Based on the research, there are three areas that need attention.

Objective	Handle cargo/PAX
Observation	Vehicle Operations personnel made initial inventory of deployed vehicular assets; provided coordination flow to source additional assets as required through J4.
Comments	421st CTS needs to develop a realistic bare-base vehicle support package to provide the ground trans team. Current assets are residual vehicles utilized by TALCE and CES. A basic fleet of passenger and cargo movement-type vehicles would enhance the ability for the ground trans UTCs to demonstrate their core functions.
Recommendation	UTC be moved to FM1 as part of advanced echelon to establish basic PAX/cargo movement requirements. This

Table 9. Eagle Flag Vehicle Observation

- Provide more and better training to commanders identified as vulnerable to deploy on what their capabilities will be at a deployed location and what their expectation should be for those forces supporting their mission that may not fall under their span of control. The Air Mobility Warfare Center (AMWC), Ft Dix, New Jersey, teaches an Air Force-level course, E2WC, that prepares "senior combat support officers to command, organize, and lead in the expeditionary environment by providing a theater-level perspective on the operational art of combat support."[13] This course should be mandatory for all deployed leaders. Leaders who are coming up on their AEF rotation are required to participate in Eagle Flag, an exercise used to evaluate an AEF's ability to function in an employed environment during the first three force modules. To date, the exercise has focused on internal integration between Air Force units. The next step would be to flow—or simulate the flow—of missions (humanitarian assistance, coalition forces, special operations, and so on) outside control of the provisional command structure to pull the TALCE from supporting its brethren to working the mobility mission as they would in the field.
- More is always better to the user but places a burden on the mobility footprint, and for that reason, the following UTCs provide the required balance to support the mission without overtaxing movement capabilities: UFBLB (10K A/T forklift) X 2 and UFTSK (5 personnel support) X 1. This would provide for 24-hour operations and the minimum number of vehicles to accomplish the reception mission. This capability already exists late in the ETB force module, and it is imperative to move this capability to either late in the OTB force module or early in the C2 force module, setting the tone for the big push of forces arriving in the ETB force module. Without movement capability, reception capacity is severely degraded by creating a backlog of cargo at the download area (remember, it is the user's responsibility to move the cargo to the necessary area) and could prolong the base setup.
- Continually evaluate—there are 12 people in this program who have deployed in support of real-world missions, and not one of us would give the same answer on what is required for initial base operations; it is very dynamic. By default, we need to be dynamic in the way we prepare for our next deployment and never take for granted what is being provided (force modules) but constantly evaluate each event on its own merit. What worked today may not work tomorrow, and the mission impact is too great to bear if it is not done right.

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Cost-Benefit Analysis of Air Force WRM Program

Introduction

In our current security environment, the US military is being forced to deploy to new operating locations. Oftentimes, these locations are in austere environments. Complicating this is the tremendous sense of urgency when responding to a crisis. For example, the United States and its coalition partners went from virtually a cold start to bombs on target in just 3 weeks for Operation Enduring Freedom.[1] Further exacerbating this situation is the constraint placed on our forces by a lack of strategic lift. The Department of Defense (DoD) has lobbied Congress repeatedly to authorize more lift assets. According to General John Handy, commander of US Transportation Command and Air Mobility Command (AMC), the United States needs at least 222 C-17s and 52 refurbished C-5s to meet current strategic airlift needs.[2] In recognition of this, the DoD has determined that strategic mobility will consist of three legs: airlift, sealift, and prepositioning.[3] Prepositioning allows the United States to maintain assets at forward locations to shorten the long strategic deployment leg.[4]

The Air Force recognizes the importance of prepositioning. According to the Agile Combat Support Concept of Operations (ACS CONOPS), prepositioning is one of the tasks accomplished during the Preparing the Battlespace phase.[5] While the ACS CONOPS is fairly new, the genesis of the Air Force prepositioning program goes back to the Cold War. The Army created the Prepositioning of Materiel Configured to Unit Sets (POMCUS) program in the early 1970s.[6] It was determined then that putting assets at forward locations, especially in Europe, would save the United States and its allies valuable time if the Soviet Union and Warsaw Pact were to invade Western Europe. The North Atlantic Treaty Organization POMCUS

eventually grew to contain $1.2B in assets. Today, the DoD still maintains billions of dollars in war reserve materiel (WRM).

This article addresses the cost-benefit analysis of the Air Force WRM program, with particular attention played to the role of WRM in supporting Enduring Freedom and Iraqi Freedom. It explores potential benefits gained by completely filling WRM authorizations and looks at potential ways the program may need to evolve.

Expeditionary Aerospace Force and Agile Combat Support

Strategically, the Air Force has been operating under the expeditionary aerospace force mindset since 1998.

Our current security environment, coupled with the fiscal realities under which the DoD operates, demand efficient, responsive logistics to generate combat power around the world on very short notice. Air Force senior leadership has recognized this, and a variety of initiatives are underway to enhance the way we fight. Strategically, the Air Force has been operating under the expeditionary aerospace force mindset since 1998.[7]

This operational mindset was intended by Chief of Staff General Michael Ryan to be a way of life for airmen. The end of the Cold War meant a dramatic reduction in forward basing, as well as manpower and budget reductions. At the same time, our operations tempo and personnel tempo increased.[8] The expeditionary aerospace force (EAF) and aerospace expeditionary force (AEF) concept is the new way the Air Force thinks and presents forces to a combatant commander. According to Air Force Instruction (AFI) 10-400, *Aerospace Expeditionary Force Planning*:

> The AEF concept is how the Air Force organizes, trains, equips, and sustains itself by creating a mindset and cultural state that embraces the unique characteristics of aerospace power—range, speed, flexibility, and precision—to meet the national security challenges of the 21st century. The concept has two fundamental principles: first, to provide trained and ready aerospace forces for national defense and, second, to meet national commitments through a structured approach that enhances total force readiness and sustainment.[9]

There are challenges associated with this concept for planners at all levels, in not only combat but also combat support roles. According to William L. Dowdy, "Logistics is the most daunting challenge to fulfillment of the vision of 'light, lean, and lethal'—and rapid— expeditionary forces."[10] Under the EAF concept, the response to a crisis will be to deploy a tailored package rapidly to the crisis area of responsibility (AOR) from continental United States (CONUS) bases. This is in marked contrast to the Cold War mentality of fighting from fullup, main operating bases in Europe and having follow-on forces fall in on a well-developed infrastructure.[11]

Deployment planning requires a coordinated effort between various planning functions to ensure such issues as diplomatic clearance, adequate strategic lift support, force protection, and base infrastructure are solved—or at least have been mitigated—prior to sending forces into an AOR for an operation. While initiatives are looking at ways to make our deployment packages lighter (such as the Army's

Stryker Brigade Combat Team), our current equipment items are still large and bulky and require a lot of lift support.

The ACS CONOPS provides guidance for Air Force logisticians. The CONOPS is evolving, as is the Air Force process for generating combat power. According to Lieutenant General Michael Zettler, former Air Force Deputy Chief of Staff for Installations and Logistics, "ACS [is] the capability produced by the forces and processes that create, sustain, and protect air and space forces across the spectrum of military operation."[12]

ACS has six master processes: Ready the Force, Prepare the Battlespace, Position the Force, Employ the Force, Sustain the Force, and Recover the Force. According to the ACS CONOPS, battlespace preparation is specific to a theater, mission, or contingency location. Two actions during this process include defining the level of theater assets and prepositioning assets.[13]

Although originally a Cold War concept, the Air Force is still reliant on WRM. Major Joni R. Lee showed that prepositioning is viable in the EAF environment.[14] According to her, land-based prepositioning of large items, as well as common support equipment, would provide the most efficiency in terms of successfully supporting a rapid projection of combat power. The study done by Gallway, et al, also supports this premise.[15]

WRM 101

The Air Force uses the WRM program to manage its prepositioning efforts. According to AFI 25-101, *War Reserve Materiel,* "WRM is service-owned resources positioned as either starter or swing stock, or a combination of both, to maximize worldwide warfighting capability…. WRM is based on additive requirements to meet the two-MTW [major theater war] strategy."[16] WRM is used to provide an initial capability until reachback and sustainment can be established or to provide resources in theater so that they do not have to be shipped from CONUS.

Air Force WRM is broken into two broad segments: munitions and nonmunitions. Items are sorted further based on whether they are consumables or equipment items. Consumables are listed on the Wartime Consumables Distribution Objective, while equipment items are on the Wartime Plans Additive Requirements Report. Nonmunitions items are separated further into vehicles, aircraft support equipment, bare-base assets, and medical WRM. To narrow the scope, this article focuses on nonmunitions equipment items, specifically items that support combat air forces.

To be effective, enough equipment must be maintained to have a significant impact on the ability to generate and sustain combat power.

Problems with Prepositioning

There are several concerns with prepositioning. The concept requires large stockpiles of materiel to be maintained around the world. To be effective, enough equipment must be maintained to have a significant impact on the ability to generate and sustain combat power. In most situations, it makes little sense to preposition one -86

Cost-Benefit Analysis of Air Force WRM Program

Having starter stocks positioned forward means that the United States is forced to rely on the host nation for space to stockpile the assets, as well as unimpeded access and use of materials.

generator when the deploying forces need 20 such generators. Care must be taken during the requirements determination process to ensure the correct type and quantity of assets are selected and stored. Economic considerations apply, because we may not have the money to procure or infrastructure to store and maintain the amount of WRM that we would like.

Land-based stockpiles are inherently risky. There are force protection concerns with maintaining large stockpiles of any equipment anywhere, whether in the CONUS or forward.

Having starter stocks positioned forward means that the United States is forced to rely on the host nation for space to stockpile the assets, as well as unimpeded access and use of materials. Changing attitudes means that we may not have access to the equipment (or airspace, for that matter) when we need it.[17] We have several examples of not being able to use certain bases or airspace for our operations (El Dorado Canyon and Turkey during Iraqi Freedom).

The new security environment we are in means that we do not necessarily know where or whom we will be fighting. That means we may need to use WRM stored in one location to conduct an operation in a nearby area. The host nation may not want us to pull the equipment for fear it will weaken its defensive posture. Additionally, the WRM will have to be outloaded if we beddown forces at bases other than the storage location of the WRM. This was the case for Enduring Freedom and Iraqi Freedom as we opened more than 38 new operating locations.[18] As early as 1963, Congress raised concerns about the efficacy of prepositioning equipment, given that our potential enemies may not allow our forces the luxury of marrying up with the equipment and may choose to engage us at a time and in a space that is not convenient to our location.[19] Host-nation agreements involving prepositioning, therefore, must guarantee the United States exclusive use and unimpeded access to the equipment.

Another concern is the storage and maintenance costs inherent with prepositioning. There are examples of WRM equipment being poorly maintained. This reduces the effectiveness of the program, as it does no good to have units fall in on equipment that will require extensive maintenance prior to use, especially when they are operating under a tight time line, as the United States has done recently. Several years ago, the General Accounting Office conducted a study of the Army and Air Force prepositioning programs. They found that the Army and Air Force had reported significant shortages and poor maintenance conditions of equipment yet had no reliable way to quantify the readiness of the program.[20] This lack of fidelity in the program contributes to deploying units *not trusting* that the equipment will be there when they need it. This means they deploy with additional equipment that could have been left at home station, needlessly taxing an already stressed strategic airlift system. The Air Force is working on several initiatives to correct this shortcoming.

Budget Data

As noted above, one constant concern with the WRM program is funding. The authorizations need to be funded, and an aggressive maintenance program is required to maintain the assets at peak readiness. Up until Enduring Freedom and Iraqi Freedom, WRM most often was used for exercises, so the funding priorities were not always there to keep the program healthy.

From FY02-04, the Headquarters Pacific Air Forces (PACAF) WRM operations and maintenance (O&M) budget was underfunded by $7.5M, which equates to approximately 50 percent of the requirement. It is worthwhile noting that the funding shortfall for FY04 was only $661K or 12 percent of requirements. This increase may be short term, though, and is probably related to the Global War on Terrorism.

Much of the Air Force's nonmunitions WRM is procured under appropriation 3010, Aircraft Procurement. Figure 1 summarizes the Air Force's funding efforts for common support equipment.[21] As can be seen, this funding stream has been increasing steadily. Much more funding is required to erase the shortfalls in WRM equipment.

Two other costs associated with the program are contract costs for maintenance and facility costs for storage. Both PACAF and US Command, Central Air Forces (CENTAF) employ contractors in support of the WRM program. In CENTAF, contract costs for FY03 and FY04 were $29.8M and $33M respectively. Military construction (MILCON) and leasing costs are also a factor. Both CENTAF and PACAF have storage shortfalls. Ideally, all equipment would be stored inside. This could lower the costs of maintenance on the equipment because of less exposure to the elements. However, CENTAF, for example, had a total storage shortfall of 400,000 square feet last year. Its indoor storage shortfall was 2,600,000 square feet (assuming all WRM was stored indoors). According to data obtained from the Air Force Civil Engineer Support Agency (AFCESA) Web site, the FY06 cost for covered

Much of the Air Force's nonmunitions WRM is procured under appropriation 3010, Aircraft Procurement.

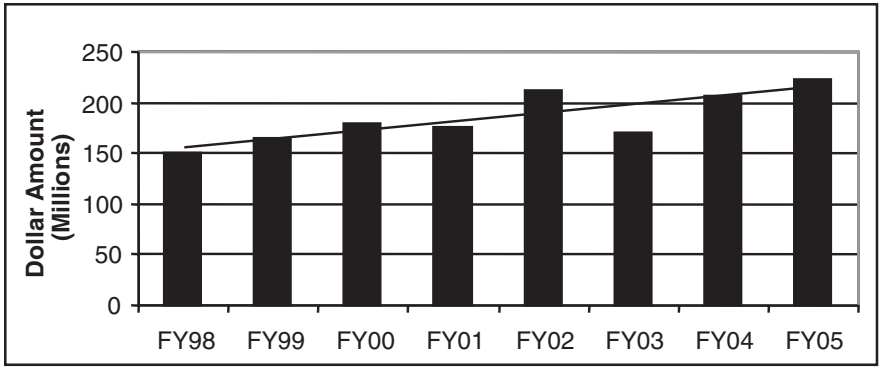

Figure 1. Air Force 3010 Appropriation for Common Support Equipment

Cost-Benefit Analysis of Air Force WRM Program

storage is $32.60 per square foot.[22] Assuming this would be the cost per square foot for new construction in the CENTAF AOR, the cost would be $84.8M. This represents approximately 13 percent of the Air Force MILCON budget for FY05. The programmatic changes required become more dramatic when you look at MILCON outside the United States. The $84.8M figure is 53 percent of the FY05 budget for OCONUS MILCON. While most MILCON funding for major projects is spread out over a number of years, this still represents a substantial amount of funding.[23] Additionally, the host nation would have to agree to the construction. New construction implies a permanent presence, and the DoD may face political pressure in that regard, even if the funding were available to erase the shortfall.

The combat air force WRM UTCs are designed to be used in pairs.

WRM UTCs

One of the challenges with the Air Force WRM program has been the lack of a clear picture as to the true capability of the program. It always has been tough for planners to determine what was in place at a location and, more important, what was serviceable and available for use. Historically, WRM has not been well accounted for in either deliberate or crisis-action planning.[24] In recognition of this, in 1999 the Air Force WRM Executive Review Board tasked AMC, Air Combat Command (ACC), and PACAF to organize aircraft support WRM into UTCs, similar to the existing bare-base UTCs.[25]

These UTCs are configured for C-130 airlift in case they are malpositioned (stored at a location other than the planned operating location) or tasked to forward deploy. More important, the inplace WRM assets in the CENTAF and PACAF AORs will be loaded into the Joint Operation Planning and Execution System (JOPES) and Deliberate and Crisis-Action Planning and Execution System (DCAPES) for use in time-phased force and deployment data (TPFDD) as inpace taskings. Further, the UTCs will be tailored to show actual amounts of serviceable items. Many of these items are end items, such as B-4 stands and level-four detail, and are all that is required to be shown. Logistics planners at the operational level will ensure that deploying units have these data and use them to tailor their deployment packages. These changes will be used to prevent the waste of airlift that happened during Enduring Freedom and Iraqi Freedom when DoD transported equipment that was, in fact, prepositioned and ready for use.[26] Table 1 is a summary of these UTCs. C-17 equivalents are based on 45 short ton ACL (PACAF Pamphlet 24-1, *Airlift Planning Guide,* 5 April 2002). Actual load plans rarely come close to the planning ACL, because of either cube or fuel limitations. Therefore, the actual C-17 equivalent for these packages is probably higher.

Notional Deployment Scenario

The combat air force WRM UTCs are designed to be used in pairs. Each aircraft support UTC has an accompanying munitions UTC that represents the initial capability needed to recover and generate combat sorties. According to the mission

capability statements, accompanying aircraft-specific support equipment must be deployed to generate aircraft fully, notably mission readiness spares packages and tools for the maintenance and munitions personnel.[28] Additionally, of course, there must be munitions in place or sent to the operating location. Also, this analysis does not take into consideration base operating support such as Class I, Class III, or Class VIII. While these and other classes of supply are all vital to a successful deployment, analysis of those classes is outside the scope of this article.

UTCs HFWF6 and HHWF6 can be used to illustrate the value of having and using prepositioned WRM. As shown in Table 1, those two UTCs are approximately 187 short tons or five C-17 equivalents. The FY04 contingency airlift rate for a C-17 is $7,208.[29] Using the deployment of a 12-ship package from the eastern United States to a forward operating location in the CENTAF AOR, the airlift costs for the five missions is $540.6K.[30]

According to the information contained in the Manpower and Equipment Force Packaging (MEFPAK) summary and its mission capability statements, UTCs HFKS1 and HGKS1 are designed to provide independent support to 12 primary mission aircraft inventory of Block 50 F-16s. These two UTCs total 250.8 short tons or six

UTC	UTC Title	Short Tons	C-17 Equivalents
HFW05	WRM C5 02 PMAI	52.8	1.17
HFW10	WRM KC10 03 PMAI	64.9	1.44
HFW35	WRM KC135 03 PMAI	63.8	1.42
HFW41	WRM C141 02 PMAI	50.1	1.11
HFWA1	WRM 6 PAA A 10/OA 10 AV AGE AUG	29.6	0.66
HFWA2	WRM 12 PAA A10/OA 10 AV AGE AUG	62.8	1.40
HFWB1	WRM 6 PAA B 1 AVIATION AUG PKG	171.4	3.81
HFWB2	WRM 4 PAA B 2 AVIATION AUG PKG	141.9	3.15
HFWB5	WRM 6 PAA B52H AVIATION AUG PKG	143.1	3.18
HFWF4	WRM 12 PAA F15C/D AVIAT AUG PKG	64.5	1.43
HFWF5	WRM 12 PAA F15E AVIAT AUG PKG	83.4	1.85
HFWF6	WRM 12 PAA F16C/D AVIAT AUG PKG	51.8	1.15
HHWA1	WRM 6 PAA A 10/OA 10 AV MUN AGE	41.2	0.92
HHWA2	WRM 12 PAA A10/OA10 AV MUN AGE	67.7	1.50
HHWB1	MMS 6 B 1B MUNS WRM AUG PKG	121.3	2.70
HHWB2	MMS 4 B 2 MUNS WRM AUG PKG	85.5	1.90
HHWB5	MMS 6 B 52 MUNS WRM AUG PKG	155.7	3.46
HHWF4	MMS 12 F 15C/D MUNS WRM AUG PKG	65.4	1.45
HHWF5	MMS 12 F 15E MUNS WRM AUG PKG	86.7	1.93
HHWF6	MMS 12 F 16C/D MUNS WRM AUG PKG	135.2	3.00
HHWF7	MMS 12 F 117 MUNS WRM AUG PKG	47.4	1.05

Table 1. Aircraft WRM UTCs[27]

According to the information contained in the Manpower and Equipment Force Packaging summary and its mission capability statements, UTCs HFKS1 and HGKS1 are designed to provide independent support to 12 primary mission aircraft inventory of Block 50 F-16s.

Cost-Benefit Analysis of Air Force WRM Program

In most situations with aircraft deployments, the unit does not leave equipment behind but takes its equipment home when the deployment is over.

C-17 missions ($648.72K). The equipment in these two UTCs includes common aerospace ground equipment (AGE), munitions trailers, and other items that duplicate the equipment in the two WRM UTCs mentioned earlier. If this F-16 package were deploying to a location where UTC HFWF6 and HHWF6 were available and 100 percent serviceable, they could eliminate most of their airlift requirement (the exceptions being mission readiness spares packages and other Block 50-specific equipment), for a cost savings of $540.6K. Of note is that the two UTCs contain a total of 288 passengers, requiring a commercial wide-body mission to carry them. Additionally, the operations UTC, 3FKS1, contains 11.3 short tons and 28 passengers. Together, with the residual cargo and passengers from HFKS1 and HGKS1, this represents one C-17 and one wide-body mission.

However, what if the assets are not already at their planned operating location? As noted above, the coalition has opened 38 new operating locations so far during the Global War on Terrorism. In a scenario where the WRM needs to be outloaded, intratheater movement must be considered. Continuing with the 12-ship F-16 package above, it would take at least 15 C-130s to move that package. Using the FY04 rates for a C-130 and assuming a 5-hour mission, that intratheater move would cost $305.7K.

In most situations with aircraft deployments, the unit does not leave equipment behind but takes its equipment home when the deployment is over. However, using WRM that remains in theater negates the costs of that retrograde movement. Under the current AEF construct, units are to deploy for 90 days. Continuing with the example of the F-16 package above, four such rotations in 1 year would generate 48 total C-17 missions (12 missions each for four different packages), for a total deployment and redeployment transportation cost of $5,189,760. Additionally, the equipment in these UTCs is fairly generic AGE, MHU-141 trailers, and so forth. This equipment is not specific to one type of mission design series. This allows the WRM to be used initially by an F-16 package and then by an F-15E unit that came in to replace them, for example.

Another factor that must be considered is the time saved in generating mission-capable aircraft. The Tanker Airlift Control Center (TACC) almost certainly would have an easier time tasking one C-17 and one wide body versus the six or seven airframes needed to move the entire package. This means the package would close faster and be able to start generating missions sooner.

WRM Shortages

Because of the funding issues mentioned above, WRM is not filled at 100 percent of its authorizations. According to data from CENTAF, as of September 2003, the AOR was authorized approximately 2,200 pieces of AGE but only had approximately 800 pieces on hand and only 600 of them mission capable. The serviceable numbers are only 27 percent of the authorized quantity.[31] The situation in PACAF is similar. For a given 12-ship fighter package, 121 pieces of equipment

are authorized at POB 0WS. This package is short 46 pieces, for a fill rate of 62 percent. The total dollar amount of authorized equipment for that package is $3.7M. The shortages are worth $1.8M.[32] Looked at another way, the shortages represent 73 short tons or two C-17 equivalents. This means that even if the WRM UTCs were loaded in JOPES/DCAPES and a deploying unit wanted to tailor its package appropriately, it still would have to bring a significant amount of materiel from home station. When the cost of completely filling the authorizations for this package is compared with the cost of deploying the equipment shown above, it shows that the Air Force could get a significant return on investment from filling its WRM authorizations to 100 percent in just 1 year's time.

Another benefit to filling the authorizations completely is the time saved in being able to stand up a base and generate combat missions in a very short time. Under the new *1-4-2-1* strategy, the DoD's stated objectives are to defend the homeland and fight the war against terrorism (1), deter forward in four geographic operating areas (4), swiftly defeat enemy efforts in any two theaters of operation during overlapping timeframes (2), and win decisively in one of two theaters at the President's direction (1).[33] To meet this challenge, the United States must be able to project combat power globally in a very short period. Prepositioning is a vital part of the strategic mobility triad. The new initiatives with WRM UTCs, as well as other studies being conducted to look at putting more Air Force assets in afloat prepositioning ships, will not do any good if the authorizations are not filled to 100 percent and adequate operations and maintenance money is not found to keep the assets in peak readiness. It is difficult to quantify the value of having bombs on target in time to meet National Command Authority and combatant commander time lines. However, the ability to put *bombs on target* at a moment's notice is crucial to defeating an enemy swiftly. Additionally, a strong prepositioning program serves as a strategic deterrent. Our potential adversaries can see that the DoD is serious about power projection and literally is putting its money where its mouth is. This deterrence may prevent a potential adversary from making a miscalculation and prevent the loss of thousands of lives, to say nothing of the potential economic and environmental disasters a large-scale conflict could produce.

The new initiatives with WRM UTCs, as well as other studies being conducted to look at putting more Air Force assets in afloat prepositioning ships, will not do any good if the authorizations are not filled to 100 percent and adequate operations and maintenance money is not found to keep the assets in peak readiness.

Use of WRM During Enduring Freedom and Iraqi Freedom

WRM was used heavily during Enduring Freedom and Iraqi Freedom. In addition to aircraft support equipment, bare-base assets were deployed to support tent cities throughout the CENTAF and PACAF AORs. For CENTAF, use of WRM saved $14M for fighter support and more than $20M for bomber support equipment in 2003 alone. In PACAF, WRM prepositioned at Andersen AB, Guam, saved $1.7M. At Diego Garcia, WRM equated to 51 C-17s—or $8.6M—for Enduring Freedom and Iraqi Freedom.

A survey was sent to approximately 25 Air Force logisticians at the Air Staff, most MAJCOMs, CENTAF, and Seventh Air Force (Korea). Thirteen were returned.

The Air Force WRM program remains viable in today's post-Cold War environment; however, the program is expensive and will require substantial programmatic changes to get the full capability from the program.

Among the questions asked of the respondents was, "Do you think the WRM program met its objectives during Enduring Freedom and Iraqi Freedom?" The answers were overwhelmingly positive. However, some of the respondents pointed out problems with the serviceability of some of the assets. This can be attributed in large part to the chronic O&M underfunding the program has been saddled with for many years. Other problems noted by survey respondents included the fact that Enduring Freedom was not a scenario for which WRM was stored, contributing to the significant intratheater moves that were required. Another problem stemmed from deploying personnel not being familiar with certain types of equipment stored in WRM. Much of the equipment is older, and a lot of people were not trained to operate the older equipment, since newer equipment is used at home station. Placing new equipment into WRM, as has been done recently with 60K Tunners, would help mitigate this problem.

Another challenge faced during Enduring Freedom was accountability of assets. The lack of accountability led to problems with reconstitution, as well as the redistribution of assets intratheater. Also, some requirements were not outsourced, leading to a heavy reliance on WRM assets.[34]

Recently, the Joint Staff tasked a firm to conduct a thorough review of the DoD's prepositioning program, with the goal of determining a strategic posture for the DoD prepositioning program in 2010, and recommending changes to current prepositioning assets to meet emerging challenges. The study determined that the DoD program indeed had been successful during Enduring Freedom and Iraqi Freedom but not without some challenges. The study went on to caveat the lessons learned from Iraqi Freedom, as Iraqi Freedom was an MTW executed as part of the two MTW strategy. The authors state that the prepositioning program needs to be revamped to meet the new *1-4-2-1* strategy.[35]

Findings and Potential Solutions

The Air Force WRM program remains viable in today's post-Cold War environment; however, the program is expensive and will require substantial programmatic changes to get the full capability from the program.

There will have to be a cultural shift in Air Force units. Air Force units typically deploy in unit sets, particularly combat air force assets. However, WRM is not necessarily allocated this way. This contributed to deploying units' not being able to determine what was prepositioned or not trusting the status of the assets even if they were told that the equipment was prepositioned for their use. Several steps have to take place to correct this problem.

In telephone interviews conducted with ACC staff, along with a Synergy contractor, both interviewees recommended that WRM UTCs be loaded in JOPES and tailored by the storing command.[36] These UTCs can then be tasked as in place on a given TPFDD. As deliberate plans progress through their planning cycle, MAJCOMs should ensure these UTCs are loaded into the *Generate the Mission* Air

Force module of a given operations plan that is tied to a specific aviation package. This would allow deploying units to see what equipment was prepositioned for them and tailor appropriately. Also, at execution, a deploying unit could make contact, through the supporting component, with the supported component to try to get more information about equipment that is not mission capable. For instance, if an MC-7 is not mission capable for supply for a certain part, the unit could bring that part to get the MC-7 back online, rather than bringing an entire piece of equipment. Units will have to get out of the paradigm of bringing their own equipment all the time, which will take time and oversight from the MAJCOM level.

Programmatic changes are also going to be required. As mentioned above, the Air Force procurement budget for 3010 money has been increasing steadily; however, the WRM program remains well below a 100-percent fill rate. Although the DoD budget has been increasing recently, the Air Force will have to change its priorities and shift more funding percentage-wise to common support equipment (as well as vehicles, bare base, medical, and consumable assets) to ensure the long-term viability of the program. Assets used during Enduring Freedom and Iraqi Freedom are starting to get returned to storage. The reconstitution costs are going to be quite large and, almost certainly, will outstrip the O&M dollars the Air Force has placed against this program. If these assets are not made serviceable, we run the risk of not being able to respond rapidly and efficiently during the next crisis. Additionally, several of the survey respondents advocated for increased O&M funding. This increase in funding will need to be made if authorizations are filled at a higher rate in order to maintain the assets in serviceable condition.

The Air Force procurement budget for 3010 money has been increasing steadily; however, the WRM program remains well below a 100-percent fill rate.

Another programmatic change that could be explored is breaking WRM funding out into a separate funding stream. Separate appropriations could be created for both WRM O&M and WRM initial procurement. The program then could have better visibility at all levels. The current program element code system may not be the most effective way of managing the fiscal requirements of the program.

Several survey respondents advocated for better integration of WRM into crisis and deliberate planning. Echoing the findings of the 1998 Government Accounting Office (GAO) study and the 1999 Air Force WRM Tiger Team, respondents stated functions may not know the extent of the capabilities of the program and fail to use WRM to maximum benefit.[37] These responses indicated that WRM planning efforts need to follow the same time lines and involve the same personnel as other deliberate and crisis-action planning staffs.

Several initiatives are underway to lower the costs of WRM storage and maintenance. One such program is technology created by the Cortec Corporation. Its deep-storage system allows vehicles and equipment to be stored in Technical Order 36-1-191 or equivalent condition and then not touched for years and yet be ready for use in a very short time. Air Staff-level sponsored tests conducted in both the PACAF and CENTAF AOR started in 1999. The initial results were excellent, and the Cortec process is now being used to store AGE and vehicles. It takes

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Despite the problems experienced by WRM in recent years, the program remains a vital part of our logistics posture and has proven to be cost effective.

approximately 5 hours to prepare a vehicle or piece of equipment, depending on the size. The materials per vehicle cost less than $1K.[38] Several survey respondents advocated an increase in the deep storage program, which can be used on AGE, vehicles, and certain bare-base assets as well.

Another recurring theme in the survey responses was the manpower-intensive nature of the WRM program. CENTAF and PACAF have recognized this, and WRM maintenance has been contracted out in the CENTAF AOR and South Korea. Several survey respondents advocated an increase in the use of contracted maintenance for these assets.

Two other initiatives that have been suggested are an increase in afloat prepositioning and a complete revamping of how WRM is managed. The Air Force uses afloat prepositioning for munitions. This eliminates the need for storage on land; however, the ship still must sail to a dock and download. The theater-distribution system must be up to the task of getting these assets to the point of intended use in time to be effective. The Joint Staff-commissioned study mentioned above advocates an increase in the use of afloat prepositioning. One survey respondent also questioned the need for a WRM program in its present form, given that we have fought several major campaigns in just 3 years and are poised for potential future operations. The Air Force *operationalized* WRM 463L pallets and net sets several years ago, and the rest of the program may need to go this route as well.

Additionally, many of the survey respondents indicated that a thorough review of the WRM program is needed. While almost all respondents were in agreement that WRM is beneficial and the program needs to continue, several stated that WRM is a Cold War program and, as such, may need to be revamped to meet the new strategy. As we evolve from the 2-MTW strategy into the 1-4-2-1 strategy outlined above, it is apparent that we may need to have WRM available in theaters or use it in operating locations different from where it has been stored in the past.

Conclusion

Despite the problems experienced by WRM in recent years, the program remains a vital part of our logistics posture and has proven to be cost effective. Using the F-16 case study as an example, the Air Force could save several million dollars a year on just one 12-ship fighter deployment if the WRM is available for use in theater. The programmatic changes required to get the maximum benefit from the program are large. However, research indicates that these changes will be necessary to meet the new defense strategy.

The Air Force should load all aircraft support equipment into UTCs for all plans. Planners at all levels should be educated on these UTCs and use available automated planning tools to the fullest extent. As TPFDDs come up for review in the course of the normal deliberate planning cycle, they should be updated with this capability. They should also be loaded in precanned *Generate the Mission* Air Force force

modules in JOPES/DCAPES to enable rapid assessment and use during crisis-action planning.

The Air Force traditionally has not used afloat prepositioning for nonmunitions assets. However, given a rapidly changing security environment, the freedom of movement inherent in afloat prepositioning is a real asset. However, most Air Force personnel are not experienced in surface shipments. The Surface Deployment and Distribution Command (responsible for terminal operations) and the Military Sealift Command should be contacted for recommendations and lessons learned. The Army and Marine Corp have experience with storing equipment in unit sets, and they should be tapped for possible benchmarking as well.

Additionally, the Air Force should look at having WRM program maintenance done completely by contractors. There is risk involved with that, yet contractors have been used successfully in both CENTAF and PACAF. A study should be conducted to determine the costs of contracting out the maintenance versus adding additional manpower variances for WRM maintenance.

The Air Force also should explore ways to lower the maintenance costs of the WRM program. In addition to using deep storage technology, procuring new equipment and placing that equipment into WRM may prove beneficial in the long run. A cost analysis may be needed to determine the benefits of continuing to maintain old equipment, which many of our personnel are not familiar with and which face challenges of sources of repair parts as manufacturers go out of business or stop producing certain vehicles. Procuring new equipment would mitigate both of those concerns.

A cost analysis may be needed to determine the benefits of continuing to maintain old equipment, which many of our personnel are not familiar with and which face challenges of sources of repair parts as manufacturers go out of business or stop producing certain vehicles.

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The Impact of JCS Project Code Removal on the Ability to Continue C-5 Operations at Travis AFB without a Cannibalization Aircraft

Introduction

It is important to have a historical perspective of C-5 spares and their funding to gain a better appreciation of the current situation. Many Air Force members are aware of the poor maintenance reliability inherent in C-5 operations. A point paper written by Lieutenant Colonel Anthony Marchesano, Air Mobility Command Regional Supply Squadron (AMCRSS), provides the background data used in this introduction.

The most recent situation was highlighted during 1997 when there was a decline in most spares readiness trends and an even more dramatic decline over the last few months of 1999 concerning spare parts availability. Many of the spares problems could be attributed to two factors.

The first was associated with constrained requirements and poor spares funding in previous years, which created a growing buy-and-repair backlog at the depots. The second was the Base Realignment and Closure of the Sacramento and Kelly Air Logistics Centers and the workload transition to new sources of repair, contributing to the abrupt supportability problems. Spare parts requirements to fill the logistics pipeline were constrained in expectation of efficiencies that never materialized since the implementation of Lean Logistics in 1993 and 1994. Spares funding hovered around 90-95 percent of the constrained requirement, except in

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It had been 30 years since Travis did not have one of its C-5 aircraft carrying the designation of cann bird.

fiscal year (FY) 1997, when funding was 56 percent for buy and 83 percent for repair. Buy-and-repair lead times caused the effect of this deficit to spread across FY97, 98, and 99, creating a buy-and-repair backlog bow wave at the depots. Air Force Materiel Command's (AFMC) estimate of the bow-wave requirement, presented to the Office of the Secretary of Defense, was $381M. AFMC received and obligated these funds in FY99 and spent $257.2M on engines and $124.6M on spares; however, the C-5 only received $5.2M, about 4 percent of the funding.

Beginning in FY00, the Defense Logistics Agency (DLA) launched its aviation investment strategy, investing an additional $56M in C-5 spares support. This 4-year initiative boosted the stock level for more than 1,700 C-5 national stock numbers, many of which were poor weapon system performers. In FY00, there was 100-percent funding of the validated requirement through AFMC for the first time in many years. Demand levels were established on the first mission capability (MICAP) request for consumable items (XB and XF) beginning 1 January 2001. This change established the demand pattern required when the depot received the first MICAP request to forecast buys, versus the previous two requests required to create a demand level. Bottom line here was increased stock, which may ultimately reduce MICAP numbers."[1] This may be a positive trend but not the final solution by any means. It was not until the tragic events of 11 September 2001 that C-5 funding for spare parts hit its highest levels, paving the way to increased performance levels based on spares availability. This was accomplished primarily by the assignment of Joint Chiefs of Staff (JCS) project codes and a depot surge for spare parts production and procurement.

These events, coupled with a new maintenance philosophy at Travis AFB, California, pushed logistics to a new level. The 60th Maintenance Group—in conjunction with the 60th Logistics Readiness Squadron (LRS), the AMCRSS, and the entire C-5 team at Warner-Robins Air Logistics Center (WR/ALC)—made history. On 15 April 2003, Travis finished repairs and launched its last cannibalization jet (cann bird).

It had been 30 years since Travis did not have one of its C-5 aircraft carrying the designation of cann bird. To date, Travis has operated its maintenance program without a cann bird as a constant source of mission capable parts and relied heavily on increased depot support via surge operations, project codes increasing their pecking order for MICAPs, and an aggressive campaign by the AMCRSS, the WR/ALC C-5 Team, the 60th Maintenance Group, and the 60th LRS mission support element to obtain critical aircraft spares through nontraditional, albeit approved, methods. Additionally, based on Travis' success, Dover AFB, Delaware, *repaired* and flew its cann bird in February 2004. Now, both Air Mobility Command (AMC) active-duty C-5 wings have operated without a cann bird for time-sensitive parts.

The focus of this research effort was to answer the questions, can the C-5 fleet continue to operate without a cann bird once the depot surge status is turned off and project codes authorizing expedited delivery and priority times are removed from the system, and will the AMRSS, WR/ALC C-5 team, and LRS mission-support elements be able to continue their high level of support?

One important aspect of the research was determining how long the C-5 fleet has operated in its current environment in terms of spare parts funding for MICAPs and depot surge operations. This information may help develop a better perspective on the current level of support that depots provide and how the logistics community has become accustomed to this support.

The second area of consideration was the current level of support provided to the maintenance community from the logistics readiness squadrons, AMCRSS, and the C-5 team at WR/ALC. It is important to know how this support is provided under the current surge operations and project code environment. This was used as a baseline for making predictions about support that can be provided once the depot surge operations are turned off and the project codes are removed.

Summary

Historically, the C-5 fleet has been a maintenance nightmare from the beginning in the mid-1960s. It was not until the late 1990s that the major commands with C-5s pressured AFMC to shift its focus and provide better spare parts support. Fleet health improved somewhat in early 2000, but not until the tragic events of 11 September did the fleet enjoy an almost *open checkbook* of spare parts support. The depots went into surge operations, and JCS project codes were assigned. In April 2003, Travis and its associated support organizations repaired and flew their last cann bird. Travis has continued to operate without a cann bird for the last 14 months, and the future is uncertain. Can Travis continue to operate in this manner without direct MICAP support from a cann bird when the depot surge is stopped and the project codes are removed?

Historically, the C-5 fleet has been a maintenance nightmare from the beginning in the mid-1960s.

A topic of this nature is very subjective. The C-5 fleet has never operated without a cann bird of some fashion from its very inception. For Travis to operate without a cann bird for the last year is an amazing achievement in and of itself. All the key players are very passionate about their accomplishments and were even recognized by General John P. Jumper himself.

When dealing with government employees, it is often difficult to get honest opinions about the current state of affairs. Many people fear reprisal for what they say, especially if they talk about problems with the system. Some people only give their honest opinions if they can remain anonymous. Others are more willing to express their views openly with a caveat stating it is their opinion but not official Air Force policy. Both situations can pose a problem to researchers because they cannot alienate the interview subjects, and they cannot compromise the interviewee's job or career. However, this case proved to be different. The employees interviewed were more than willing to express their views and even remarked that one of the reasons for their recent successes was related to their ability to communicate their issues and suggestions to senior leadership without fear of reprisal.

Immediately after the terrorist attacks on 11 September, the United States took actions to prepare for the Global War on Terrorism. One of those actions was preparing the military's industrial base for surge operations. There are numerous programs that were initiated to ramp production, but this research focused on one area: the JCS

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Travis established the expectation that it will no longer resort to a cann bird as a source of MICAP parts since it has operated under this construct for more than a year.

project code. Project codes are supported by several mechanisms, one being depot surge operations. In combination, a project code with a surging depot behind it potentially can create a windfall of spare parts and a favorable priority system to put the right parts in the right place, at the right time.

Hand in hand with the project code came the authorization for depot surge operations. AFMC's air logistics centers operated on a tight budget with minimal gains in funding. However, post 11 September, the depots were authorized to increase operations and spend vital dollars to keep America's warfighting assets ready for battle. These two actions were an immense contribution to the elimination of Travis' cann bird. This sounds simple, so why is there a problem?

Travis established the expectation that it will no longer resort to a cann bird as a source of MICAP parts since it has operated under this construct for more than a year. It possibly has created an unrealistic expectation that the C-5 fleet can operate this way indefinitely and that the return to cannibalization at Travis would somehow reflect a flaw in leadership. Travis has become accustomed to the high priority it receives with the project code and counts on receiving its MICAP parts within days after ordering, unlike the weeks it once took before the code was assigned.

The impact on expeditionary logistics is harder to quantify. If Travis operates without a cannibalization aircraft, technically there is an additional airframe available for use. However, the reality of the situation is not so clear. When one or more of the C-5s at Travis are down for maintenance, there is a MICAP part the aircraft needs. More often than not, the part could be cannibalized from a plane already broken for a different part, and the mission could proceed. Instead, the practice has become to press the support system to produce the necessary part with an incredibly quick turnaround time to make both aircraft fully mission capable. Not a bad idea, except you run the risk of having multiple aircraft down for MICAP parts instead of just one, the cannibalization jet. The bottom line is still a bit fuzzy because there is no clear-cut way to define an impact on expeditionary logistics at this point. One thing is for certain, Travis has been operating without a cannibalization aircraft for 14 months.

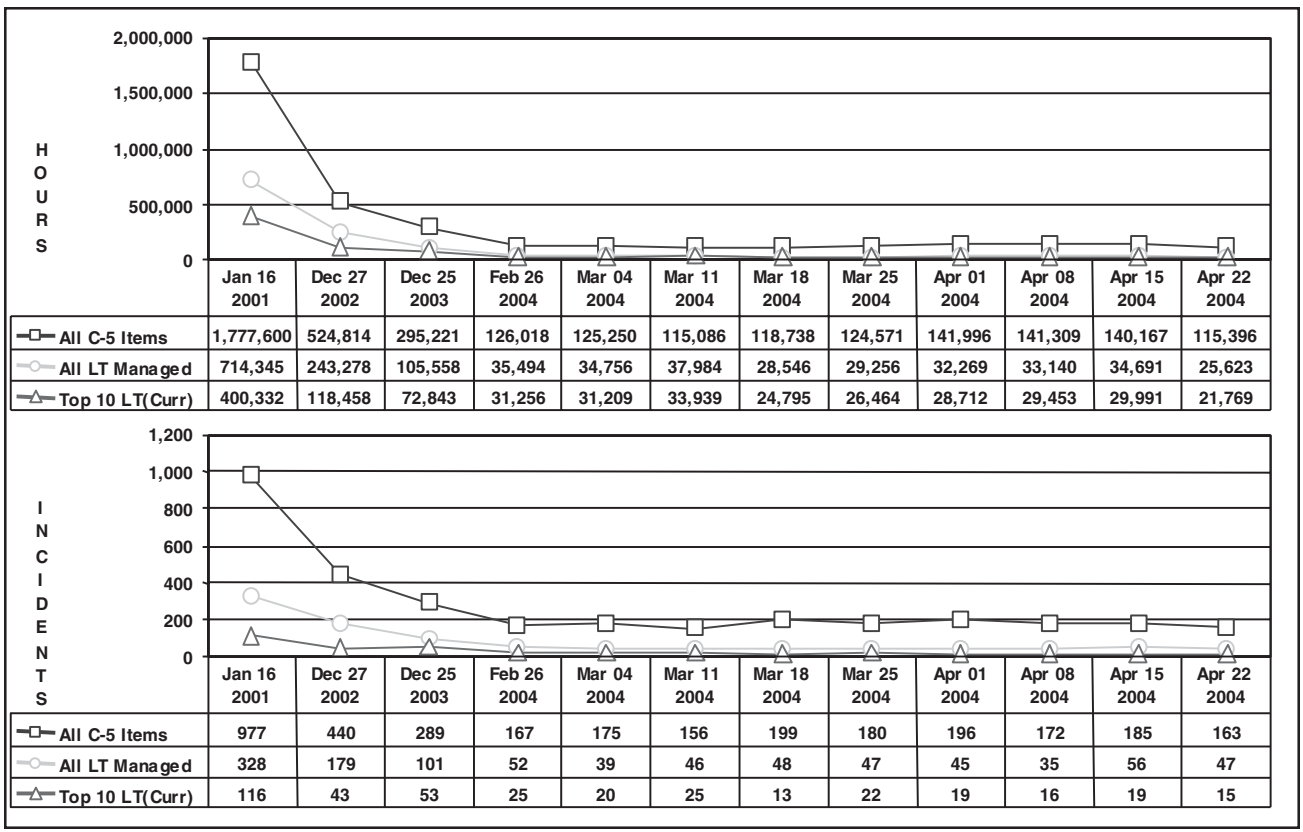
Figure 1 shows the historical perspective of MICAP parts since January 2001. One can see from the graph the massive decline in both MICAP hours and incidents. MICAP incidents refer to the number of MICAP parts needed, and hours refer to the amount of time it took to fill the order. The downward trend occurs almost immediately after the depot surge began after 11 September 2001 and has remained at that level since. The money has been in the system to procure the extra parts, as well as fund the overtime at the air logistics centers to push the spares through the system and get them out to the field.

Although it is not readily apparent on this graph when the post-11 September surge went into effect, the near immediate downward trend is obvious to the casual observer. Additionally, JCS Project Code 9GF (Operation Enduring Freedom) was approved for use by the entire support network responsible for the maintenance and supply activities supporting the C-5 on 20 September 2001. Fortunately for the C-5 fleet, the trend continued its downward flow and almost has reached a steady

state since February 2004. The graphs also highlight the downward trend in the spring of 2003 when Travis finally was able to put its cannibalization aircraft back together.

Figure 2 highlights the average number of MICAP parts ordered per day across the active-duty C-5 fleet. Unfortunately, there were no data available at the time this article was written to cover the one Air National Guard C-5 unit or the two Air Force Reserve units. The column on the left is the total number of starts, and the numerical representation underneath is the number of starts for the fleet as a whole and by base each month.

The data for Travis from April 2003 until March 2004 are quite consistent with nearly the same numbers of MICAP starts for an entire year, with a small increase in the summer months of 2003, right after the cannibalization aircraft reentered service. Although the number of MICAP parts ordered every day does not seem to correlate to project codes and depot surge, this is an important aspect of the problem. The data still point out that, even though the money is available for parts and the overtime



	Jan 16 2001	Dec 27 2002	Dec 25 2003	Feb 26 2004	Mar 04 2004	Mar 11 2004	Mar 18 2004	Mar 25 2004	Apr 01 2004	Apr 08 2004	Apr 15 2004	Apr 22 2004
All C-5 Items	1,777,600	524,814	295,221	126,018	125,250	115,086	118,738	124,571	141,996	141,309	140,167	115,396
All LT Managed	714,345	243,278	105,558	35,494	34,756	37,984	28,546	29,256	32,269	33,140	34,691	25,623
Top 10 LT(Curr)	400,332	118,458	72,843	31,256	31,209	33,939	24,795	26,464	28,712	29,453	29,991	21,769

	Jan 16 2001	Dec 27 2002	Dec 25 2003	Feb 26 2004	Mar 04 2004	Mar 11 2004	Mar 18 2004	Mar 25 2004	Apr 01 2004	Apr 08 2004	Apr 15 2004	Apr 22 2004
All C-5 Items	977	440	289	167	175	156	199	180	196	172	185	163
All LT Managed	328	179	101	52	39	46	48	47	45	35	56	47
Top 10 LT(Curr)	116	43	53	25	20	25	13	22	19	16	19	15

Figure 1. MICAP Hours and Incidents Since January 2001

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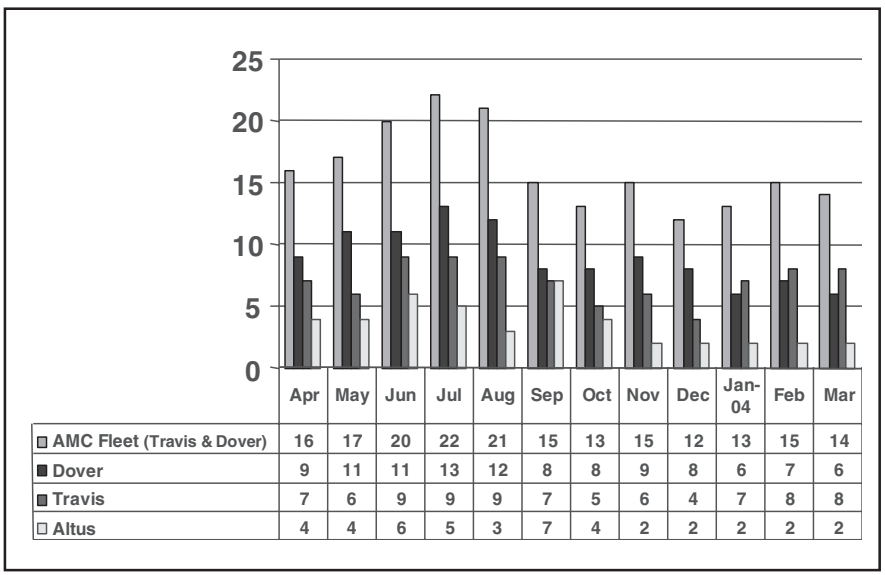
You get a better predictor for what parts you may need in the future based on current trends by identifying the reason parts are ordered as MICAPs.

required to get the parts through the depots, the C-5s still break, and it is very difficult, if not impossible, to have all the spares readily available on the shelf to fix the plane. It is important to understand that it probably is not possible to eliminate MICAPs, so when the depot surge stops, it is likely the MICAP numbers will rise.

Knowing the number of MICAPs ordered each day is key. Additionally, it is worth looking at why those parts need to be ordered as MICAPs in the first place. This is known as a MICAP cause code. You get a better predictor for what parts you may need in the future based on current trends by identifying the reason parts are ordered as MICAPs. This next chart breaks down the reasons parts were ordered as MICAPs during the last year and how many times the incident occurred. The cause codes are defined as follows in Air Force Manual (AFMAN) 23-110, Volume 2, Part 2, Chapter 17:[3]

- **R—**Full base stock: assets cannot be used to satisfy this requirement; that is, deployed mission support kit, inaccessible supply point balance, or otherwise unavailable.
- **K**—Less than full base stock: no stock replenishment due-in established.
- **J**—Less than full base stock: stock replenishment requisition does not exceed priority group Uniform Materiel Movement and Issue Priority System (UMMIPS) standards. **Note:** This cause code also will be assigned when a routine due-out has been linked manually to a stock replenishment due-in and a MICAP condition occurs. The due-in is no longer recognized as stock replenishment due-in.



	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan-04	Feb	Mar
AMC Fleet (Travis & Dover)	16	17	20	22	21	15	13	15	12	13	15	14
Dover	9	11	11	13	12	8	8	9	8	6	7	6
Travis	7	6	9	9	9	7	5	6	4	7	8	8
Altus	4	4	6	5	3	7	4	2	2	2	2	2

Figure 2. Daily MICAP Starts[2]

- **H**—Less than full base stock: stock replenishment requisition exceeds priority group UMMIPS standards.
- **C—**AFMC/SPM/IMS: has determined the item should not be stocked at base level.
- **B—**No stock level established: past demand or reparable generation experience but Air Force base stockage policy precluded establishing level.
- **A—**No stock level established: no demand or reparable generation before this request.

Figure 3 illustrates the number of cannibalizations per 100 sorties across the active-duty C-5 fleet. Again, Guard and Reserve data were unavailable because of time constraints. This chart displays the number of times maintenance personnel were forced to cann a part from an aircraft to fulfill a MICAP request to meet mission demands. There is a significant difference in the number of cann actions between Dover and Travis from April 2003 until March 2004. You can see that, even after Travis repaired its cannibalization aircraft in April of 2003, the number of cann actions remained low with only slight increases throughout the rest of the year. This is in stark contrast to the actions at Dover and Altus AFB, Oklahoma, whose cann actions regularly exceeded the recommended goal of less than 19 actions per 100 sorties. As a matter of fact, even without a cannibalization aircraft, the team at Travis routinely averaged ten cann actions, nearly half the recommended level (Figure 4). Obviously, they were doing something right.

There is a significant difference in the number of cann actions between Dover and Travis from April 2003 until March 2004.

An additional and very important piece of this puzzle is the availability of parts in the depot system. This is identified and tracked as stockage effectiveness. Stockage effectiveness means the spare part was available on the shelf immediately at the home station. These data are key for two reasons. One, the depot surge keeps parts moving through the system and replaces the assets on the shelf faster. Second, the project code assigned to Travis and its lack of a cann bird increase its pecking order for the parts on the shelf, allowing it to repair aircraft faster and avoid unnecessary cann actions. Figure 5 illustrates the stockage effectiveness for the active-duty C-5 fleet, with a goal of 85 percent. The sources of supply are AFMC, DLA, and any other approved sources. These include contractors, the Defense Reutilization and Marketing Office, and even some independent vendors such as partsbase.com that have managed to collect miscellaneous spares over the years. Unfortunately, this chart does not include the items locally manufactured at each installation to meet mission demands.

It should be apparent, by looking at this graph and comparing it to Figure 3, that the increase in funding that drove down the number of MICAP incidents and hours is responsible for the increase in stockage effectiveness . This translates to parts on the shelf.

One final piece of tracking data covers the top 100 C-5 MICAPs (Figure 6). The chart depicts the top 100 parts the C-5 community (active, Guard, and Reserve) had to order as MICAPs for the last 6 months. A summary for the last 12 months was unavailable from the source at Warner-Robbins. This chart tracks the parts ordered

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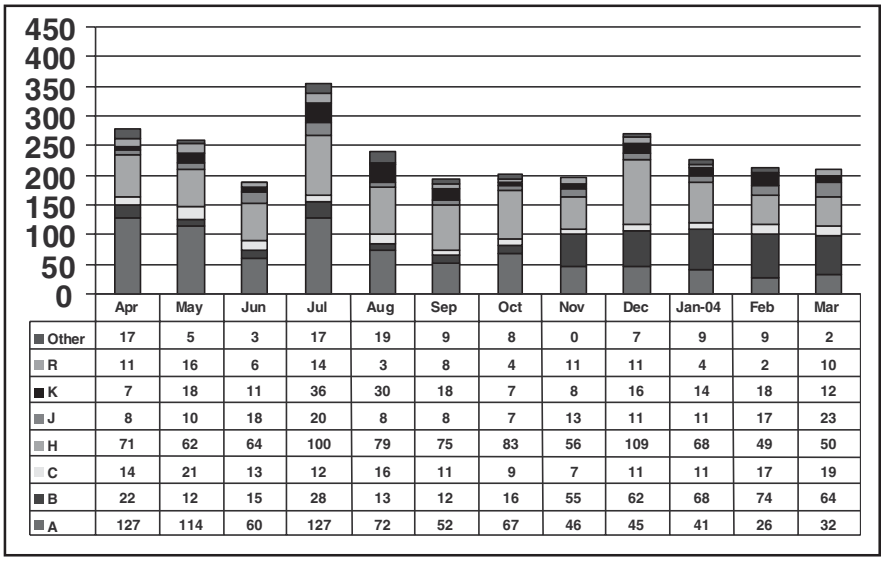
each month, ranks them by number of times they were ordered during the month, and then ranks the part's priority during the month. For example, the top MICAP ordered in April 2004 was a safety relief valve, with 27 incidents totaling 5,368



	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan-04	Feb	Mar
Other	17	5	3	17	19	9	8	0	7	9	9	2
R	11	16	6	14	3	8	4	11	11	4	2	10
K	7	18	11	36	30	18	7	8	16	14	18	12
J	8	10	18	20	8	8	7	13	11	11	17	23
H	71	62	64	100	79	75	83	56	109	68	49	50
C	14	21	13	12	16	11	9	7	11	11	17	19
B	22	12	15	28	13	12	16	55	62	68	74	64
A	127	114	60	127	72	52	67	46	45	41	26	32

Figure 3. MICAP Cause Codes[4]

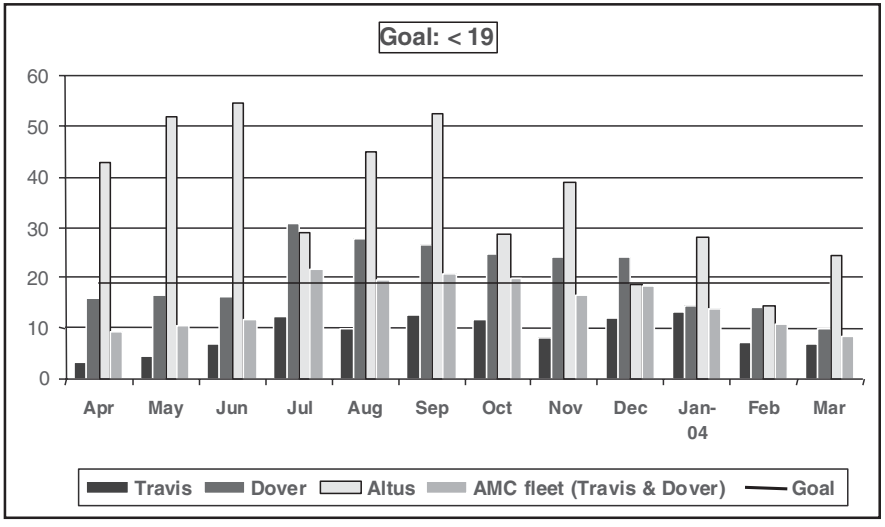


Figure 4. Cannibalization Actions Per 100 Sorties[5]

hours for the month. The number of orders for the valve and the high number of hours waiting for the part made this the number one MICAP for April. Numerous other factors determine the top 100 list, but for the purposes of this research, the important take-away is that there was no clear indication over the last 6 months that any one or group of parts was responsible for grounding the fleet in a consistent manner. A part could have been number 347 in November, then number 1 in April. Therefore, the data do not show a clear correlation from one month to the next in terms of specific MICAP parts. This makes it extremely difficult to determine where the depots should place their priorities for parts from one day to the next. It almost becomes a guessing game of hit or miss. A prediction in the wrong direction potentially could ground the fleet (Table 6).

The data to this point have focused on the hard numbers. They have shown the distinct downward trend in MICAP incidents and hours since the spare parts funding increased and the depots went into surge operations. This directly resulted in increased stockage effectiveness which, in turn, lowered MICAP orders. The implementation of the project code and depot surge bolstered requisition priority for Travis, allowing it to make better cannibalization decisions to fix and launch cannibalization aircraft. From this point on, the data collected focused on opinions from the field in regard to the ability of Travis to maintain its fleet without the reliance on a cann bird.

Surprisingly, the data collected in the field from multiple individuals were remarkably similar. The opinions expressed obviously were not just from one person, but it seemed that all involved in the process were on the same page. One area that

A prediction in the wrong direction potentially could ground the fleet .

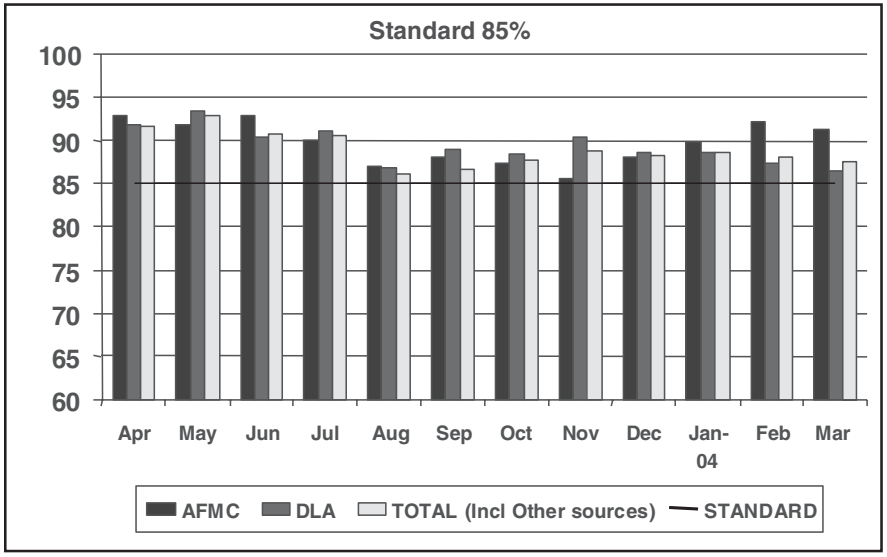


Figure 5. Stockage Effectiveness[6]

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There were three critical reasons the C-5 team was able to eliminate the cann bird.

did not get covered was a direct response from the 60th Maintenance Group at Travis. This was attributed to conflicting schedules and a lack of time on the part of the team at Travis and the researcher. However, the team at Travis did publish an article detailing the events that took place to fix the cannibalization aircraft, which outlines their work and maintenance philosophy. This material will be used as a reference in lieu of the interview.

According to the article "Travis Kicks the Cann,"[8] there were three critical reasons the C-5 team was able to eliminate the cann bird:

> Enhanced and consistent spares funding since FY99, organizational changes related to spares distribution, and policy and process changes in spares programming and repair. Bottom line, the enhanced spares availability, resulting from these policies and programming initiatives, created the readiness spares posture for a base-level attempt at eliminating the Travis C-5 cannibalization jet. While higher headquarters initiatives got Travis to third base, the Travis attitude of teamwork and innovation brought the team across home plate.
>
> The daily teamwork between the maintainers, the 60 logistics readiness squadrons and AMCRSS were instrumental. Almost constant oversight of daily MICAPs between representatives from each organization was critical. In addition, a close working relationship with WR-ALC further improved the response to potential showstopper MICAP conditions. Innovation also was vital in the local effort to reduce the C-5 cannibalization jet. For example, Travis supply and maintenance personnel discovered a Web site (www.partsbase.com) that linked them with commercial vendors who possessed legacy parts that were not often available in standard Air Force inventories. Once maintainers located these parts, they passed the information to the appropriate supply and depot authorities to procure the item from the vendor. The most notable difference at the base level was a cultural shift in attitude toward cannibalization. Initially, maintainers wanted to resort back to cannibalization when a critical spare was unavailable. To prevent this, the maintenance group commander designated only senior squadron supervision as approving authorities for all cannibalizations. Now, every grounding MICAP requirement attracts tremendous attention. Additionally, this increased emphasis improved troubleshooting. This approach forced both the logistics readiness squadron and the maintenance group to review their approach to cannibalization and forced the system to aggressively pursue alternatives to cannibalization.
>
> The article gives credit to the entire team involved in the C-5 community. One thing the article did fail to mention was the help in spare parts priority garnered from the project code. A slight oversight, perhaps, but one worth noting. The main point to gain from the article is the reference to a cultural change in the maintenance, logistics readiness, regional supply squadron, and depot repair support arenas.

A critical piece of information for this research is the current level of support provided by the C-5 *supply* community to the C-5 maintenance community. Roger L. Shoemaker, C-5 Integrated Logistics Support Manager, WR-ALC,[9] was kind enough to provide a thorough answer to this question. The question asked for his opinion on the current level of support the C-5 team provides for MICAP support. It was followed up with a question asking if, in his opinion, this level of support represented a cultural change as alluded to in the *Exceptional Release* article. Before

Shoemaker provided his opinion, he made it clear that this opinion is his alone and does not reflect Air Force policy or necessarily that of the WR-ALC. He stated:

> When a cann request is received, WR-ALC/LTSC springs into action trying to obtain the needed part by any means available. First, we contact the part's item manager for procurement and repair status of the part. If a part is nearing completion of an overhaul, we can sometimes expedite the completion and ship the part immediately. If no parts are expected in the near future, we go to the Aerospace Maintenance and Regeneration Center (AMARC) to see if the part is available from one of the retired C-5s. If a part is on contract, sometimes we can ask the manufacturer to do a partial shipment to fulfill the MICAP requirement. If all other means of support prove fruitless, we will direct WR-ALC/MAB to pull the part off an aircraft in programmed depot maintenance (PDM); however, this is a last resort since it directly affects the PDM production line.
>
> In my opinion, this sea-change in attitude is accepted and embraced by everyone involved with the C-5 program at WR-ALC, from the center commander and directorate level to the item managers working the parts issues and the maintenance professionals in PDM turning the wrenches. It feels very good to be on a winning team, and we intend to keep it that way. We are a finely tuned machine working at top capacity and loving it! This positive change in attitude is also seen across the board in our other sources of supply (Defense Logistics Agency, Oklahoma City ALC, Ogden LC, and our repair contractors). In my opinion, support for the C-5 has never been better.

Shoemaker made some very insightful comments in his answer to the questions, especially highlighting the cultural change. He was asked two followup questions regarding the level of support he feels the system can provide when the project codes are taken away and if he thinks Travis could maintain its flying mission without a cann bird. He responded as follows:

When a cann request is received, WR-ALC/LTSC springs into action trying to obtain the needed part by any means available.

> In my opinion, there will be no change in spare parts support when the 9GF project code is dropped. We continue to work closely with DLA, Ogden ALC, and Oklahoma City ALC, identifying problem parts and solving support problems. The C-5 aircraft sent to AMARC have been a gold mine of hard-to-get parts. None of this will change when the project code is dropped. However, there are no guarantees. Travis and Dover have definitely benefited from the use of the 9GF project code, since you get top priority on the parts you need. When the 9GF code goes away, the playing field will be leveled again in terms of who gets the parts first. The oldest MICAPs, regardless of the generating command, will be filled first, in most cases.
>
> In my opinion, you will see some minor increased delays in receiving reparable parts; however, you should not see any noticeable increased delays in receiving expendable parts. On the bright side, be aware that everyone in the Strategic Airlift Directorate is dedicated to giving our warfighters the very best support possible. We will endeavor to make the loss of the 9GF project code as painless as possible.

Field M. Ledford, WR-ALC Warfighter Support, Strategic Airlift Directorate,[10] was also kind enough to offer his thoughts on the same two questions. His answers also came with the caveat that they were his opinions alone and not official policy. He states:

> Project codes have most certainly been favorable to Travis and Dover over the last couple of years. In my opinion, AMC will see increased lead time to the customer for reparable

spare parts when the project codes are no longer authorized. However, I would not expect any change in support for expendable spare parts. Some reasons I would expect to see increased lead time to the customer for reparable items are: 1) supply chain mechanisms that drive in repair (Execution and Prioritization of Repair Support System) and issue assets (Military Standard Requisitioning and Issue Procedures) to the customer will revert back to their normal repair and issue priority systems, and this will definitely impact the pipeline flow of assets to AMC, and 2) project code assignment also generates additional funding for repair, manpower, overtime, priority contracts, premium funding, etc, which will no longer be available when the codes are removed.

Finally, both men were asked if the loss of the project codes or a wartime environment will lead to a decrease in C-5 supply support. Both men had interesting answers to this question. Ledford states:

> Yes, I believe it will eventually, but not immediately. The surge mechanism is currently fully engaged, and this has a tremendous impact on parts availability for units authorized wartime project codes. Wartime project codes impact all aspects of the supply chain in terms of how we react and respond to the warfighters' requirements. Readiness spares packages and stock levels are increased; funding, overtime, manpower, capacity, management oversight, and many other initiatives are increased and expanded to support and react to the increased ops tempo.

Project codes have most certainly been favorable to Travis and Dover over the last couple of years.

Along a different path, Shoemaker responded, "No. We maintain the same high sense of urgency in peacetime and in wartime. Our only customers are the warfighters, and we do everything within our power every day to support them. Our closely knit team of seasoned government professionals and highly experienced contractors will continue to provide the highest level of support." Both men's opinions and insight into the situation are almost the same. The only difference seems to be timing. Ledford thinks the support may eventually erode, while Shoemaker believes there has been a complete cultural shift and the support will be there almost always.

Findings and Potential Solutions

The data collected from the various sources proved to be very insightful. There were no clear-cut answers, but that was not an unexpected outcome. There were two distinct areas that were looked at as possible indicators for the future health of the C-5 fleet and Travis' ability to maintain operations without a cann bird when the project code is removed and the depot system ends its surge operations. From a historical perspective, the data clearly show that the increase in funding during the late 1990s increased spare parts availability to help improve the health of the fleet. It also shows a large decrease in MICAP incidents and hours when the depot system went into surge operations on 20 September 2001. The number of MICAP incidents went from 977 in January 2001 down to only 440 in December 2002, just a year after the project code and depot surge went into effect. That is more than a 50-percent reduction in the number of spare parts that needed to be ordered as MICAPs. That bit of data shows that parts were readily available on the shelf.

The parts-on-the-shelf concept is further highlighted in Figure 5, which shows stockage effectiveness rates for C-5 parts at a level higher than the 85-percent goal for the last year. Again, when the parts are available, they do not need to be ordered

as MICAPs. The extra money for the spare parts because of depot surge operations obviously directly translated to an increase in parts availability. When parts are available on hand, the aircraft can be repaired faster and meet their mission objectives.

Figure 2 shows the number of parts that were ordered as MICAPs on a daily average during each month of the last year. The only trend this chart shows is the consistent number of parts that Travis ordered over the course of the year and compares it to Dover and Altus' ordering practices. The three bases' trends were nearly identical, with the exception of the actual number of MICAPs ordered at each installation. Altus' numbers were the lowest, but it also has the least number of aircraft. Dover started off in the double-digit realm and then managed to get its incidents under an average of ten. Travis maintained its numbers at nearly the same level for the entire year. Unfortunately, this chart does not give a clear answer to how Travis managed this practice but perhaps alludes to some clues about its maintenance practices as a whole.

Figure 3 breaks down the reason, or cause codes, for MICAP orders. This is important because it points to trends in the support system, specifically parts availability. This chart showed the three major causes for MICAP conditions during the last year were codes A, B, and H. Code A represents no stock level established, no demand data available. This means there was a history of the particular part's being ordered in the past, so the system did not see a need to stock the spare part. This is a key piece of information, highlighting that the old C-5 fleet is breaking in new ways. Code B shows that there were requisitions for this part in the past but not enough in recent history to show a consistent demand for the item. The part would have been stocked in the supply system if there was a consistent demand for the part. Code H represents a demand level for the part that exceeds the current authorized supply level. Basically, the system, based on past demand trends, set the priority stockage level for this particular part at a specific level, but current demand trends for the part are exceeding the ability of the system to supply the part. Again, this points to the aircraft's breaking in new ways, as the demand was not anticipated.

If you have a consistent demand for an item, chances are you will have it either on the shelf or readily available in the support system within a day or two.

Hand in hand with stockage effectiveness and MICAP cause codes is cannibalization actions. You do not need to cann a part that you have on the shelf. If you have a consistent demand for an item, chances are you will have it either on the shelf or readily available in the support system within a day or two. Figure 4 shows the average number of times the C-5 maintenance crews had to cann a part for every 100 sorties flown. This particular chart probably shows the greatest difference in maintenance practices as a whole and the effect of the JCS project code. First, that all three bases do still cann parts is simply a necessary evil. However, the graph shows a radically different approach. Altus seems to cann parts from one plane to the next on a recurring basis simply to have a plane or two to fly. The practice seems out of control, but this is not necessarily true. Altus has the JCS project code but it is a *B-Flag* applied only to its mission readiness spares packages because it is a training base and is not supporting war efforts directly. Therefore, its priority for MICAPs is dead last. Dover's cann rates are still high but less than Altus' rates. Dover

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In its simplest form, the cultural change represents a new attitude toward maintenance and supply support both at Travis and at the depot.

seems to cann a substantial number of parts to meet its mission demands. Conversely, Travis hardly ever canns a part. Travis seems to rely on a different maintenance philosophy than other C-5 wings regarding cannibalization .

The C-5 top 100 MICAP list (Figure 6) did not provide the expected information. When the research began, the assumption was that perhaps there were a handful of parts in the system that were responsible for grounding the aircraft. If these parts were readily available in the future, other C-5 wings perhaps could repair their cann birds and maintain all their aircraft as fully mission capable. However, this was not the case. Just a quick glance at the listing will show that, over the last 6 months, the only trend seems to be the lack of any one part or even group of parts as the answer to the cannibalization issue. As noted, many parts were not even a priority in the last 3-4 months; yet at one point, they rose to the first or second priority. An interesting trend but not one that will provide the concrete answer this research hoped for. Instead, this research took an unexpected turn.

When this task was started, the expected answers were a list of problem parts and a lack of funding for spares. The assumption was that when the JCS project codes were taken away Travis would be back to a cannibalization aircraft in a matter of weeks. How could it possibly keep all its jets active without the project code? What else was needed to make this happen, and why could other C-5 wings not match its accomplishments?

The answer seems to lie in the article from the *Exceptional Release* and the interviews with key leaders at Warner-Robins AFB, Georgia. The project code, coupled with the depot surge, was merely the foundation for Travis to repair and fly its cannibalization aircraft. It took more than parts on the shelf to make it happen, and the work continues to keep all their aircraft fully mission capable. Make no mistake, the added parts support from the surge and project code remain a key piece of the puzzle. However, that was just the beginning. As the article pointed out, there needed to be a cultural change within the entire support system to make it a reality and maintain the standard.

In its simplest form, the cultural change represents a new attitude toward maintenance and supply support both at Travis and at the depot. For the change to take place, leadership from the highest levels had to support the initiative. The leadership then needed to articulate this new philosophy down to those actually turning the wrenches and procuring the parts. This was not to be a one-time good deal; this was to be the new way of doing business. The people needed to be innovative and change the way they looked at maintenance and supply.

Innovation, for the purpose of this research, refers to maintenance practices and supply support. In the past, when maintenance needed a part that was grounding an aircraft that supply did not have, they would cann the part from another source and, at the same time, order the MICAP. This MICAP would be against the plane the part was canned from. When enough parts were taken from one particular aircraft, that plane had so many *holes* it was nearly irreparable and became a cann bird. During the last 14 months, this practice changed at Travis. Instead of instantly canning a part from one jet to another, the maintenance team coordinated its requirements

with the suppliers to see how long it would take to get the replacement. Additionally, the maintenance team helped the suppliers locate additional sources of repair parts and even received engineering assistance from the depots to repair many parts at home station. This often cut aircraft downtime by several days since they did not have to wait for the spare part to be shipped; they could manufacture or repair the part at Travis. This also led to the referenced cultural change.

As mentioned, instead of automatically canning the parts to *green up* a jet, the maintenance team now coordinates all parts requests (MICAPs) with the supply team. This has become the norm for avoiding unnecessary cannibalizations. For example, if one of Travis' aircraft breaks and the part is a MICAP, the aircraft is not scheduled to fly its mission for 2 days, and the anticipated repair time is 4 hours. In the past, maintenance would have canned the part from another aircraft to have the jet ready to go. Now, the maintenance team checks with the supply team to see how long it will take to get the part from the supplier. If the part is being repaired at the depot, the supply team at Travis will work through the readiness supply squadron to obtain detailed information on when the part will be ready to be shipped. The readiness supply squadron will coordinate with the depot to provide the anticipated time line for repair, inspection, and shipping to the supply team at Travis. The supply team will work with the maintenance team to determine if the time line will be fast enough to avoid the need to cannibalize the part. The cann action will not take place if the part will be received in time to make the aircraft's scheduled departure time. If the window of opportunity is too narrow, the part will need to be canned, and the in-bound spare will be applied to the other aircraft. This practice occurs each and every time a potential cannibalization situation arises. This procedure has become part of the maintenance and supply culture at Travis, the readiness supply squadron, and the depot.

When enough parts were taken from one particular aircraft, that plane had so many holes *it was nearly irreparable and became a cann bird.*

The final concern with this cultural change was whether the system could keep up once the project code was removed and the depot surge was over. Referencing the interviews with Ledford and Shoemaker, the answer seems to be yes, at least for the foreseeable future. Both these men are key leaders in the depot repair process and are responsible for the cultural change at the depot. Both men provided direct feedback that they and their teams are on board with the new philosophy and have conveyed it to the lowest levels at the depot. All team members at the depot know and understand their role in keeping the spare parts flowing to the field. With their support, through the readiness supply squadron, to the base level, it seems that Travis will be able to maintain its operations without a cannibalization aircraft as the first source for MICAP parts.

This was an unforeseen conclusion at the beginning of the research but a valid one, nonetheless. Perhaps the solution to the problem is forced cultural change to maintenance and supply practices throughout the Air Force.

Conclusions and Recommendations

There were many reasons for the increase in spares support that led to Travis' repairing and launching its last cannibalization aircraft. Funding increases in the late 1990s

						MICAP Hrs	Incidents						
#####	#####	Jan-04	#####	Mar-04	Apr-04	Apr-04	#####	#####	Jan-04	Feb-04	#####	####	AMC Rank
185	455	1,353	0	1,017	5,368	27	374	293	89	0	27	1	65
0	0	5,208	0	3,059	2,880	4	0	0	3	0	6	2	0
0	0	3,248	0	3,142	2,746	3	0	0	8	0	5	3	0
321	1,890	4,022	5420	5,208	6,070	9	321	52	15	12	11	4	726
135	0	1,095	92	3,854	2,724	8	421	0	37	524	3	4	816
0	0	1,696	0	5,374	2,632	6	0	0	16	0	1	5	0
0	0	1,129	37	993	2,623	18	0	0	35	727	28	6	157
0	0	0	0	551	2,561	8	0	0	0	0	65	7	0
0	0	84	0	1,954	2,487	13	0	0	259	0	15	8	592
0	0	376	5,827	6,239	5,231	9	0	0	313	11	8	8	1,008
5,265	6,263	8,277	7,293	5,234	5,170	6	11	6	5	8	10	9	606
0	0	952	0	5,374	2,397	3	0	0	43	0	2	9	0
2,686	2,341	2,403	0	2,521	2,160	3	30	34	35	0	9	10	1,171
615	0	1793	0	3,466	2,089	6	241	0	14	0	4	11	968
0	1,964	2,976	3,118	4,464	4,535	7	0	50	27	26	14	11	343
6,480	6,230	5,149	3,590	4,386	4,528	6	6	7	10	20	16	12	171
0	0	0	0	1,137	2,049	2	0	0	0	0	22	12	0
450	0	2,232	0	2,232	1,778	3	273	0	13	0	12	13	0
249	744	1,674	734	2,353	4,320	6	344	225	17	139	39	13	214
0	0	0	0	1,221	1,600	3	0	0	0	0	20	14	0
0	0	0	0	2,251	1,473	2	0	0	0	0	11	15	0
0	0	111	0	34	1,458	22	0	0	215	0	411	16	949
0	0	0	3,450	4,464	3,762	2	0	0	0	23	15	16	572
2,169	2,293	2,488	3,543	81	3,617	6	40	35	34	21	238	17	264
0	0	1,409	0	744	1,457	3	0	0	27	0	44	17	0
0	0	744	0	887	1,440	2	0	0	79	0	31	18	0
128	0	188	2,688	1,801	1,397	4	429	0	381	34	17	19	570
0	0	2,377	0	744	1,376	2	0	0	11	0	42	20	0
0	0	0	0	695	1,358	2	0	0	0	0	55	21	0
0	0	0	0	1,986	1,332	11	0	0	0	0	14	22	206
431	744	839	1,789	2,976	3,353	6	282	222	116	57	26	22	1,041
109	141	348	1,188	1,514	1,327	7	471	425	122	100	18	23	1,179

Figure 6. Five

Rank									
NSN	MMAC	Noun	IMS	SOS	PD	Branch	SOR	WUC	Cum Hours
4820 01 189 7830	LE	Valve, Safety Relief	LHG	OO	LI	LILAM	OO	13	8378
5330 00 757 7209	UC			DLA	S9I			14	11147
5306 00 146 3104	SX			DLA	S9I			23	9136
5930 00 222 3770	TP	Switch,Thermostatic		DLA	S9E			41	22931
1620 00 179 1425	LE	Beam Assembly,Bogie	LHK	OO	LI	LILAM	OO	13	7900
5306 00 401 5614	SX			DLA	S9I			23	9702
6620 01 465 5120	UC	Indicator,Rate Of F	AA7	WR	LA	LASA	CN	23	4782
1560 00 172 0289	UC			DLA	S9G			41	3112
1560 01 169 4763		Door,Access,Aircraft	AS3	WR	LA	LASS	WR		4525
5340 01 365 8088	SX	Panel,Blank		DLA	S9I			11	17673
1650 00 535 0662	UC	Manifold Assembly,H	AA8	WR	LA	LASA	OO	14	37502
1560 00 120 0050	UC			DLA	S9G			23	8723
1560 00 102 4916		Carrage Assembly,Cargo		DLA	S9G				12111
1560 01 149 2746		Radome	AS3	WR	LA	LASS	CN		7963
1680 01 008 6102	SX	Manifold,Dewar Relief		DLA	S9G			49	17057
1680 00 106 8527	UC	Receptacle Assembly	AM4	WR	LA	LASS	CN	46	30363
1560 00 866 0566	UC			DLA	S9G			14	3186
1560 00 136 3085		Spoiler,Wing,Aircraft	AS6	WR	LA	LASS	CN		6692
5340 00 350 7208		Leaf,Butt Hinge		DLA	S9I			12	10074
4130 00 193 2661	TG			DLA	S9I			11	2821
5995 01 202 3083	UC			DLA	S9G			55	3724
1650 01 488 4018				DLA	S9G			13	1603
1560 01 126 9284	UC	Insulation Cover		DLA	S9G			11	11676
1560 00 421 2083	UC	Duct Assembly,Oil Cooler		DLA	S9G			45	14191
1680 00 248 7049	SX			DLA	S9G			14	3610
5315 00 678 8204	SX			DLA	S9I			13	3071
3120 00 432 9070	UC	Bearing,Plain,Self-Aligning		DLA	S9G			13	6202
5995 01 202 3084	UC			DLA	S9G			55	4497
5305 01 507 2297				DLA	S9I			13	2053
1560 01 169 4764	UC	Door,Access,Aircraf	AS3	WR	LA	LASS	WR	23	3318
1560 00 865 4274	UC	Duct,Alternator Cooling		DLA	S9G			24	10132
5826 01 412 0738	CX	Radio Set	N4W	WR	LY	LYGN	CN	69	4627

Top 100 MICAPs

21	158	0	1,681	3,942	3,031	3	817	401	0	60	20	24	434
356	62	4,186	302	627	1,314	17	304	565	5	334	59	24	1
80	342	200	324	791	1,288	13	531	325	164	325	37	25	2
0	0	744	0	1,98	1,276	2	0	0	65	0	19	26	0
0	0	744	0	744	1,271	2	0	0	85	0	46	27	367
2,390	1,799	0	47	1,981	2,875	9	37	55	0	676	56	27	33
1,440	2,351	2,831	2,509	2,232	2,860	4	72	32	30	35	43	28	750
50	33	286	3	1,854	1,252	11	637	710	139	870	16	28	593
0	0	744	0	842	1,246	2	0	0	71	0	33	29	412
0	0	0	0	0	1,154	4	0	0	0	0	0	30	167
2,160	2,543	0	2,688	744	1,131	2	44	30	0	31	49	31	599
1,440	1,481	1,452	1,344	2,021	2,667	4	90	85	81	80	55	31	352
0	0	0	0	383	1,127	2	0	0	0	0	86	32	0
720	744	744	672	1,022	2,629	5	169	178	161	158	108	32	0
66	83	513	0	648	1,084	6	578	511	104	0	58	33	1,027
0	432	46	493	2,267	2,620	8	0	301	728	281	41	33	161
0	0	1,488	0	2,758	985	5	0	0	22	0	7	34	0
0	0	0	102	858	2,505	9	0	0	0	495	120	34	883
0	0	0	0	0	879	0	0	0	0	0	0	35	0
0	0	503	682	2520	2427	3	0	0	285	142	36	35	157
0	0	0	0	0	857	4	0	0	0	0	0	36	0
37	0	1518	0	1198	843	7	705	0	18	0	21	37	62
0	0	1097	0	2212	818	3	0	0	36	0	13	38	0
28	580	136	1320	1299	2214	15	754	267	432	91	95	39	512
0	0	0	0	389	791	2	0	0	0	0	85	39	0
0	0	0	0	120	787	4	0	0	0	0	176	40	0
2880	2976	2976	2175	77	2172	4	28	21	21	41	250	40	908
718	99	0	1565	0	767	8	226	477	0	62	0	41	34
0	0	0	0	1102	753	1	0	0	0	0	24	42	0
2160	2232	0	1847	0	2160	3	41	36	0	56	0	43	625
0	0	0	0	0	732	2	0	0	0	0	0	43	729
0	0	1488	0	1133	725	1	0	0	19	0	23	44	0
1440	1488	1419	1679	2232	2160	3	80	70	84	61	50	44	645
2651	2203	1744	2185	319	720	1	34	47	15	40	101	45	568

Figure 6.

1680 00 239 1235	SX	Cam,Spoiler Mixer		DLA	S9G			14	8833
6610 00 018 0682	UC	Indicator,Mach And	AA7	WR	LA	LASA	OO	51	6847
6110 01 161 4873	HY	Control,Generator	ZCB	OC	LI	LIACD	OO	42	3025
1560 00 139 8419	UC			DLA	S9G			11	3518
5955 00 488 9503				DLA	S9E			52	2759
4920 01 276 7758	UC	Test Set Subassembl	AA8	WR	LA	LASA	WR	55	9092
1560 00 787 1305	UC	Door,Access,Aircraft		DLA	S9G			11	14223
1560 01 313 1802	UC	Panel,Structural,Ai	AS8	WR	LA	LASS	WR	11	3478
1560 01 030 0877	UC			DLA	S9G			11	2832
4730 00 307 8053	SX			DLA	S9C			49	1154
1680 00 185 1139	UC	Gearbox Assembly,Ai	AM4	WR	LA	LASS	CN	45	9266
6220 00 103 3217	SX	Panel,Indicating,Light		DLA	S9I			11	10405
5342 01 007 4202				DLA	S9G			13	1510
1560 ND 161 678L	UC	Regulator, C5 Acft.	7AC	WR	LG	LGS		13	6531
6610 00 782 6892		Indicator,Air Speed	NFD	OC	LI	LIIND	OO	51	2394
6685 00 757 6787	SX	Transmitter,Temperature,El		DLA	S9G			55	5858
5310 00 133 2368	SX			DLA	S9I			13	5231
4010 00 880 3579	SX	Wire Rope Assembly,Single		DLA	S9G			14	3465
1620 01 457 6116		Landing Gear,Retrac	LG2	OO	LG	LGHLAM	OO	13	879
1560 00 775 7912	UC	Track Assembly,Cargo		DLA	S9G			11	6132
1620 00 477 7642				DLA	S9C			13	857
6680 01 160 9434	UC	Indicator,Liquid Qu	AA2	WR	LA	LASA	CN	46	3596
1660 01 184 3635	UC			DLA	S9E			41	4127
4320 00 726 4435	HS	Pump,Axial Pistons	EPF	OC	LI	LIIEP	OO	46	5577
1560 00 195 7356		Frame,Aircraft	AS1	WR	LA	LASS	CN		1180
4920 00 246 7225		Amplifier,Temeratur	AA2	WR	LA	LASA	WR		907
6220 01 472 5673	73	Light Assembly,Indicator		DLA	S9I			44	13256
6615 01 187 7821	UC	Computerassembly,A	AA2	WR	LA	LASA	OC	52	3149
9540 01 499 9335				DLA	S9I			12	1855
1560 00 225 1772	UC	Panel,Structural,Ai	AS7	WR	LA	LASS	CN	11	8399
1560 00 141 8575				DLA	S9G				732
1620 01 195 1090				DLA	S9C			13	3346
1680 00 434 0031	SX	Manifold		DLA	S9G			49	10418
1650 00 450 4819	UC	Motor-Pump, Hydrauli	AMA	WR	LA	LASS	CN	13	9822

Continued

0	503	744	1247	3253	2160	3	0	278	218	96	23	45	633
588	744	744	705	1488	2160	3	246	215	192	140	86	46	631
80	0	848	0	980	720	1	533	0	44	0	29	46	0
0	0	1102	3975	5208	2157	6	0	0	100	19	12	47	410
0	0	744	0	744	720	1	0	0	66	0	45	47	0
0	0	383	0	744	720	1	0	0	118	0	47	48	0
0	0	0	0	744	720	1	0	0	0	0	51	49	0
743	1488	16	2016	2232	2027	3	142	82	496	50	49	49	315
0	0	0	0	551	720	1	0	0	0	0	64	50	0
0	0	90	0	239	1848	4	0	0	248	0	345	50	251
115	27	0	770	529	1832	6	455	733	0	131	257	51	690
0	0	0	0	551	720	1	0	0	0	0	67	51	0
0	0	0	0	551	720	1	0	0	0	0	72	52	0
0	0	0	0	551	720	1	0	0	0	0	66	53	0
0	0	0	0	551	720	1	0	0	0	0	69	54	0
0	0	0	0	551	720	1	0	0	0	0	70	55	0
0	0	0	0	551	720	1	0	0	0	0	71	56	0
2160	2232	2528	2277	2232	1738	3	47	37	33	38	45	56	876
720	839	1488	1344	1742	1738	3	210	132	78	84	62	57	371
0	0	0	0	551	720	1	0	0	0	0	68	57	0
0	0	0	0	0	720	1	0	0	0	0	0	58	0
1402	1488	1488	1344	1488	1737	3	99	80	70	79	75	58	594
99	311	150	672	55	683	2	498	335	186	215	314	59	659
0	0	0	53	168	683	2	0	0	0	641	143	60	838
2068	2901	0	5363	117	677	2	51	24	0	13	181	61	316
1715	2232	2232	2039	2683	1682	4	57	42	38	46	32	61	982
2315	1469	0	781	66	674	6	38	86	0	130	285	62	250
626	1696	2232	2968	1145	658	2	240	56	42	28	99	63	827
0	0	1488	251	744	657	1	0	0	21	354	43	64	832
0	0	0	141	428	656	1	0	0	0	435	80	65	730
0	662	744	672	1196	1622	3	0	245	211	206	97	65	0

Figure 6.

5342 01 006 1582	UC	Latch, Forward Ramp		DLA	S9G			12	7907
1560 00 927 5177		Support, Structural		DLA	S9G			11	6429
1560 01 005 2522		Aileron	AS6	WR	LA	LASS	CN		2628
1560 01 339 9722	SX	Panel, Structural, Aircraft		DLA	S9G			11	12442
1680 00 738 4890	UC			DLA	S9G			13	2208
1560 01 194 4360				DLA	S9G			52	1847
1560 00 102 7743	UC			DLA	S9G			11	1464
1560 00 732 2758	UC	Duct,Floor Heat		DLA	S9G			41	8522
1560 00 400 0574			AS1	WR	LA	LASS	CN		1271
4810 00 140 8550	SX	Valve,Solenoid		DLA	S9C			23	2177
6340 01 187 3226	UC	Computer, Warning, Gr	AA7	WR	LA	LASA	OO	51	3273
9540 01 499 9276				DLA	S9I			12	1271
9540 01 499 9303				DLA	S9I			12	1271
9540 01 499 5411				DLA	S9I			12	1271
9540 01 499 9316				DLA	S9I			12	1271
9540 01 499 5363				DLA	S9I			12	1271
9540 01 499 5402				DLA	S9I			12	1271
4010 00 496 0601	SX	Wire Rope Assembly,		DLA	S9G			14	13167
1680 00 467 0740	SX	Manifold Assembly,Fire		DLA	S9G			49	7871
9540 01 499 5415				DLA	S9I			12	1271
1560 00 175 8105	UC	Support,Structural	AS4	WR	LA	LASS	WR	11	720
1560 00 824 6428	UC	Fairing,Aircraft		DLA	S9G			11	8947
1560 00 677 8572	UC	Spoiler,Wing,Aircra	AS6	WR	LA	LASS	CN	14	1970
1560 00 774 2115	UC	Slat,Aircraft	AS7	WR	LA	LASS	WR	11	904
1650 01 327 1355	UC	Manifold Assembly,H	AMB	WR	LA	LASS	CN	14	11126
3040 00 102 7713	SX	Connecting Link,Rigid		DLA	S9C			11	12583
1680 00 476 7675	UC	Variable Feel Unit	AM5	WR	LA	LASS	OO	14	5305
6685 00 215 0548	SX	Transmitter,Pressure		DLA	S9G			49	9325
1560 01 261 1305		Flap,Wing Landing	AS7	WR	LA	LASS	CN		3140
1560 00 195 7357		Frame,Aircraft	AS6	WR	LA	LASS	CN		1225
5340 ND 161 872L	UC	Bracket Assy	7LM	WR	LG	LGS		11	4896

Continued

The Impact of JCS Project Code Removal on the Ability to Continue C-5 Operations at Travis AFB without a Cannibalization Aircraft

It quickly became apparent that there was more to the story than simply a proliferation of spare parts.

and the assignment of a JCS project code and depot surge after the terrorist attacks on 11 September 2001 directly led to an increase in spare parts for the users. Fixing and flying a cann bird is an awesome accomplishment in and of itself, but maintaining that status for 14 months is a historical achievement. It quickly became apparent that there was more to the story than simply a proliferation of spare parts. There were clearly new and innovative maintenance and supply practices across the entire C-5 team, as well as a cultural shift in the way they do business.

This research focused first on how Travis was able to fix and fly its cann jet and then took a look at the ability of the team to maintain a *no cann bird* status once the JCS project code and depot surge ended. The research included an analysis of MICAP trends from the last 6 months to 1 year, as well as interviews with those directly involved in the process. The hard data showed the direct effects of the extra money from the surge that put parts directly in the hands of the maintainers via the supply channels. The surprising turnout from the research was the top-to-bottom cultural change that is probably the biggest reason for the team's success. Every person, from the wrench turner to the A-4 at AMC, is on the same page.

Unfortunately, the research did not give a clear indication of what would happen when the project code was turned off and the depot surge ceased. Team members were kind enough to express their opinions that nothing would change from a cultural perspective, and the only shortfall may be a parts shortage in the coming years if the funding dried up. All seemed committed to keeping Travis free of its cann bird. It would be easy to recommend that the institution, as a whole, continue to embrace this cultural change. However, that is not overly practical. Instead, the best recommendation, based on the limited research done for this article, is to request a followup study 1 year after the project codes are removed and see if, indeed, the cultural change was responsible for Travis's success or if the extra spare parts made the difference.

Notes

1. Lt Col Anthony Marchesano, USAF, point paper on C-5 Spares/BRAC Workload Transition presented to AMC/LG Staff, Oct 99.
2. [Online] Available: https://www.my.af.mil/amcrss (password required).
3. AFMAN 23-110, *Basic USAF Supply Manual*, Vol 2, Part 2, Chap 17, 1 Apr 04.
4. [Online] Available: https://www.my.af.mil/amcrss (password required).
5. *Ibid.*
6. *Ibid.*
7. Top 100 C-5 MICAP Listing [Online] Available: https://ltwebsrv.robins.af.mil/lts/.
8. "Travis Kicks the Cann," *The Exceptional Release,* Winter/Spring 2004, 26-29.
9. Author's interview via e-mail with Roger L. Shoemaker, C-5 Integrated Logistics Support Manager, WR-ALC, Robins AFB, Georgia.
10. Author's interview via e-mail with Field M. Ledford, WR-ALC, Warfighter Support, Strategic Airlift Directorate.

Air Force Logistics Management Agency
Air Mobility Warfare Center

Captain Erin C. Cluff, USAF
Major David Durbin, USAF, ALROC

Implied OPCON? TACP ULN Series, Command Relationships, and Redeployment

Introduction

On 1 May 2003, President George W. Bush proclaimed that major combat operations in Iraq were over…. As the operation shifted from direct combat to force sustainment and humanitarian relief, in retrospect, it's difficult to imagine how many lives from our US and coalition military family would have been lost, had it not been for the precision, expertise, and dedication of our Tactical Air Control Party (TACP) teams….

—484th Aerospace Expeditionary Wing History Report

The Air Force TACP is a control element usually stationed with and supporting an Army combat unit…. The TACP provides the interface between the unit and the TACS [Theater Air Control System] system…. TACPs are under the operational control of the ASOC [Air Support Operations Center] or senior TACP element deployed.

—Joint Publication 3-09

Even before the Air Force became a separate service, specially trained personnel were used to coordinate the employment of airpower and its effects in support of ground combat units. This long tradition is carried on today by the tactical air

Implied OPCON? TACP ULN Series, Command Relationships, and Redeployment

As combat operations in Iraq and Afghanistan enter their second and fourth years respectively, Air Force personnel are being deployed in direct support of Army units in greater and greater numbers.

control parties. These highly skilled professionals' "primary role is to direct combat airstrikes against enemy targets…[and] coordinate artillery fire with airstrikes."[1] Given the unique role of the TACP in direct support of the Army, combined with its location at the farthest forward edge of the Air Force theater air control system, there has been some disagreement over whose requirement it is to have them deploy (an issue that will be discussed in further detail later) and what the command relationship of these personnel should be. Just as significant as the command relationship issues are the challenges the control issues create when the Air Force tries to redeploy these personnel and their equipment.

As combat operations in Iraq and Afghanistan enter their second and fourth years respectively, Air Force personnel are being deployed in direct support of Army units in greater and greater numbers. As a result, command relationships and their implications are taking on a greater importance. Research for this article focused on the relationship between what service and component built the TACP requirement (or unit line number [ULN] series under which a TACP unit deploys), command relationship, and redeployment complications. These relationships are critical to current and future operations as more and more Air Force members deploy in direct support of Army units.

How do differing command relationships and ULN tasking methods used during deployment affect the TACP redeployment process?

Background

The most difficult thing about planning against the Americans is that they do not read their own doctrine, and they feel no particular obligation to follow it if they did.

—Admiral Sergei I. Gorshkov

OPCON or operational control is the command authority that may be exercised by commanders at any echelon at or below the level of combatant command and can be delegated or transferred. OPCON is…the authority to perform those functions of command over subordinate forces involving organizing and employing commands and forces, assigning tasks, designating objectives, and giving authoritative direction necessary to accomplish the mission…normally, this authority is exercised through subordinate joint force commanders and service and/or functional component commanders. OPCON normally provides full authority to organize commands and forces and employ those forces as the commander in operational control considers necessary to accomplish assigned missions.... OPCON is the authority to exercise the following:

- *Give direction to subordinate commands and forces necessary to carry out missions assigned to the command, including authoritative direction over all aspects of military operations.*

Implied OPCON? TACP ULN Series, Command Relationships, and Redeployment

- *Plan for, deploy, direct, control, and coordinate the action of subordinate forces.*[2]

—Joint Publication 1-02

TACON or tactical control is the command authority over assigned or attached forces or commands or military capability or forces made available for tasking, that is limited to the detailed and, usually, local direction and control of movements or maneuvers necessary to accomplish missions or tasks assigned. Tactical control is inherent in operational control. [3]

—Joint Publication 1-02

In contrast, the command relationships of tactical air control parties are clearly defined at all levels. It is explicitly spelled out in joint, Army, and Air Force doctrine that the air component has operational control of all tactical air control parties. Tactical control is inherent in operational control unless specifically delegated. There was no specific reference found in any manual, joint or service, that specifically defined tactical control separately; therefore, one could assume tactical control is also doctrinally aligned under the air component.

The Air Force Theater Air Control System. *The Air Force component commander exercises operational control over assigned forces through the TACS. The focal point for tasking and exercising operational control is the AOC [air operations center] the senior element of the TACS…. These elements are…airborne battlefield command and control, air support operations center, TACP, and the tanker and/or airlift control element.*[4]

—Joint Publication 3-09

Tactical control is inherent in operational control unless specifically delegated.

The Air Force deploys an air support operations center (ASOC). An ASOC must direct and control on-call close air support and air reconnaissance assets that support ground forces. This center usually locates with the supported corps main CP and functions under the Air Force forces' operational control through the JAOC. [Joint Air Operations Center].[5]

—Field Manual 3-52

The ASOC plans, coordinates, and directs aerospace support for land forces, normally at corps level and below. It is directly subordinate to the JAOC…. The ASOC director exercises OPCON of all subordinate TACPs.[6]

—Field Manual 100-103-2

Furthermore, in a memorandum of agreement between the Army and the Air Force for Army and Air Force liaison support, dated 16 June 2003, both services agreed that tactical air control parties should report through the Air Force operational chain of command in direct support of the Army maneuver unit.[7]

Implied OPCON? TACP ULN Series, Command Relationships, and Redeployment

Airmen deployed to [Operations Iraqi Freedom and Enduring Freedom] in direct support of the Army are operational control to CENTAF.

Reaffirming a Central Command (CENTCOM) message dated 20 September 2003,[8] the Air Force Chief of Staff released a message, dated 20 December 2003, stating, "Airmen deployed to [Operations Iraqi Freedom and Enduring Freedom] in direct support of the Army are operational control to CENTAF [Central Command Air Forces]." [9]

While not correct, the literature often used the terms *air component command* (or Joint/Combined Forces Air Component Command [JFACC/CFACC]) and *Air Force component* interchangeably. The same is done with the *land component command* (or Joint/Combined Forces Land Component Command [JFLCC/CFLCC]) and *Army component*. Furthermore, CENTCOM-specific terms are used synonymously in some correspondence. CENTAF is the Air Force component, while Army Central Command, or ARCENT, is the Army component.

ULN series is addressed in the Time-Phased Force Deployment Data (TPFDD) Letter of Instruction, Chairman of the Joint Chiefs of Staff Manual 3122.02C (CJCSM 3122.02C), dated 22 March 2004. It is important to note the date on this CJCSM because it was updated nearly 1 year after much of the data referenced in this article. It states clearly that, at times, it is appropriate for one service to build unit line numbers within its construct to move assets of another service.

> The supported command components coordinate development of Service-related unit line numbers with counterparts from supporting commands. Assignment of unit line numbers to another service is allowed; for example, Air Force tactical air control parties and weather teams may be assigned Army component unit line numbers. This same logic applies to augmentee support where a supported component requests additional augmentation not affiliated with a unit requirement.[10]

This paragraph is ambiguous in that it allows but does not direct. For example, ARCENT can argue that it is an Army requirement to have TACP support and use this paragraph to justify *T* series unit line numbers. The Army could then assume that it was the supported component. Conversely, CENTAF could argue that it is an Air Force requirement to have tactical air control parties on the ground as part of the most forward element of the Theater Air Control System and, therefore, the requirement should be built under F series unit line numbers. There is nothing in this paragraph indicating that it would be incorrect in assuming CENTAF was the supported command.

In an e-mail from CENTAF/A3 to CENTCOM CCJ3, subject "F unit line numbers for TACP units," dated 10 December 2003, a series of challenges are highlighted.

> Deployment of TACPs under "T" series unit line numbers is usually not an issue (there are exceptions)…the real problems occur when intertheater movements or redeployment is required…. We (CFACC) could not get CFLCC to coordinate on a redeployment order—they refused to even consider releasing the assets, and therefore, CENTCOM would not cut redeployment orders without their concurrence.… Redeployment of 14, 15, 17, 19, and 21 ASOS were similarly affected. Even though we had buy-in from their respective division/LCR Cdrs for them to redeploy, again, we could not get CFLCC coordination due to the T unit line numbers.

Figure 1 depicts the independent variables that this article seeks to analyze for impact on the dependent variable—significant redeployment challenges.

There were several significant limitations of the research for this article. A significant portion of the primary data was classified, which created problems when extracting data and attempting to maintain an unclassified product.

The Department of Defense has very specific rules for how organizations, personnel, and equipment are moved into an area of responsibility. All movements must go through a series of steps to ensure that the requirement is valid, adequate resources exist to fill the requirement, proper units are sourced, and lift is available to move the personnel and equipment. The overall listing of these movements is termed a TPFDD (often pronounced TIP FID). Every line of data within the TPFDD must be *verified* by the supported component (CENTAF or ARCENT) and *validated* by the supported command (CENTCOM), the supporting command (or *force provider*), and US Transportation Command (TRANSCOM). Each service, through the joint TPFDD letter of instruction is assigned a letter to designate movement of its respective forces. This letter becomes the first digit in a five-digit alphanumeric code for each line of data, called a unit line number. For example, the Air Force has been assigned the letter *F*. Therefore, an Air Force fighter squadron, as an individual line of data in the TPFDD, could have a ULN FB123.[11] For most situations, this system works very well. However, when forces deploy in direct support of another

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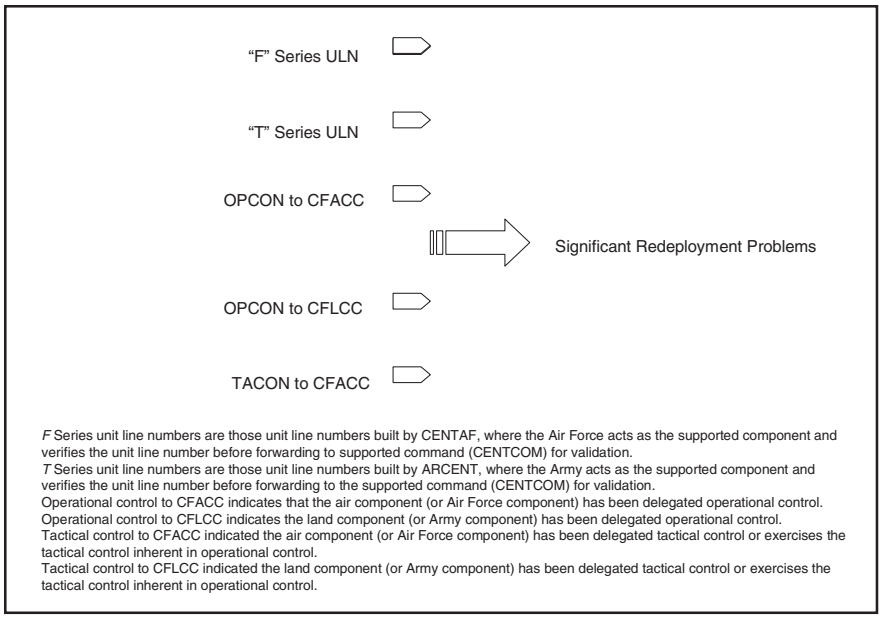

Figure 1. Causal Model

Implied OPCON? TACP ULN Series, Command Relationships, and Redeployment

Command relationship was determined when the serial deployment order number was present in the TPFDD unit type code description field for a given unit line number.

service, there is ambiguity in the guidance. The unit line number is initially built in the TPFDD by the component with the requirement for the specific capability being tasked—the supported component.

There is clear doctrinal guidance for the appropriate command relationship of deployed TACP units, which is illustrated in Figure 2.[12]

This doctrinal construct of command relationships for TACP conflicts with the Joint Operations Planning and Execution System (JOPES) process as defined in CJCSM 3122.02C when tactical air control parties are deployed under *T* unit line numbers.

Methodology

Tactical Air Control Party. *A subordinate operational component of a tactical air control system designed to provide air liaison to land forces and for the control of aircraft.*

—Field Manual 101-5-1

TPFDD data for two deployment plan identifications, XXX and YYY (where the actual plan identifications s are Secret), and two corresponding redeployment plan identifications, RXX and RYY (where the actual plan identifications are Secret), were used to define total unit line numbers, total *T* and *F* series unit line numbers, total passengers and cargo, as well as unaccounted for unit line numbers, passengers and cargo, during redeployment.

Command relationship was determined when the serial deployment order number was present in the TPFDD unit type code (UTC) description field for a given unit line number. The deployment order was then referenced to determine which specific command relationship was initially directed. Undetermined command relationships were based primarily on failure to comply with CENTCOM guidance for incorporating the serial deployment order number into the UTC description field. Additionally, on 20 September 2003, CENTCOM issued a message directing all tactical air control parties be operational control to CENTAF in direct support of fielded component.[13]

Significant redeployment challenges were defined as important enough to be annotated in situation reports, submitted twice daily to higher headquarters. Where a situation report is defined as a situation report on file with the CENTAF historian's office (Ninth Air Force) and maintained in the 484th Air Expeditionary Wing Historical SITREP file. The 484th was the parent unit for all TACP units within the

Figure 2. Doctrinal Guidance Diagram

CENTCOM area of responsibility. It is important to note that some of these situation reports are from subordinate units to the 484th and others are from the 484th to higher headquarters and that direct comparison introduces an undetermined level of error, as subordinate commander comments and inputs may have been deleted or edited in parent situation reports based on commander discretion. Also significant is that situation reports are inherently subjective, in that the commander who submits the situation report determines what is *important* enough to warrant attention by superior command structure, which may differ significantly by philosophy, personality, and relationship with superiors. Redeployment references are based on an interpretation of commander's comments indicating information beyond packup status; for example, "REDUCE MANNING TO 50%—*AWAITING RELEASE LETTER*" (emphasis in original)" in the 19th Expeditionary Air Support Operations Squadron's situation report dated 26 April 2003.

Significant redeployment problems were measured by the number of times these problems were addressed in unit situation reports. However, the SITREP format was not standardized across the command. Even among the subordinate units themselves, the *approved* format may or may not have included certain information, depending on how important the commander who was writing or editing the information felt it was.

The above sampling discussion reveals that accuracy of the hypothesis results is limited. However, even though the results are limited, they still are timely and relevant to today's operations and allow some conclusions to be made. They address a topic with implications not only for Air Force units, like tactical air control parties who have traditionally deployed in direct support of Army units, but also for the increasing number of Air Force combat service support career fields that are now being tasked to provide direct support to the combatant commander in place of traditional Army support units.

Redeployment references are based on an interpretation of commander's comments indicating information beyond packup status.

The situation report is written or reviewed by commanders who have different philosophies and comfort levels with highlighting challenges to superiors. This is a potential for great disparity in primary data, because what one commander deems a problem may not be addressed by another commander in exactly the same situation. Direct comparison requires a huge assumption that all define problems the same way.

Status of Forces Impact on Expeditionary Logistics

The implications of this research are relevant to expeditionary logistics, not only from the facilitating and supporting deployment and redeployment perspective but also from the fact that the Air Force has been tasked to provide more combat service support, such as vehicle operators, in direct support of the Army. Additionally, the current practice is to send these combat service support assets on *T* unit line numbers with operational control to CENTAF. Under this construct, the conflict between written guidance and JOPES protocol allows ARCENT, as the supported component,

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The situation report is written or reviewed by commanders who have different philosophies and comfort levels with highlighting challenges to superiors.

to exercise a degree of control that is inherent in operational control. The ability to direct deployment and redeployment to achieve the mission most effectively is an OPCON respon4ibility.[15] JOPES protocol requires supported components to verify unit line numbers before validation for movement,[15] which gives them the ability, if they choose to exercise it, to stop deployment or redeployment, effectively exercising operational control, which was formerly delegated to CENTAF. This is important, not only as we try to rightsize our forces in the field to get critical career fields, like tactical air control parties, home, reconstituted and current, but also as the Air Force strives to maintain the current 90-day air expeditionary force deployment cycles in stark contrast to the 1-year deployment cycles for the same Army units currently augmented.

Examination of Raw Data

Based on the research outlined, there is no sufficient basis to either accept or reject the hypotheses, though the research does support the existence of significant redeployment problems.

Several variables were not accounted for in the research design, including the inability to correlate the individual unit line numbers to a deployment order and, therefore, establish a command relationship and an attached unit for ease of correlating SITREP inputs to specific unit line numbers.

Proper analysis required a series unit line number, initial command relationship, and existence of redeployment problems that could be connected to a specific unit line number. Of these requirements, only series unit line numbers could be determined for a significant portion of the total unit line numbers. Because there were so few unit line numbers that met these criteria, the error in any mathematical analysis would render the results useless. Based on this inability to correlate primary data, some data were not able to be analyzed properly.

Summary

The number of SITREP references to redeployment problems were statistically insignificant. However, while the data do not support a direct correlation between the command relationships or the series unit line number and significant redeployment issues as defined in this article, there are strong indications of a problem. Ninety-six percent of TACP personnel and 99 percent of TACP cargo did not redeploy on corresponding unit line numbers (Table 6). Figure 3 shows, by ULN series, the difference between TACP unit line numbers deployed and redeployed. Figures 4 and 5 make the same comparison by total numbers of persons and tons of cargo. These charts illustrate that the difference in total unit line numbers in Figure 3 cannot be attributed to aggregation of TACP unit line numbers together, because so many people and cargo are unaccounted for.

Findings and Potential Solutions

We won the big battle—CENTAF has OPCON of our deploying TACPs and CWTs [combat weather team]. Although not as critical, in an ideal world, it would seem to me we would also control the deployment/redeployment of these unit type codes by using F-series unit line numbers in our PIDs [plan identification], vice letting ARCENT have control via T-series unit line numbers

—Anonymous

Findings

Less than 4 percent of TACP personnel and less than 1 percent of TACP cargo deployed under TACP unit type codes are accounted for in TACP UTC

	XXX-F	XXX-T	YYY-F	YYY-T
OPCON to CFACC/TACON to CFLCC	0	0	5	42
OPCON to CFLCC	0	0	1	100
Total ULNs	31	14	9	311
Unable to determine command relationship	31	14	4	169
Percent unable to determine command relationship	100%	100%	44%	54%

Table 1. Command Relationship

PID XXX	Total ULNs	F ULNs	G ULNs	T ULNs	U ULNs
Number of ULNs	62	31	2	14	15
Total PAX	136	71	2	34	29
Total s/t	79.8	2.8	0	31.1	45.9

Table 2. Deployment Data XXX[17]

PID YYY	Total ULNs	F ULNs	G ULNs	T ULNs	U ULNs
Number of ULNs	363	9	11	311	32
Total PAX	794	30	11	675	78
Total s/t	1,194.3	0	0	1,168.2	26.1

Table 3. Redeployment Data YYY

Implied OPCON? TACP ULN Series, Command Relationships, and Redeployment

Ninety-six percent of TACP personnel and 99 percent of TACP cargo did not redeploy on corresponding unit line numbers.

redeployment unit line numbers. The reason for this disconnect cannot be determined accurately based on the research but demands further investigation.

There is a potential for conflict between JOPES procedures for validation of unit line numbers and freedom to exercise operational control when unit line numbers are built by another service and operational control is maintained by the parent service. The supported command component (ARCENT for *T* or CENTAF for *F* series unit line numbers) must review and verify every unit line number before it can be forwarded to the supported command (CENTCOM) for validation and scheduled for movement.[17] If they choose to, this gives the supported component the ability to stop deployment or redeployment of forces not under their operational control.

Based on the number of situation reports reviewed, the number raising redeployment concerns to superiors is statistically insignificant. However, there is ample contextual reference data to support, at a minimum, a perception of some correlation between *T* series unit line numbers and redeployment problems; however the primary sources used in the hypotheses did not.

PID XXX	Total ULNs	F ULNs	G ULNs	T ULNs	U ULNs
Number of ULNs	2	1	0	1	0
Total PAX	6	2	0	4	0
Total s/t	25.3	0	0	25.3	0

Table 4. Redeployment Data RXX

PID YYY	Total ULNs	F ULNs	G ULNs	T ULNs	U ULNs
Number of ULNs	15	0	2	13	0
Total PAX	27	0	2	25	0
Total s/t	61.9	0	0	61.9	0

Table 5. Redeployment Data RYY

Comparison Data	Total ULNs	F ULNs	G ULNs	T ULNs	U ULNs
Total Deployment	425	40	13	325	47
Total Redeployment	17	2	2	14	0
Totally Deploy PAX	930	101	13	709	107
Total Redeploy PAX	33	2	2	29	0
Percent Unaccounted	96.45	98.02	86.62	95.90	100
Total Deploy s/t	1,274.10	2.8	0	1,199.30	72
Total Redeploy s/t	87.20	0	0	87.20	0
Percent s/t Unaccounted	99.92	100.00	0	92.73	100

Table 6. Comparison Data

TACP unit line numbers did not redeploy on unit line numbers with TACP unit type codes. Potential reasons include aggregation of unit line numbers to unit line numbers without TACP unit type codes; general lack of TPFDD discipline on redeployment for all career fields, intentionally circumventing the JOPES process;[18] or redeployment via opportune lift. All these potentially impact intransit visibility and efficient use of strategic lift assets. Lack of TPFDD discipline and opportune

Date	Total SITREPs	Redeployment References
Mar 03	89	8
Apr 03	89	23

Table 7. SITREP Data

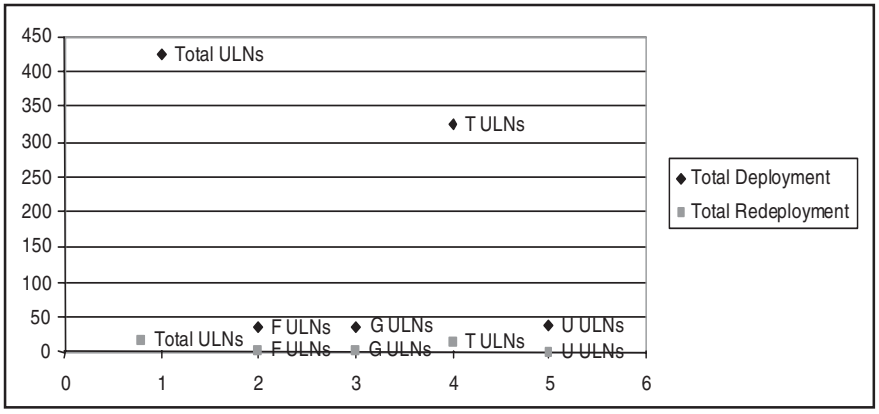

Figure 3. Total ULN Comparison

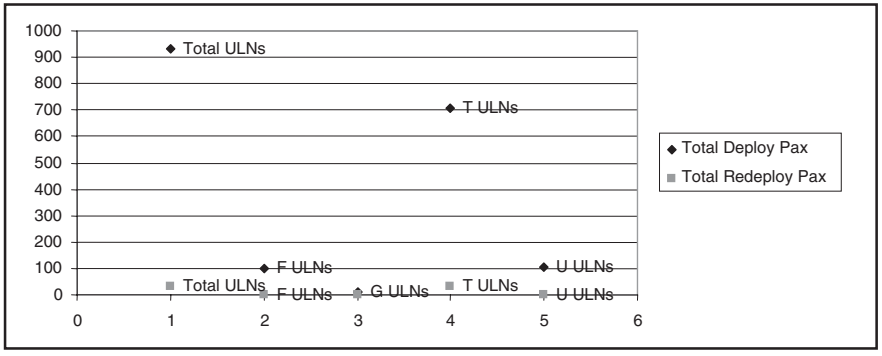

Figure 4. Total PAX Comparison

Implied OPCON? TACP ULN Series, Command Relationships, and Redeployment

Lack of TPFDD discipline and opportune redeployment may cause strategic ports to become inundated with passengers and cargo awaiting lift and affect efficient port operations and proper prioritization.

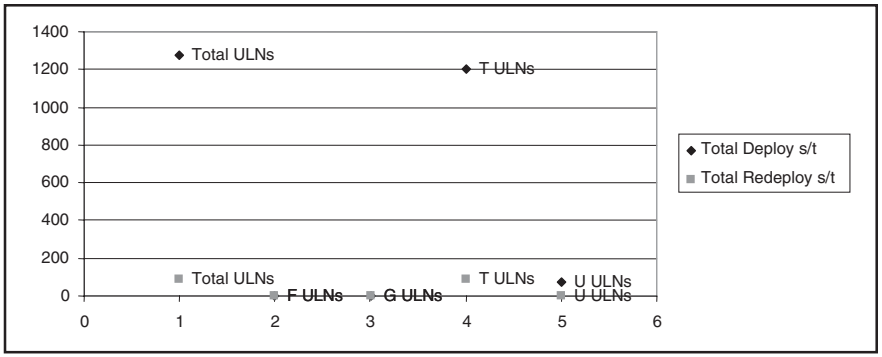

Figure 5. Total Cargo Comparison

redeployment may cause strategic ports to become inundated with passengers and cargo awaiting lift and affect efficient port operations and proper prioritization. Again, further research is required to determine why TACP unit line numbers did not redeploy the same way they deployed and whether that phenomenon was unique to the TACP community or more widespread.

Potential Solutions

Deployment of tactical air control parties on *F* series unit line number is one potential solution, though not without its own set of potential complications. For example, synchronization with the supported unit and onward movement become potentially more complicated.

Formalized joint procedures to address the specific unique situation of direct support with operational control maintained by the parent service are also potentially viable solutions.

Conclusions and Recommendations

They are not OPCON to CFLCC, but the Army exercises OPCON based on T series unit line numbers.

—Lieutenant Colonel Alan L. Shafer, USAF

Recommended Solution

Whether the decision is made to deploy consistently on parent service unit line numbers or another service when in direct support, the decision must remain constant and be applied consistently during training, as well as a contingency. Specific procedures must be developed for unit line numbers affected by this disconnect. These procedures need to be accomplished above the combatant commander level, because the current conflict is between joint doctrine documents and a CJCS manual. If procedures and workarounds are established between ARCENT and CENTAF, it will not resolve the potential conflict in other theaters or other components.

Further research needs to be conducted to determine whether the level of TACP unit line numbers unaccounted for in the redeployment TPFDD is comparable to that for other career fields. If there is a significant disparity, extensive research would be required to determine whether there is a correlation between series unit line numbers and why they are unaccounted for, since less than 5 percent of all TACP personnel and cargo were accounted for during redeployment.

Future research on this topic should be expanded to include all Air Force unit line numbers during Iraqi Freedom and Enduring Freedom rotations, deployed on *T* series unit line numbers, to verify the existence and determine the scope of the problem.

Conclusion

T series unit line numbers require ARCENT verification and, by so doing, allow ARCENT to exercise a measure of control over movement of TACP assets. While not directly supported by the research parameters originally defined as a problem, when the supported component is not the same as the component with OPCON authority, there is potential for redeployment challenges and delays, because joint doctrine and JOPES guidance do not agree. While JOPES is simply a regimented system to accomplish planning and execution and there is no mention of command relationships when determining which component should build a specific unit line number, there is an exercise of control that is inherent in requiring coordination. This control is tantamount to operational control, though operational control is established separately. If the air component (CENTAF) is not free to move personnel or cargo at will to best provide direct support to its ARCENT customer—to include deployment, rotation, and redeployment—it is not able to execute the operational control designated to them.

This problem is not limited to the CENTCOM theater or to Army and Air Force unit line numbers. It is a significant disconnect, potentially affecting all forces deployed in support of another service in any theater and will require either doctrinal or policy change at the highest level.

While JOPES is simply a regimented system to accomplish planning and execution and there is no mention of command relationships when determining which component should build a specific unit line number, there is an exercise of control that is inherent in requiring coordination.

Notes

1. "Tactical Air Control Party Airmen Help Ground Forces," *Defenselink News*, Jan 04 [Online] Available: http://www.defenselink.mil/news, 13 May 04.
2. Joint Publication 1-02 [Online] Available: http://www.dtic.mil.
3. *Ibid.*
4. Joint Publication 3-09, *Doctrine for Joint Fire Support*, 12 May 98, II-11.
5. Army Field Manual (FM) 3-52, *Army Airspace Control in a Combat Zone*, 1 Aug 02 [Online] Available: http://www.adtdl.army.mil.
6. FM 100-103-2, *Multiservice Procedures for Theater Air Ground Systems*, 29 Jul 98 [Online] Available: http://www.adtdl.army.mil.
7. Memorandum of Agreement between the Army and Air Force for Army and Air Force Liaison Support, 16 Jun 03.
8. USCENTCOM/CCJ3-P message DTG 201228Z SEP 03 [Online] Available: http://www.centcom.smil.mil.

Implied OPCON? TACP ULN Series, Command Relationships, and Redeployment

If the air component is not free to move personnel or cargo at will to best provide direct support to its ARCENT customer—to include deployment, rotation, and redeployment—it is not able to execute the operational control designated to them.

9. Chief of Staff of the Air Force Message, Subject: Air Force Support of OIF II and OEF V Force Rotation, DTG: 201431Z DEC 03.
10. CJCSM 3122.02C, 22 Mar 04, Enclosure F, Appendix A, Para 3
11. CJCSM 3122-02C, 22 Mar 04 [Online] Available: http://www.dtic.mil.
12. Compilation from multiple sources, including Army Field Manual 100-103-2, *Multiservice Procedures for Theater Air Ground Systems*, 29 Jul 98 [Online] Available: http://www.adtdl.army.mil; FM 3-52, *Army Airspace Control in a Combat Zone*, 1 Aug 02 [Online] Available: http://www.adtdl.army.mil; and Joint Publication 3-09, *Doctrine for Joint Fire Support*, 12 May 98 [Online] Available: http://www.dtic.mil.
13. CJCSM Message, Subject: Air Force Support of OIF II and OEF V Force Rotation, DTG: 201431Z DEC 03
14. Joint Publication 1-02 [Online] Available: http://www.dtic.mil.
15. CJCSM 3122-02C, 22 Mar 04 [Online] Available: http://www.dtic.mil.
16. *G* and U ULNs represent TRANSCOM and Special Operations ULNs, respectively, and were included to demonstrate total TACP ULNs within each PID.
17. CJCSM 3122-02, 22 Mar 04 [Online] Available: http://www.dtic.mil.
18. The author has firsthand knowledge of intentionally circumventing the JOPES process. TACP personnel and cargo could not get redeployment movements validated through the proper process and had remained in theater 6 weeks beyond release by maneuver units. These persons and cargo were moved as security forces and A-10 excess BOS ULNs to Air Force bases rather than to the home station.

Air Force Logistics Management Agency
Air Mobility Warfare Center

Captain Keith W. Holmes, USAF
James Mead, ALROC

Air Expeditionary Forces Investigating Equitable Tasking of Surface Transportation Forces

Introduction

The end of the Cold War in 1991, force reduction legislation, and Desert Storm resulted in discussions pertaining to how the Air Force will plan and prepare for combat operations. Large-scale major theater wars (MTW) were the premise for most of our deliberate planning and operational concepts up to this point in time. The advent of the expeditionary air force (EAF) concept modernized our methodology for training, equipping, and deploying our air expeditionary forces (AEF).

> The Air Expeditionary Force represents the Air Force's strategy to adjust to the ambiguous post-Cold-War environment, declining defense budget, and reduced forward presence. The AEF capitalizes on the superior mobility, range, and lethality of airpower. It provides a regional commander in chief (CINC) with tailored force packages that can deploy rapidly to conduct operations ranging from presence to the employment of airpower against a hostile force. Toward this goal, AEF literature is heavily weighted to responding to conventional state-to-state aggression. Within this concept, the emphasis has been on the deployment of airpower to conduct a halt phase-style operation against an aggressor nation.[1]

The current AEF structure includes ten separate air expeditionary wings (AEW) with tailored force packages based on capability. Parts of these force packages include personnel unit type codes (UTC). They reflect the type and number of persons required for particular capabilities required by the combatant commander (CoCom) in deliberate plans and crisis-action planning. One of the strong points of

AEF Investigating Equitable Tasking of Surface Transportation Forces

Can the AEF concept sustain increasing operational requirements, or is there a gradual decline back to the Palace Tenure methodology?

the AEF concept is providing stability to military personnel. The original concept dictated that airmen would know when they would deploy next.

> To alleviate pressures created by Post-Cold war downsizing and an unexpected growth in smaller but diverse regional commitments, the Air Force established the air and space expeditionary force concept as a means to provide forces and support on a rotational and, thus, relatively more predictable basis.[2]

Based on ten air expeditionary wings and 90-day deployments, airmen would only deploy once every 15 months, allowing them to train, reconstitute after deployment, and provide stability for military families.

Prior to the AEF concept, Palace Tenure concept tasked personnel to forward deployed units in Southwest Asia after Desert Storm had little predictability. Airmen in low-density/high-demand Air Force specialty codes (AFSC), such as Fire Truck/ Refueling Maintenance, often returned home only to deploy on the next deployment rotation.

> Palace Tenure was the Air Force personnel deployment program managed by the Air Force Personnel Center (AFPC). AFPC managed individual augmentation support force requirements for long-term, stable contingency operations. The rapid increase of long-term contingencies throughout the 1990s resulted in AFPC'S managing a significant portion of all deployments with limited input from existing planning staffs. In addition, AFPC's efforts to "fair-share" taskings across the Air Force have negatively impacted the team concept associated with standard UTC-based planning. Personnel became disconnected from UTCs designated for MTW OPLANs [operational plans], without visibility to planning staffs. Development of the EAF concept highlighted this disconnect between UTC management and individual rotations, resulting in a significant reduction of Palace Tenure taskings in late 1999.[3]

The AEF concept looked promising to those who frequently deployed and the unit that provided the airmen.

Palace Tenure tasking presented challenges to airmen and units. First, the frequency of deployments for airmen created retention problems because of unpredictable and often lengthy deployments. Second, the home unit faced serious training and experience problems resulting from the tasking of the experienced airmen who were also the trainers for the newer, less experienced airmen. Many other factors, such as professional military education and upgrade training, affected the airmen and units. The predictability of the AEF concept looked promising for all concerned.

After roughly 10 years, is the AEF concept delivering as intended, or are there problems? Our end strength is smaller, and further reductions are required. Our force projection requirements have increased with Operations Enduring Freedom and Iraqi Freedom. Can the AEF concept sustain increasing operational requirements, or is there a gradual decline back to the Palace Tenure methodology?

The Air Force core combat support principle of *Responsiveness* states the importance and relevance of equitably tasking our forces.

> Combat support has the flexibility to provide a tailored response with personnel, equipment, and support. Inherent in this principle is a properly prepared force, well trained, organized

> to achieve mission essential tasks, and equipped with sufficient resources to accomplish the mission. Agile Combat Support (ACS), one of the Air Force's core competencies outlined in AFDD [Air Force Doctrine Document]1, *Air Force Basic Doctrine*, is achieved by proper planning and providing equipment and trained personnel when and where needed.[4]

Equitable AEF tasking is of importance to the author, having spent 6 years in surface transportation positions. During this period, the author contended with Palace Tenure taskings and the eventual standup of the AEF concept.

Assumptions

The units and personnel tasked in the time-phased force and deployment data (TPFDD) followed the established AEF concept guidance. This would mean that each base would have two separate periods to provide personnel to fill UTCs identified in the AEF library. Each period has one odd and one even AEF (that is, AEF 7 and 8) supporting two different areas of responsibility (AOR) or missions, such as, Kosovo Stabilization Forces, Enduring Freedom, or Iraqi Freedom. In the case of AEF Silver, a surge tempo took effect, resulting in the tasking of more than the scheduled steady state AEFs.

> The Air Force is establishing two transitional air and space expeditionary forces, Blue and Silver, to put the deployment schedule back on track by March 2004 and to bring home deployed airmen as quickly as possible. "We envision these two 120-day rotations filling the requirements of combatant commanders through spring when we can once again implement the normal steady-state AEF rotation," said Major General Timothy A. Peppe, special assistant for AEF matters at the Pentagon. "Additionally, we can expect some aircraft, aircrew, and associated maintenance rotations outside these two transitional AEFs as we attempt to get them back to the normal schedule next spring." The Blue AEF will be on call to fulfill mission requirements between July and November, Peppe said. Silver will be on call from November through March. "The magnitude of the various combatant commanders' continuing requirements throughout the world will dictate the number of airmen that we will have to deploy," he said.[5]

Once these transitional AEFs are completed, normal rotations resume as scheduled starting with AEF 7 and 8. These AEFs support steady-state operations and represent the typical rotations Air Force personnel are most familiar.

> "Most of the 2,000 airmen will come out of already scheduled AEFs and should already know they are in or approaching their deployment eligibility window," said Colonel Buck Jones, deputy director for air and space expeditionary force matters. Despite the continued surge in operations, Colonel Jones said most of the Air Force could expect a return to the AEF battle rhythm by March. "We still will deploy AEF 7/8 very close to on schedule," Colonel Jones said. "The vast majority of the Air Force is returning to the AEF battle rhythm starting with AEF 7/8 in March."[6]

A variance in the number of Vehicle Operator, 2T1X1, taskings increased because of the new mission requirement for convoy operators during AEF Silver.

> The call came out from the SECDEF [Secretary of Defense] and the Joint Staff for other services to fill some Army CENTCOM [Central Command] AOR requirements with similar capabilities. In the Air Force transportation community, we're providing the

A variance in the number of Vehicle Operator, 2T1X1, taskings increased because of the new mission requirement for convoy operators during AEF Silver.

AEF Investigating Equitable Tasking of Surface Transportation Forces

The major command mission may result in large numbers of civilians employed, thus reducing the availability of military for tasking (that is, Air Education and Training Command and Air Force Materiel Command).

> equivalent of 3.5 light/medium truck companies…. In terms of individual bodies, this amounts to 550 total persons (480 vehicle operators, 62 vehicle mechanics, 4 supply materiel controllers, and 4 LRO [logistics readiness officer] captains with a vehicle background.[7]

These convoy operations bolstered lagging Army capability, allowing mission focus in critical areas. Air Force personnel assigned to these convoy operations are under the command of Air Force officers. Vehicle Operator UTCs (2T1X1) should increase during AEF Silver because of this new requirement.

All personnel trained and equipped according to the mission capability statement and the special requirements for the area of responsibility. The additional requirement mentioned above requires additional training by the Army on its equipment and convoy operating procedures. All ancillary training requirements completed prior to deployment, such as, Law of Armed Conflict, weapons, computer security, and operational security. Failure to complete this training could result in the tasked individual returned to home unit for a replacement. This would result in taskings other than the AEF rotation requirements.

Limitations

The scope of data includes only AEFs (Silver and 7 and 8) during and after the Iraqi Freedom and Enduring Freedom surge. The surge operations may not reflect AEF steady-state requirements accurately. A further study over a longer period—such as, two complete AEF cycles—would provide a better assessment of actual taskings. Only two completed AEFs are investigated because of time constraints and limiting the scope of data to a manageable level.

Because of the time constraints, manpower documents were not reviewed for each base to determine the total available strength of the units tasked. Studying the active duty authorized and funded manpower for each base tasked would show the total resources available. A comparison of the number tasked to the number authorized would show those bases not tasked to the full extent of their capability. In accordance with the AEF construct, all AFSCs are eligible for AEF taskings (Figure 1).

Operational requirements of some bases may have impact on the amount of taskings allocated. Considerations apply to active-duty, Reserve and Guard units. This article does not address total force mobilization. These matters require further investigation in a separate study.

A major command's (MAJCOM) mission may result in a large number of civilians employed thus reducing the availability of military for tasking (that is, Air Education and Training Command and Air Force Materiel Command). Larger numbers of civilians may reduce the eligible pool of personnel. It is, therefore, reasonable to expect bases with contracted operations to have fewer military tasked to support AEF requirements than bases without contracted operations.

Air Force Reserve and Air National Guard can be tasked from an active-duty unit and base. It is possible that identification of only the active-duty unit in the TPFDD would result in more individuals tasked from that base. As a result, numbers tasked

would seem higher than other bases. Investigation of manpower documents would filter these data entry errors.

The role of contractors supporting the Air Force mission may have an impact on the number of persons tasked and is not addressed in this article.

Methodology

Research Design

The AEF Center at Langley AFB, Virginia, provided two TPFDDs from completed AEF rotations. The receipt of AEF Silver (November 2003-April 2004) and AEF 7 and 8 (March-August 2004), through the Secret Internet Protocol Router Network allowed for initial assessment of these AEFs.

Detailed Discussion of the Problem

The Air Force Core Combat Support Principle of *Responsiveness* is the focus of this research. Providing equitable taskings allows the units to properly prepare, train, and equip personnel for AEF employment.

> The 15-month AEF life cycle includes periods of normal training, preparation, and on-call/deployment eligibility. The approximately 10-month normal training period concentrates on unit missions and basic proficiency events, in accordance with applicable Air Force directives and AFSC requirements, and may include Joint Chiefs of Staff, Air Force, or MAJCOM exercise participation. Most contingency and deployment training should take place during this period. The 2-month deployment preparation period focuses unit activities on AOR-specific events required (if known) for the 3-month on-call/deployment eligibility period, which follows. The 3-month on-call/deployment is based

Providing equitable taskings allows the units to properly prepare, train, and equip their personnel for AEF employment.

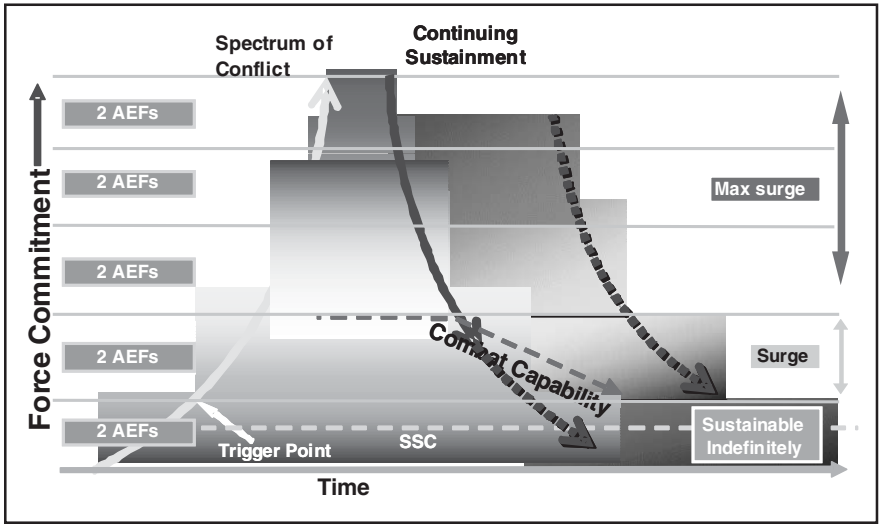

Figure 1. Operational Reality

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Concentrating taskings on the on-call period allows wings to plan and peak their resources for their deployment period, as well as make the most of their training periods.

> on a steady-state environment where all requirements are known and can be met with the forces allocated within the AEF pair. During surge operations, personnel can expect the 3-month commitment to be extended to meet mission requirements. Individuals and equipment allocated to other UTCs within the current AEF rotation must not participate in any activity that directly impacts their availability to deploy.[8]

Equitable tasking encompasses all eligible personnel aligned under UTCs across the bases identified to support the AEF. It is important to note *fair share* tasking is not the premise for equitable tasking. This involves tasking each base to provide a percentage of its forces. This breaks up UTCs and the team integrity for which UTCs are developed to produce a defined capability (Figure 2).

> Concentrating taskings on the on-call period allows wings to plan and peak their resources for their deployment period, as well as make the most of their training periods. In no case should sourcing resort to a fair-share distribution of taskings. This method of sourcing erodes the AEF life cycle for units, hampering their ability to recover, train, and prepare for the next AEF cycle. It also negatively affects the teaming concept of deploying the maximum number of UTCs from the same installation to the same forward operating location.[9]

Utilizing the AEF life-cycle model, bases prepare, train, and equip personnel to meet assigned AEF rotations.

The AEF TPFDDs provided the following data. AEF Silver tasked 1,107 persons from 85 units (41 active duty, 13 Reserve, and 31 Guard units) from 83 bases with one individual tasking from an unidentified base. AEF 7 and 8 tasked 560 persons from 41 units and bases (39 active-duty, 1 Reserve, and 1 Guard units), including

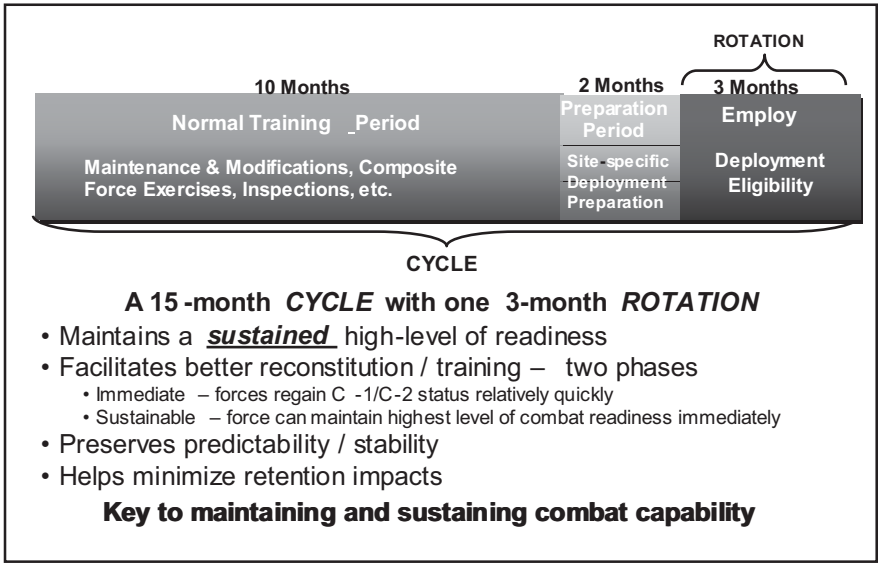

Figure 2. The AEF Cycle

Base	Number Tasked		DELTA	
	AEF Silver	AEF 7 - 8	Total	Percentage
Andrews	43	70	27	39
Barksdale	13	28	15	54
Davis-Monthan	36	25	11	31
Fairchild	17	11	6	35
Hill	17	12	5	29
Kadena	26	14	12	46
Lakenheath	19	18	1	5
Langley	34	23	11	32
Mildenhall	16	19	3	16
Minot	16	23	7	30
Nellis	54	26	28	52
Vandenberg	8	8	0	0
Whiteman	16	22	6	27
Total	315	299	16	5

Table 1. Base Comparisons

13 persons in five AFSCs from unidentified units. Taskings in both AEFs revealed 13 bases tasked back to back and provided more persons in general than other bases.

These bases were tasked back to back from a time line of November 2003 to April 2004 and March to August 2004. Actual deployed dates vary among tasked personnel. The time line above generalizes the deployed period. The figures clearly show the number and types of AFSCs tasked and the relation from one AEF to the next, as well as the total number of persons tasked for each AEF.

These bases did not seem to have significantly higher taskings across the AEFs. Base comparison shows 7 of the 13 bases had higher taskings in AEF Silver than in AEF 7 and 8. The greatest differences in taskings between AEFs were Barksdale AFB, Louisiana—15 taskings or 54 percent, Nellis AFB, Nevada—28 taskings or 52 percent, and Kadena AB, Japan—12 taskings or 46 percent. Of these three bases, only Barksdale had more taskings in AEF 7 and 8 than in AEF Silver (Table 1).

Comparing these bases to the overall AEFs, you see a much more interesting result appears. These 13 bases provided total personnel taskings of 28 percent in AEF Silver and 53 percent in AEF 7 and 8. Significant contributions by these 13 bases—when considering 84 bases and 1,107 persons and 41 bases and 560—made up the total composition for AEFs Silver and 7 and 8 respectively (Table 2).

Taskings in both AEFs revealed 13 bases tasked back to back and provided more persons in general than other bases.

Findings and Potential Solutions

Based on the data presented, it seems equitable tasking across the ten AEFs is not happening. Thirteen bases clearly show higher percentages of taskings than the total bases tasked in a single AEF and tasked back to back in AEF rotations. This could be a result of the surge requirements during Iraqi Freedom. However, with ten AEFs in a cycle, it would seem that the distribution of taskings would involve other bases

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Combat service support is an important part of combat operations but plays a much larger role after combat operations cease and the stabilization force remains.

first before tasking these bases as heavily as occurred in the AEFs investigated.

Reexamination and redistribution of AEF requirements across the entire ten AEFs in a cycle may resolve this apparent problem. Additionally, a different tasking concept requires development for combat support (CS) and combat service support (CSS) units. These units may or may not deploy with aviation or weapon system packages. The exception being the maintenance units assigned to specific airframes tasked under an aviation package or personnel directly supporting a weapon system (that is, intelligence, surveillance and reconnaissance). Therefore, nonmaintenance-related or support units directly tied to aviation packages or weapon systems require different tasking methods than those linked to aviation packages.

Conclusions and Recommendations

Research and historical searches yielded very little, if any, significant concept, research or study directed toward the application of CSS units in the AEF concept. The primary focus toward the development of the aviation package or weapon systems abounds. The focus is not on CSS operations in areas of responsibility.

> During 1996, the United States stationed about 16,500 troops in Bosnia and roughly 6,000 support persons in Croatia, Hungary, and Italy. All NATO [North Atlantic Treaty Organization] nations contributed personnel, along with 18 non-NATO nations, for an IFOR [implementation force] total of about 54,000 troops. SFOR [stabilization force] is now a smaller force of about 18,000 troops. The US contingent has been reduced to about 2,900 in Bosnia, and with about 1,000 additional persons in Italy, Hungary, and Croatia, supporting NATO operations in both Bosnia and Kosovo.[10]

Combat service support is an important part of combat operations but plays a much larger role after combat operations cease and the stabilization force remains.

> New requirements and a push toward joint operations for the economy of forces will have a profound effect on Air Force combat service support. This was evident when vehicle management personnel (operations, maintenance, materiel control, and LROs) received taskings to support Army convoy operations. While this met some resistance in the vehicle management community, the tasking met all challenges and opened new opportunities for Air Force vehicle management to support a large joint operation. Our collective Air Force transportation community is traveling down a new road with filling our sister services' requirements. Air Staff FAMs and AEF center transporter schedulers stand ready to support.[11]

	Number Tasked		DELTA	
	High-Tasked Bases	Total Tasked	Total	Percentage
AEF SILVER	315	1,107	792	72
AEF 7 - 8	299	560	261	47

Table 5. High-Tasked Bases Versus AEF Totals

Vehicle operators and mechanics have supported other services in the past but never on such a large scale.

If vehicle management continues to work more with the other services, it is of the utmost importance to develop specific doctrine and AEF concepts to support the requirements. Doctrine for CSS operations and specifically the CSS role in ACS is required to define the roles performed by these units. The current CS doctrine does not adequately cover all operations performed by combat service support.

The Air Force, as a result of these challenges, has begun realigning its organizations and doctrine to decisively establish itself as an expeditionary air and space force . While the entire Air Force has felt the effects of this realignment, support activities have been most heavily impacted. Air and space expeditionary forces are simultaneously operating from widely separated locations around the world. This places strong demands on CS activities and resources and dictates that we devise new ways of doing business with new or enhanced capabilities.[12]

Combat support should apply to those units directly supporting a weapon system and combat service support separated for the base operating support (BOS) provided. This matches the ACS concept, particularly when looking at the Open, Establish, and Operate the Base force modules.

> The individual CS and CSS support UTCs, grouped as force modules, that should be deployed to accomplish AEF operations during the deployment phase of a contingency. They are designed to accomplish the following individual functional missions: Open the Airbase, Command and Control, Establish the Airbase, and Operate the Airbase. These packages should be tailored based on the situation at each beddown location.[13]

The current CS doctrine does not adequately cover all operations performed by combat service support.

There is a two-way benefit if this is accomplished. First, it allows senior leadership, expeditionary mission support commanders, air expeditionary wing commanders, the commander of Air Force forces/joint forces air component commander, and the CoCom to understand the priorities, capabilities and limitations of combat service support. Second and of more importance, doctrine provides the units and individuals with a vision or focus of where the combat service support fits within the expeditionary mission. The development of CSS doctrine would provide great returns to the overall AEF mission.

The development of the ACS concept of operation (CONOP) concerning the development of force modeling based on a large part with combat service support is a matter of great interest. Combat service support is better served by having developed force modules similar to aviation packages. The development of such force modules will require new ways of looking at how we support garrisoned bases. Deploying force modules could create a serious impact on operations for an aviation wing if large portions of support personnel go to an AOR. Is this where outsourcing, privatization, and contracting support functions come into play? Would it benefit the Air Force to develop force modules based, trained, and deploy as a unit similar to a Rapid Engineers Deployable Heavy Operations Repair Squadron Engineers [RED HORSE] unit or air mobility operations group? What are the costs or benefits

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As the Armed Forces AFCAP or contractor operations fold into the operation, CSS force modules should return to home units for reconstitution.

from creating such an organization? The author proposes a combat support group that follows the contingency response group in the Establish the Airbase force module. The combat support group would establish and run all base operating support for the operation location and AOR, as well as command echelons at the combat air operations center/joint air operations center. Exploring this new concept deserves consideration, which the author will pursue at a latter date.

Another area worth considering in new CSS doctrine pertains to contractor support in stabilization operations and even during combat operations as we see in Iraqi Freedom.

> This problem leads to an acknowledgment of the need for a clear delineation of what functions are core—those considered *direct military CS* activities. While this question initially seems simple, the analysis can become complicated. Personnel providing support in supply, transportation, repair, and maintenance in country may well be considered to be providing services directly related to combat support, but the line is not clear, and the definitions become fuzzy.[14]

The CSS role should be initial setup in a BOS organization. As the Armed Forces contract augmentation program (AFCAP) or contractor operations fold into the operation, CSS force modules should return to home units for reconstitution.

> The Air Force is using a similar concept through a $450M contract awarded in 1997 to Readiness Management Support for installation support capabilities typically performed by CE [civil engineering] and services personnel under the Air Force contract augmentation program. The AFCAP contract specifically tasks the awardee with sustainment responsibilities after at least some beddown tasks are completed, as well as all traditional CE capabilities except for crash/fire/rescue and explosive ordnance disposal, and all traditional services capabilities, except mortuary and field exchange services. In addition, under an Army contract, the Air Force used Brown & Root for installation and supply support services, including base operations and airfield management, supply and maintenance, crash and rescue services, and aircraft refueling at Taszar AB, Hungary, during Operation Allied Force.[15]

This, of course, would require tailoring based on the capability of the contractor deliverables. Other considerations for inclusion in ACS CSS force modules should include quality assurance evaluators (QAE). The role of the QAE is an important factor for the adequate support and monitoring of appropriate use of Air Force funds.

The intent of this research was to research the equitability of AEF taskings. The author believes improvement in the equitable tasking of personnel is required. Development of CSS doctrine, ACS force modules, and necessary changes to Air Force Instruction 10-400, *Aerospace Expeditionary Force Planning*, to reflect the role of combat service support in the AEF concept.

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15. Pausch, 51.

Effectiveness of Air Force Support Agreements

Introduction

The Air Force Support Agreement Program is a very important logistics program, often overlooked and misunderstood by the logistics community. At first glance, this program may seem to have very little importance to today's environment of contingency operations. While it may be true it has a limited role in the element of contingency, it is still a very important link to Air Force doctrine in how the Air Force organizes, trains, and equips its forces. The original intent of this research project was to identify four key questions:

- Does the dollar value of the triennial review provide real benefits?
- If we do not accomplish support agreements does the Air Force lose benefits?
- What is the dollar value of manpower, equipment, and administration costs to provide support to a support agreement requirement?
- Is the money from support agreements recouped?

Because of the research method and the data compiled, this article was not able to address fully the first three questions, and further research needs to be conducted to investigate these questions further. However, data were provided for information for the last question, Is the money recouped?

The data collected by the survey respondents led to other observations in the field of support agreement management. These observations were poor accountability of dollars for support agreements and a lack of training of key personnel such as the support agreement manager, functional area agreement coordinator, budget coordinator, and manpower coordinator in the support agreement process.

Importance and Relevance

Since the purpose of the in-garrison force is to prepare itself for how it will operate in war, it is interesting that many consider the Support Agreement Program for peacetime operations only. However, consider these factors: the primary purpose of support agreements is to eliminate the duplication of support and services.[1] So in peacetime, under the Support Agreement Program, many tasks and functions fall into this category. Because of the very nature of the contractual elements of support agreements, they can affect manpower positions and fiscal funding directly. This correlates to how some units and functions may be equipped, earn or lose manpower positions through support agreements, and then be funded fiscally through money earned or recouped through its program. This tie-in can affect units directly in terms of sustainment when looked at in terms of reconstitution of forces.

The Air Force has made progress in the first three areas identified by the Eighth Army in its program. However, the Air Force is still struggling with documentation for reimbursement for services or support. The Air Force has been staffing the support agreements through the areas the Eighth struggled with. The Air Force program also has regulatory guidance that is not clear and concise, and the training issue is still a problem area.

Government Accounting Office—Military Bases: Opportunity for Savings in Installation Support Costs are Being Missed

This document illustrated six problem areas for support agreements:

- Savings through interservicing (when the support agreement is between different military services) are possible but not well documented.
- Military services are reluctant to identify further savings because of fear of additional reductions.

- Many interservicing studies were ignored because no one—to include base commanders—wanted to implement them.
- In the Air Force, there continues to be less emphasis at headquarters and major commands to regionalization or interservicing of base-support functions.
- The Air Force, unlike the other services, depends more on military rather than civilian personnel in meeting its base-support requirements.
- The difference in the Services' accounting systems complicates a lack of standards in unit costing and makes it difficult to reach an agreement on the cost of the service or support.[2]

Two recommendations came out of this report: identify options and take steps to minimize the impediments of interservicing and emphasize interservicing as part of contracting out deliberations to maximize potential savings and efficiencies. Again, this highlights the purpose of the Support Agreement Program. In this case, neither the Department of Defense (DoD) nor the Air Force has made minimal improvements in these two documented areas.

Surveys came back from support AMC agreement managers, five surveys were returned from Pacific Air Forces, three surveys were returned from Air Force Space Command, and one survey from Air Education and Training Command. Four surveys were returned without identifying the base or major command (MAJCOM).

In accordance with AFI 25-201, support agreements are not a suitable means for documenting support for war, operations other than war (OOTW), or exercise requirements, which should be documented in the appropriate plan. However, it is acceptable, by mutual agreement, to use an existing support agreement to absorb additional work temporarily created as the result of an unplanned contingency operation.[3] In today's environment, where dollars are already in short supply, every fiscal dollar needs to be accounted for and used in the most responsible way.

In review of information gathered from the 23 survey responses, 13 survey responders indicated they were recouping the dollars for their programs that were in

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Through the course of the program, the career broadening officer works in various disciplines, learning the functions and challenges of other logistics career fields and earning professional certification in Level I Program Management and Level I Acquisition Logistics. Finally, the participant has an opportunity in the final phase of the tour to concentrate in one area in order to fine tune what was learned in the first phase. This job assignment is usually related to the CBO's primary logistics specialty. The program is geared toward mid- to senior-level captains with a history of superior performance, potential for promotion to senior-level logistics. This job assignment is usually related to the CBO's primary logistics specialty. The program is geared toward mid- to senior-level captains with a history of superior performance, potential for promotion to senior-level logistics

Article Highlights

alignment with the stated value of the agreements; 10 survey respondents stated they were not able to recoup all the dollars from their support agreements. This consistently was directly attributable to a lack of training of four offices, having an immediate impact on the Support Agreement Program. These were the support agreement manager (SAM), functional area agreement coordinator (FAAC), the unit resource advisor (RA), and the budget coordinator in the wing-level finance.

Consistent with training issues, surveys did reveal that the two Support Agreement Program managers with the largest programs in terms of dollar value were able to manage the programs effectively and were recouping the total dollar value of the support agreements. However, both programs had extensive documented training for the SAM, the FAAC, RA, wing manpower office, and the budget coordinator.

It would seem support agreements are not being used to document support for war, OOTW, or exercise requirements. However, given today's operations tempo in an expeditionary air force, further study is needed to look at whether support agreements in place are being fully used and taxed or if there is an increase in support agreements caused by the nature of an unplanned contingency. It would be interesting to document whether support agreement use goes up or remains the same as units return from deployments for reconstitution.

Like all programs, the support agreement's processes need to be evaluated to see if the overall program processes need adjustments or better business practices. It is in this area that the Support Agreement Program may have a few concerns. One of the basic elements of the Support Agreement Program is documentation of the agreement itself. AFI 25-201 requires that all support agreements be documented on Defense Department Form 1144 and documented in the Support Agreement Management System (SAMS).[4] Across the Air Force, this program is being utilized consistently. This is an excellent direction in using technology to automate a very cumbersome manual system. However, the Air Force only planned and budgeted for the initial program and sustainment. There is no plan or program dollars for enhancement of the software or the development of a Web-based system. Two survey respondents commented that the SAMS program was an excellent tool and were concerned that there was no money for further development.

Four survey respondents commented they currently are revamping their Support Agreement Program. As the Air Force continues to evolve into an expeditionary force with a smaller logistics footprint, it is logical to assume this program will grow in size, because all units try to eliminate duplication and save much needed operations and maintenance dollars. However, because of the budgeting and programming of this computer infrastructure system, it will be handicapped as it attempts to keep up with change and demand. In the 2002 AMC Support Agreement Conference, this problem was identified to the MAJCOM, and at this time, it is still an open item from the conference with no point of contact researching the issue.[5]

Then, there is the actual staffing of the support agreement process. It can take 30 days to 2 years to complete a support agreement. Some of this is caused by coordination that must occur between the functions,[6] mission priorities are all competing for a finite number of people, limited time to allocate to the program's management, and support agreements historically have taken the back seat in priority when worked under suspense guidelines when other programs are equally suspensed.[7] These may be the primary causes for the lengthy staffing problem. However, money is also a problem because it is the documentation for reimbursement. Many units involved in this process have elected to forgo reimbursement since unit resource advisors did not track reimbursement costs aggressively and did not enforce reimbursement documentation. As another complication, there are units that have been using unsigned and, subsequently, unfunded support agreements. The result is a unit in violation of Air Force policies and instructions providing service or support to another. This, in turn, does two things. First, it provides services or support to a unit that is not entitled to the service and support. Second, a unit will not be reimbursed for the service or support and has no recourse to get paid for those services or support. Units entered into unsigned and unfunded support agreements have their own budgets for execution of operations. These do not include expenditures as a result of unfunded support agreements that may then siphon monies away from the unit's mission.

Three survey respondents stated their units were taking support agreements *out of the hide* for both funding and probably manpower for maintaining the agreement. Again, in today's military environment, when both funding and manning are stretched, it is remarkable and distressing these situations would occur.

Training is another practice that needs reassessment. There is no standardized training for the functional area agreement coordinator, who plays a significant role in the management of support agreements. This lack of training was identified in the 2002 Support Agreement Conference for AMC.[8] One survey respondent stated it would be difficult to train logistics readiness officers in this area since it is not emphasized in the master training plan. Another seven survey respondents stated there was a lack of training from the FAAC to unit resource advisors, budget coordinators, and SAMs. These key positions are instrumental in recouping dollars for the Support Agreement Program. This is another area that needs to have standardized documented training. The resource advisor is the catalyst to ensure units are providing the necessary documentation. This means the resource advisor and the FAAC need to determine incremental cost directly attributable to the receiver. They also must look at historical data, such as past fiscal earnings; average of earnings from previous years; and current factors such as pay rates, electricity, costs, and so on. If it is a new support agreement, in no written document does the resource advisor or the FAAC know how to estimate those expenditures, but again, it is not standardized training for resource advisors to track such expenditures. Again, since in many cases military members are assigned resource advisor duties as an additional duty, unless there is an office continuity book, they will not know where to begin.

Finance offices, because of the very complexity of the accounting system, normally rotate personnel through the different finance sections. This creates the problem of inexperienced budget analysts who face the same problem that the additional duty resource advisors face. This common problem is lack of training and experience to know what they should be seeing from unit resource advisors, particularly in tracking reimbursements in CRIS/MICROBAS (a comptroller software program), and the open document listing. Standardized training would help close the gap between what the Air Force instruction guides the program to be and what the program could be. The Support Agreement Program is one of the few programs in the military that should at least break even financially or generate revenue for the Air Force.

The survey illustrated there is a direct correlation from training to reimbursement of dollars. The programs that were able to attain all their reimbursement have a well-written and documented training plan with encompassing key players—FAAC, resource advisor, budget coordinator, and manpower office. There was also continuity when the support agreement was a civilian position versus a military position. Four surveys stated the positions should be civilian and not military positions, and the two strong programs were both executed by high-level civilians (GS-11 and GS-12). The Air Force should conduct a study on whether the civilians lend continuity to this program. As military members deploy for aerospace expeditionary force rotations and the development of logistics readiness officers requires them to move for career development, this may be an area where it would be beneficial to have a civilian position as the support agreement manager. This especially may be true since the Support Agreement Program is a high-dollar program with a lengthy coordination process and the triennial review process takes longer than most military tours of duty.

The survey did not support that the more manpower dedicated to the Support Agreement Program meant more dollars were recouped or the program was effectively managed. Two surveys showed there were two dedicated positions to the Support Agreement Programs that spent 40 hours each on the program, yet the programmed showed deficiencies in the review status of the agreements. The average response for manpower, however, was only one person allotted to the Support Agreement Program at an installation.

The survey highlighted that the average number of agreements in the program was 65. Of the 65 agreements, 19 were in current status in the triennial review process, the average number being late for the triennial review process was 14, and the average number of agreements that had completed the triennial review was 20.[9] Triennial

review is a complete review and rework of an existing support agreement. The review is documented on a new DD Form 1144 and is completed no later than 3 years from the effective date of the existing agreement per AFI 25-201.

Findings and Potential Solutions

Ten of 23 responders were not able to recoup monies from their support agreements. Based on the data from the survey and the comments survey responders provided, it was believed to have been a direct result from lack of training. Training is consistently an issue across the spectrum of Air Force operations and no less here.

A solution to this problem would be a standardized base-level training program, at least 1 week in length, presented by the support agreement managers and would include the points of contact from the respective offices involved. This training would include an overview of the Support Agreement Program in a standardized format, then any additional guidance by the particular MAJCOM, and indepth training of each section. In addition, the SAM would provide a hands-on workshop for the FAAC to train the person in the particular part of the process, using actual agreements and responsibilities, and tailor the training for the customer.

With only one person, on average, dedicated to the Support Agreement Program and working nearly 40 hours a week on it, that person is in a full-time job and does not have the opportunity to broaden to anything else for experience. This can be problematic if the position is a military one, either officer or enlisted. To begin with, military members, especially officers, move every 2 to 3 years and have to rotate through a variety of positions for training. Enlisted members follow a similar career path. If one person is averaging a full workweek covering 65 support agreements and has to leave at the 2-year mark, it allows little time for continuity in the program where training is already deemed deficient through this questionnaire.

The best possible solution would be standardization of personnel, creating a civilian GS position to manage the Support Agreement Program across the Air Force. With an average of 38 hours spent weekly on support agreements, it still fits within the civilian workforce 40-hour workweek for pay. This establishes continuity as well since GS employees are not all required to change stations, and the job announcement could be written so the position would be dedicated to the Support Agreement Program.

The third finding was the staffing procedures for support agreements. Eight survey respondents, based on their comments, clearly indicated the staffing process is too long. This applied not just to the general staffing requirements for the agreement but even more so for the triennial review required by AFI 25-201. The survey showed approximately 58 percent of support agreements are late for their triennial review. If the staffing process can be streamlined, the Air Force will see a decrease in support agreements late for the triennial review.

Two survey respondents commented on how they believe the Support Agreement Program was not properly aligned for a wing. One survey respondent even highlighted the initiative to have his/her office fall directly under the mission support group commander so this function will be in direct line with wing leadership and allow the mission support group commander to engage directly with SAMs on critical support issues affecting that wing. This seems drastic since that program is being effectively managed and recouping its dollars. On the other hand, if it is successful in getting itself realigned, other MAJCOMs would follow suit and, as a result, help those SAMs who may not have strong programs and who could really use some senior leadership involvement.

In addition, seven AMC Inspector General Unit Compliance Reports from August 2003 to February 2004 have documented three of the problems identified in this article:

- The problem with lack of standardized training
- Lack of documentation of training
- Late triennial review of support agreements

In addition, those reports document that financial management comptrollers have not been reviewing funding annexes consistently as required by AFI 20-201. However, because of the nature of the inspection, the reports do not clearly state why finance personnel were not reviewing funding annexes. Further research needs to be done with

the finance community, to include reviewing the Air Force instruction for finance accounting and the Air Force instruction for support agreements to see if there is a disconnect between the two instructions. Review of AMC Inspector General summaries of inspections showed three of seven inspections had insufficient comptroller support; namely, budget reviews of agreements were not conducted.

Conclusions and Recommendations

There are better ways to manage the base Support Agreement Program, tailor it to Air Force needs as the force evolves, and benefit all who utilize it. There are two solutions that could address the problems noted earlier and maximize use of personnel and experiences of these same persons.

First, recurring training needs to be standardized and mandated by Headquarters Air Force. This will force all MAJCOMs to be under the same compliance orientation. The training would be shared and conducted by all wing offices affected in management of the program, particularly the SAM, FAAC, RA, manpower coordinator, and the budget coordinator in the wing-level finance.

Second, continuity proved to be a problem for those support agreements that were managed poorly, while those doing well had better continuity. A senior civilian GS position, such as a GS-11 or 12 is needed to fill this role. They would have experience working within the Federal system when hired and, hopefully, within DoD. Regardless, their grade and experience would assist in enforcing the program's proper management execution upon units that are entering support agreements with the host installation. Further, they would be static, not moved or rotated as military members do every 2 to 3 years, and in the application for the position, their core document would state it would be a 5-year assignment. This further would provide the continuity needed as support agreements can take as long as 30 days to 2 years to staff.

Having a civilian position further would enable tracking of old agreements into inactive file status and the triennial review process. They would be familiar with the older agreements because of their longer minimum assignment time and not just the new agreements staffed within a 2-year time period that a military member fulfilling this role would experience.

A civilian member in the support agreement manager position, with the requirements stated above, would be able to maintain continuity for the installation's training as well. For example, this GS would still be present when wing budget personnel transitioned out but would still be able to meet the members, work them through the training in the past, and explain their roles in the wing process. Ideally, all persons associated with the process would be on longer tours of 5 or more years, but this is impractical for military members to attempt this change, as the Support Agreement Program is primarily a logistics function; therefore, a civilian can be the core of continuity. Further study needs to be done by the Air Force to see the long-term impact on the logistics planner enlisted career field and the possible benefits for the Air Force.

The continuity of necessary mandatory training dictated by Headquarters Air Force, coupled with the standardization of personnel such as the GS program manager, will result in recoupment of monies for the Air Force from the program. This established circle also will be able to evolve the program into the future, supporting new agreements and the ever-constant evolution of the Air Force.

Noes

1. AFI 25-201, *Support Agreement Procedures*, 1 Dec 96, 1.
2. General Accounting Office, "Military Bases Opportunities for Savings in Installation Support Costs are Being Missed," Apr 96, 4-5.
3. AFI 25-201, para 1.4.2.
4. AFI, para 2.2.1.
5. AMC SAM Conference Minutes, 2002, 1, item 4.
6. *Support Agreement Guidebook*, Hickam AFB, Hawaii, Oct 99, 15, II.A.3.
7. *Support Agreement Guidebook.*
8. AMC SAM Conference Minutes, 2, item 2.
9. It should be noted there is error in the data gathered from the surveys in this area. Some survey respondents only marked an X in the column number and did not identify how many actual agreements they had. Since they clearly marked the form, they were given credit for one support agreement; however, the numbers are not accurate within this paragraph and are used for a general understanding only.

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Improperly Positioned USCENTAF WRM Preposition Sites

Introduction

We need to continue the transition from a threat-based Cold War garrison force, focused on containment, to a capabilities-based expeditionary force focused on responsiveness.

—General Michael Ryan, Air Force

During the last 10 years, the Air Force began its transformation from a Cold War Juggernaut to an expeditionary powerhouse with a military force that is unequalled by any other nation. One of the most significant differences between the two perspectives is the number of forward operating locations operated from during active military operations. The number has decreased dramatically. With this massive reduction in forward basing and the growing threat from terrorists and rogue nations, the Air Force has been taxed beyond its conventional capabilities. When you add in the requirement to support operations on a global scale, it is easy to see that the metamorphosis into the expeditionary air force is just another stage in its evolution as a fighting force. So, with fewer people and bases, the Air Force must continue to search for new avenues that will ensure it continues to maintain a global capability. One way this is done is through the establishment of war reserve materiel (WRM) storage locations in or near the major threat areas. While the idea of preposition sites dates far back in history, they really saw their modern birth in the 1600s by two Frenchmen—Le Tellier and Louvois.[1] These WRM storage locations provide the Air Force with a significant amount of capability prepositioned for use by forces deployed to combat a nearby enemy. WRM is a critical facet of every

Improperly Positioned USCENTAF WRM Preposition Sites

Without inpace WRM, the ability to fulfill the obligation to support and defend the United States against all enemies would be significantly hampered and, in most cases, impossible.

combatant commander's deliberate or crisis plans because we no longer have years or months to position and transport millions of tons of equipment and munitions. We may have weeks and sometimes only days. Consequently, without inplace WRM, the ability to fulfill the obligation to support and defend the United States against all enemies would be significantly hampered and, in most cases, impossible. A discussion of all WRM sites would go beyond the scope of this article, so the focus will be on the specific US Central Command Air Forces (USCENTAF) WRM storage sites in Qatar, Oman, and Bahrain. The author worked in the command center that directed the activity for these sites during the war and has firsthand knowledge regarding their effectiveness.

Background and Relevance

Because of rising tensions, as early as the 1970s and 1980s, the US military pursued preposition sites in the Southwest Asia theater. Since there were no permanent US military bases in the region, prepositioning was the immediate solution to meeting mission needs in the region.[2] During the 1991 Gulf War, the Air Force, similar to the other military services, required significant quantities of assets in the Central Command (CENTCOM) area of responsibility (AOR) in order to conduct military operations against Iraq. With the successful removal of Saddam Hussein's forces from Kuwait, the process to move these assets home was an even larger task than getting them there. Shortly thereafter, Operation Southern Watch was established, creating a near permanent support requirement for WRM. These WRM sites originally were established to ensure any future operations in that particular region of the world could be supported in a relatively quick manner. Escalated tensions and continued terrorists activities justified the need to extend the stay in the region and eventual active warfare in March 2003.

After 10 years of sanctions and continued surveillance through Northern and Southern Watch, Saddam continued to press forward to develop weapons of mass destruction, not to mention his continued atrocities against his own people. After an extensive period of discussion with the United Nations (UN) and Saddam's failure to comply with UN mandates, it became very clear that the world was not willing to take the actions needed to remove Saddam from power and eliminate his continued efforts to develop weapons of mass destruction. President George W. Bush, on the other hand, was not willing to allow Saddam to continue as a serious threat to national security or to the world, bringing us to a situation eerily similar to that of 1991. The task this time was to remove Saddam from power and establish a stable democratic government in his place. From a military preparedness standpoint, the primary difference from 1991 to 2003 was the US extensive presence in the theater prior to the commencement of hostilities. The United States was far more prepared because of the foresight of US military planners and political leaders. In the years preceding the Gulf War, the United States had established several key bases in the region, as well as critical WRM storage locations, and maintained a continuous

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presence over a major portion of Iraqi airspace through Southern Watch and Northern Watch. This preparedness and capability was made all the easier through diligent efforts to maintain an extensive amount of WRM in the region. When the order from President Bush was signed, the US military executed Operation Iraqi Freedom. Days later, Saddam was removed from power. Here is the point: the prepositioned WRM was the key to supporting and sustaining the extensive military operation. What most military personnel did not see were the multiple problems encountered in getting the much needed and highly demanded WRM assets to the required destination. Though astutely positioned for ease of access and geography, these locations were quite difficult to maneuver these assets into and out of the war zone. Some of this was caused by political and host-nation issues beyond the scope of this article, but many delays were attributed directly to the physical locations themselves and their close proximity to, or lack thereof, to the war zone. This summarizes the totality of the problems associated with the placement of WRM in these three locations.

In the CENTCOM AOR, USCENTAF stores its WRM at five sites located in three geographically separated countries (Figure 1). The fifth site—at Masirah Island,

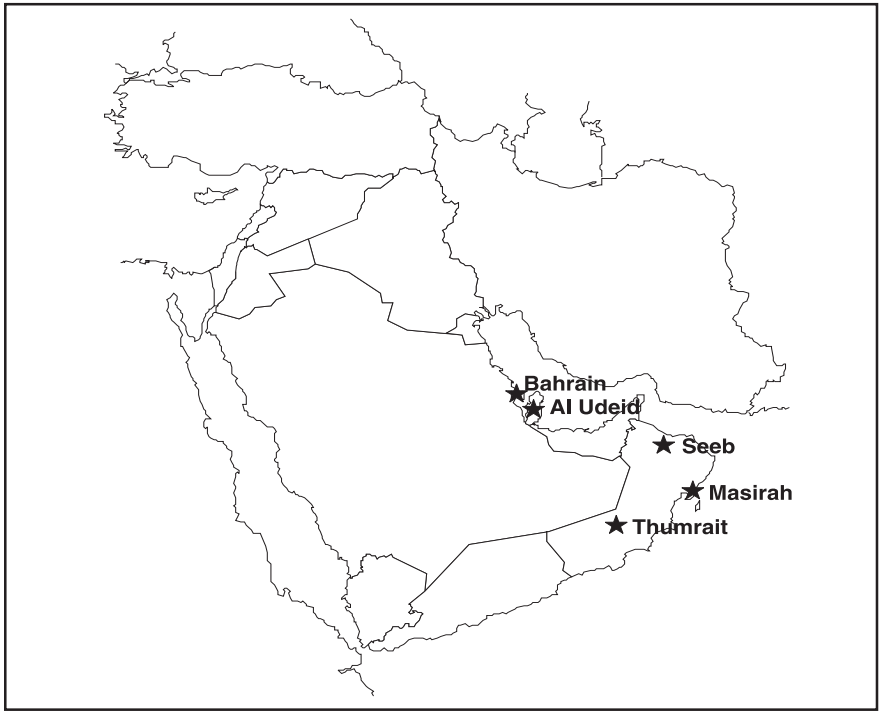

Figure 1. CENTAF WRM Sites

When the order from President Bush was signed, the US military executed Operation Iraqi Freedom. Days later, Saddam was removed from power.

Improperly Positioned USCENTAF WRM Preposition Sites

The four specific WRM sites analyzed were located at Seeb, Thumrait, Al Udeid, and Bahrain.

Oman—will not be included here as the WRM stored there is to support operations for the island only. During Iraqi Freedom, quick access to the WRM prepositioned at the other four sites was required to meet initial operational requirements and follow-on sustainment requirements.

The WRM was transported from these locations by all three modes of transportation: air, land, and sea. At the four locations, significant problems occurred in getting the assets to their final destination. In some cases, these delivery problems severely impacted flying operations. This article will prove that the USCENTAF WRM preposition sites are positioned improperly to provide the warfighter with the right equipment, at the right place, and at the right time to meet the required operational tasking.

As with any well-developed plan that has not been executed, there are always some assumptions. The first and most significant assumption is that the WRM sites can be placed only in locations where host-nation approval is already in place or expected to be positive. This drove the limited locations available to the US military prior to hostilities. For example, every plan required the use of the Turkish bases, but when the country refused to allow the United States use of those locations, WRM and all other equipment was transhipped to other locations. Strategically, Turkey was an ideal northern location, but host-nation denials drove materiel storage locations away from its borders. Similarly, there were locations in Saudi Arabia that would have eased the logistics footprint had we been allowed to use these locations, but the country would not grant approval. In these instances, it should be clear to see that the host nations' willingness to allow us to store assets in their countries drove the decision to store assets in many of the storage locations, not necessarily because these locations were the best strategically or geographically.

The second assumption made is that the location of the WRM storage impacts access and transportation effectiveness. As reflected in the data from the DynCorp study, the movement and access from these locations were continuous problems and required consistent rework to get the assets to the required places.[3] The third and final assumption was that many of these countries eventually would allow access to their locations once political and economic negotiations were resolved. Jordan only allowed full access once the United States committed to building extensive long-term contracting projects in that country. These assumptions were made based only on the events and problems experienced firsthand before and during Iraqi Freedom. As bleak as they sound, the bottom line is that the Air Force can overcome these problems in the future if it reevaluates where it is today and where it needs to be in the future.

Analysis of the Problem

The four specific WRM sites analyzed were located at Seeb, Thumrait, Al Udeid, and Bahrain. The importance of these sites can be seen in the amount of equipment stored at each location for wartime usage. In total, the four sites store more than

35,000 pieces of equipment, ranging from critical flight-line vehicles to 210,000 gallon fuel bladders (Table 1).

Site	Total Pieces of Equipment
Thumrait	17,612
Bahrain	3,335
Seeb	2,765
Qatar	11,641
Totals	**35,353**

Table 1. WRM Equipment

Each site provided critical wartime support to more than 25 bases during Iraqi Freedom. Every piece of equipment that can be taken from one of the WRM storage sites frees up critical strategic airlift used to move all other critical assets. From a logistics perspective, WRM taken from these sites allowed deployed forces to execute and sustain operations in Iraq properly and effectively. USCENTAF employed DynCorp to operate these four sites. Its data analysis reflected the volume of support provided from these sites.

Data Analysis

From the data collected from DynCorp, 1,203 unique equipment taskings were given during the specified period.[5] For a tasking to be considered valid, the data had to contain the following information:

- Date tasked
- Date required
- Destination
- Mode
- Date closed

From a logistics perspective, WRM taken from these sites allowed deployed forces to execute and sustain operations in Iraq properly and effectively.

While there was more information available in the data, anything beyond the requirements listed above had no bearing on the issue being analyzed. Included in the valid numbers are 830 equipment taskings that contained several different errors. The errors ranged from lack of a closure date to no date required information. Along with those errors, there were numerous taskings that were canceled by the user, or the taskings were never officially received by DynCorp. So, after the data were scrubbed of errors, 373 entries, or 31 percent of the data, meet the criteria for inclusion in the analysis. This 31 percent is broken down into the four WRM sites in Figure 2.

After the valid entries were collected, a determination of which taskings failed to meet the required date was made. The results of this analysis can be found in Figure 3.

As indicated in Figure 3, the number of valid entries that were late was greater than 40 percent at each of the sites. The numbers in each of the blocks represent the number of taskings that were either late or on time. This data point alone provides some indication that there was a delivery problem. The next stage of the analysis

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was to break down the late entries into the three modes of movement that were used: line haul, sealift, and airlift. By taking this step, the causes of the problems can be narrowed down. Figure 4 displays the results of this analysis.

As shown, a clear issue with the timely delivery of equipment exists with two of the three modes of shipment, especially airlift. Without a doubt, the data reflect a

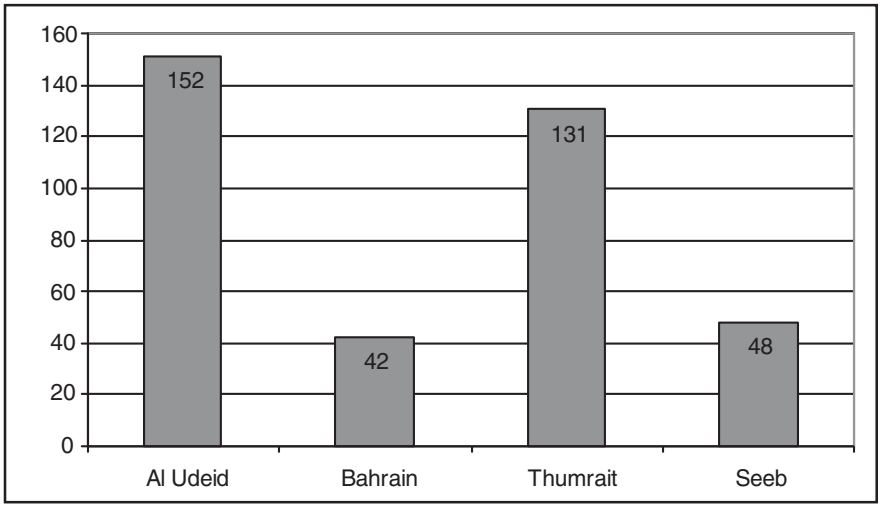

Figure 2. Valid Taskings[6]

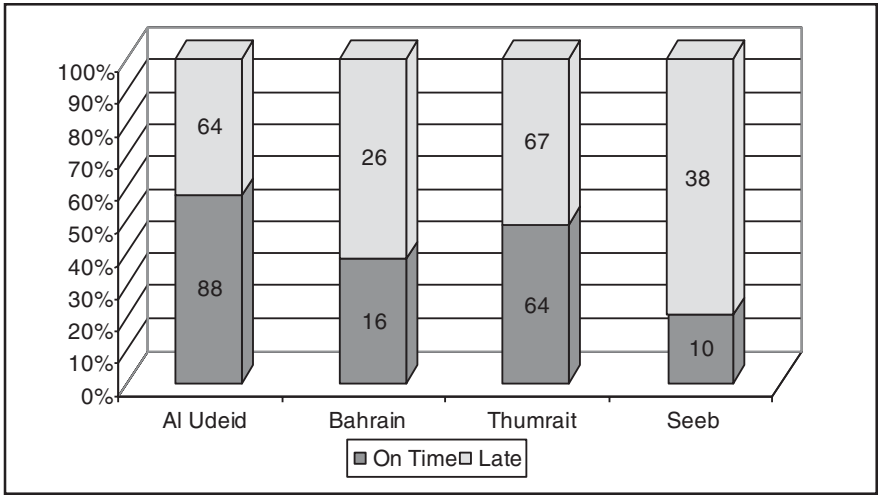

Figure 3. On Time Versus Late[7]

significant issue with the timely delivery of assets using all three modes. It also shows that one site has significant issues with meeting the taskings time line. The next stage of the analysis was to break down the entries that were late into the three modes of movement that were used: line haul, sealift, and airlift. By taking this step, the causes of the problems can be narrowed. Figure 4 provides a clear look at the results of the analysis on the different modes of shipment and shows a clear issue with the timely delivery of equipment via airlift and line haul. It also clearly shows that there is a significant problem with moving assets from Thumrait, Al Udeid, and Bahrain with airlift. Finally, this chart also indicates a delivery issue via the line-haul mode at Seeb. Without a doubt, the data provided show a significant issue with the timely delivery of assets. The final chart in this section provides a consolidated breakdown of all four sites and their overall percentages.

Survey Data Analysis

The results of the survey provide a firsthand glimpse of the delivery problems that were encountered. A resounding theme emerged from the responses. More than 50 percent of the responders agreed that the three most significant problems that impacted the movement of WRM were host-nation customs clearance issues, Saudi Arabian customs clearance issues, and a lack of available airlift. The three issues also were identified as problems that occurred because of the physical location. When asked whether the issues were isolated to a single location, 33 percent of the responders indicated that airlift problems were compounded primarily at the

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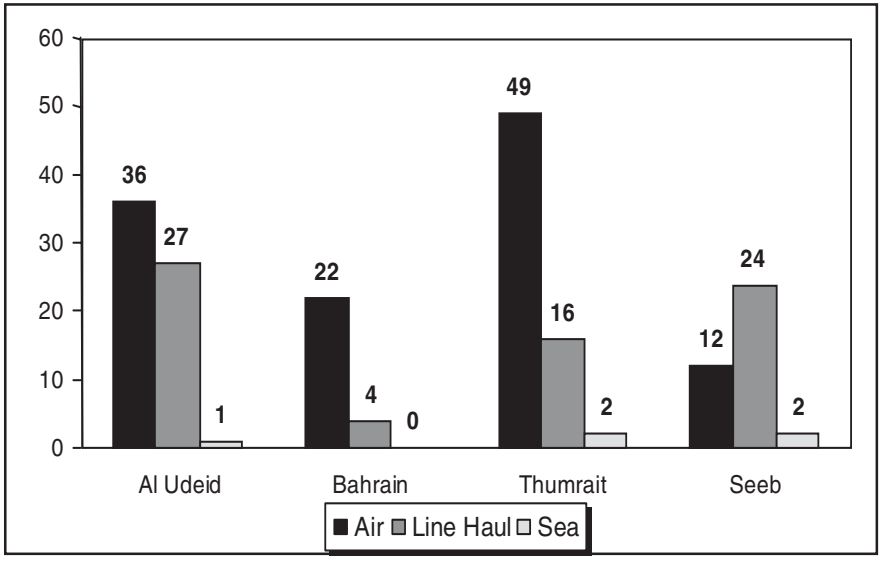

Figure 4. Late Taskings By Delivery Mode[8]

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For movement of assets via line haul, customs clearance issues were identified by 69 percent of the responders as the most significant problem encountered.

	Al Udeid	Bahrain	Thumrait	Seeb
Total on Time	88	16	64	10
Total Late	64	26	67	38
Percent Late	42 %	62%	51%	79%
Late by Air	36	22	49	12
Percent Late	56%	85%	73%	32%
Late by L/H	27	4	16	24
Percent Late	42%	15%	24%	63%
Late by SEA	1	0	2	2
Percent Late	2%	0%	3%	5%

Table 2. Consolidated Site Breakdown

Thumrait site. Thumrait was also a common response to the questions concerning the effects of distance of the WRM site from its final destinations. Relating the survey results to the data from DynCorp, 46 percent of the responders indicated that airlift was the most avoidable problem. Not only that, the replies also support the DynCorp data in the mutual identification of the lack of airlift as being one of the biggest problems in the delivery of WRM to its destination. This lack of airlift is also reflected in the responses regarding which specific problems caused delays in the execution of operations. It should be noted that the requirement to airlift these assets to get them to their destinations on time further suggests that they were geographically located in distant locations, making it more difficult in time and cost to move these assets to their final destinations. For movement of assets via line haul, customs clearance issues were identified by 69 percent of the responders as the most significant problem encountered. The same three factors that have been identified as the most avoidable were also listed as avoidable with proper planning in advance of any operation. But this does not encapsulate all the problems encountered. Falling right behind the three issues above were problems with availability of line-haul assets, 50 percent of the responses, and equipment backlog, 46 percent of the responses. The same responses also stated that these two issues were isolated to a single WRM storage site, Thumrait. Of the four sites, Thumrait was also physically located the farthest from Iraq.

The data collected from both sources provide definitive proof that there is a significant problem moving WRM assets from all storage sites, especially Thumrait. Not only do the DynCorp data show this, but the results of the survey also provide a similar conclusion. With two different sources providing data to support one another, it becomes clear that the problem exists. As with any problem, there are several possible solutions that can reduce or eliminate this problem and hopefully prevent it from recurring in future operations.

Findings and Potential Solutions

As shown above, the DynCorp data clearly reflect significant issues with getting assets through the different stages of strategic movement. When you analyze that data even further, it shows that more than 50 percent of the shipments were more than 5 days late in reaching their strategic lift point. All the results from the data show significant issues with all modes of delivery from all four sites, but the most compelling numbers are from the airlift portion. The percentage of shipments that were late by air was 42 percent at Al Udeid, 85 percent at Bahrain, 73 percent at Thumrait, and 32 percent at Seeb. When you compare these data to the feedback on the survey, a very telling conclusion can be made. Collectively, they clearly identify Thumrait as the single biggest problem for airlift and all other modes of shipment. While the data reflected problems when moving via airlift, the amount of equipment tasked to move from Bahrain was significantly less than that from Thumrait. How can the WRM outload problems via airlift for Thumrait be reduced or eliminated? There are three possible solutions:

- During crisis, increase the channel missions or strategic lift availability to Thumrait.
- Move the WRM site to another more accessible location.
- Create additional small-scale WRM storage sites in other areas to preclude the continuous need to go to Thumrait.

Because of the severe limitations imposed by the host nations and longstanding political sensitivities regarding war-related support, probably the easiest solution is to increase the amount of airlift that routinely travels to Thumrait. By doing this, the amount of equipment that gets backlogged could be reduced significantly, not to mention that it would eliminate the single biggest challenge for the Thumrait's location. The difficult part of this solution obviously is finding the necessary airlift assets to meet the requirement.

The second most viable option is the relocation of the WRM storage site from Thumrait to a more accessible location.

The second most viable option is the relocation of the WRM storage site from Thumrait to a more accessible location. This would be the most difficult of all the solutions. In addition to the host-nation issues identified above, the amount of money it would take to build another WRM site with the capabilities that Thumrait currently has would be around $75M.[9] The benefit that would be received from its relocation may not be significant enough to offset the exorbitant cost. The third and most feasible solution would be the creation of several small outload sites where a small amount of WRM could be located. By choosing this option, the workload at Thumrait could be reduced because the smaller sites would be able to meet an initial requirement to establish a new operating location. This idea is also consistent with the Air Force's recent kit configuration changes that allow for a 50-percent reduction in WRM kits, from 1,100 to 550. While it sounds easy, the biggest challenge would be the maintenance and storage requirements needed at the smaller locations. The

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The CENTCOM AOR is probably the single most unstable region in the world today.

benefit of having several smaller locations available would be a reduced movement requirement because the sites would be positioned at possible beddown locations. On top of that, these sites could be established at future exercise locations, enabling the dual use of the assets. The additional benefit here is that the equipment at the sites could be used to support these exercises during a time of peace. This proposal would guarantee at least some usage of the equipment, ensuring WRM assets are stored and maintained properly. Each of the three possible solutions has its benefits and drawbacks.

Summary

The data collected via the survey and through DynCorp provided very compelling statistics. The two different sources of information provided data that supported similar conclusions. When analyzed, the data clearly showed problems with the timely delivery of WRM from all four sites, but especially at Thumrait via airlift. Now that the issue has been narrowed down to a single location, possible solutions can be developed. In all, there are three possible solutions, with one being much more feasible than the others. Based on the extreme cost of relocating Thumrait and the already critical shortage of airlift assets, the creation of additional small-scale WRM storage sites is probably the most timely and cost-effective of the three options.

Conclusion

The CENTCOM AOR is probably the single most unstable region in the world today. With the bulk of the world's oil reserves, it is not that surprising. Throughout the execution of Iraqi Freedom, there were many problems with the timely and efficient movement of WRM from origin to destination. These are lessons that must be learned to ensure they are not repeated in the future.

The Global War on Terror and Iraqi Freedom, in particular, have shown the Air Force that any future conflict in the CENTCOM AOR is going to require a significant outload of equipment to support operations. The best possible avenue to ensure the United States can meet its wartime requirements is through the smart prepositioning of WRM assets. To achieve this ideal solution with WRM, data were collected on the WRM used to support more recent operations. DynCorp provided some critical data that reinforced the idea that properly placed WRM can increase effectiveness and reduce the requirement to move assets to their final destinations. The downside is that just having WRM is not enough; the WRM needs to be placed properly to increase this effectiveness. To that end, Thumrait has been identified, through statistical analysis of the DynCorp data and confirmed in the survey results, as the single biggest problem location. Several critical issues—such as distance from operating locations, amount of equipment required, and lack of critical airlift—are the primary reasons why Thumrait was clearly the single biggest problem site. To that end, there is only one solution that is really viable from a cost and time standpoint. The creation of several small WRM sites in other areas would provide

the optimal solution. These other sites would probably work best in Jordan, Kuwait, Egypt, and Djibouti. I say this because we have been conducting exercises there for the last several years. By relocating enough WRM assets to support one or two bases at the listed locations, the amount of WRM requiring strategic movement from Thumrait could be reduced significantly. The other benefit is the increase in timely establishment or movement of assets from these sites to meet future needs. The assets would not need strategic lift since they already would be located at the employment site. One way to approach this relocation is to establish annual exercises at these forward locations. By doing this, the forces involved in the exercise can use the equipment already in place rather than requesting additional airlift to bring assets in. In the end, the cost savings, if any, can be used to ensure that WRM equipment is maintained in the appropriate manner. Finally, for any solution to work, the Air Force will have to be willing to invest the time and money in it. This process will not happen overnight; however, if the Air Force is to ensure adequate and timely support of military forces in the CENTCOM AOR, it needs to be explored further for possible implementation before the next operational contingency occurs in this region.

Notes

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If the Air Force is to ensure adequate and timely support of military forces in the CENTCOM AOR, it needs to be explored further for possible implementation before the next operational contingency occurs in this region.

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Old Supply Training Paradigm—Is It Viable Today?

Introduction

The concept of the regional supply squadron was born during the Desert Shield and Desert Storm experience, when the Air Force Contingency Supply Support Activity (AFCSSA) was activated to centrally manage supply support to deployed units. Following the construct of the AFCSSA, Air Combat Command, Air Mobility Command (AMC), United States Air Forces in Europe, and Pacific Air Forces established regional supply squadrons—to this day they remain true to the original construct of centralized, reachback, and weapon system support but have developed unique staffing and structures.

Each regional supply squadron (RSS) performs stock control, mission capability (MICAP), stock fund, equipment management computer operations, records maintenance, and weapon system support for all bases supporting the combat and mobility forces at home or deployed, thereby reducing mobility footprint and streamlining supply operations.

The regional supply squadron is weapon-system focused, but they have supported base operation support needs of deployed forces when normal avenues of support—for example, host-nation support and local purchase—were not available. In this manner, regional supply squadrons transition from support of weapon systems at home station to support of the Commander, Air Force Forces (COMAFFOR) mission during contingencies.

The regional supply squadron is a critical Air Force materiel distribution command and control (C2) node, providing dedicated support to the major command (MAJCOM) commander and to the COMAFFOR during wartime.

During peacetime and contingencies, the regional supply squadron is the source of information and assistance to the sources of supply for combat weapon system

Old Supply Training Paradigm—Is It Viable Today?

The challenge today lies in providing the appropriate level (3, 5, and 7-skill level) quality training, upgrade, and core task competency qualifications training to ensure successful training of supply technicians at both regional supply squadrons and base-level supply units.

and mobility system spares and the critical C2 link between home station and deployed forces and global sources of supply. As such, the regional supply squadron is an inherently military C2 organization, staffed with military and Air Force civilian personnel who are fully trained and worldwide deployable (even though they have no official unit type code commitments).

Base-level supply (formerly known as supply squadrons) evolved through the years working as part of a wing staff agency, then deputy commander of resources, then the logistics group, and later mission support group. Base-level supply finally merged with the transportation squadron and logistics plans function to become what is now the logistics readiness squadron. Additionally, supply personnel within the organization have endured several changes and additions to their Air Force specialty code (AFSC) requirements, from merging the warehouse and inventory management functions, to releasing the supply deliveries to its sister AFSC-transportation, to creating a new paperless system (Supply Asset Tracking System) to control and document supply issues and deliveries.

Until the creation of the regional supply squadron, base-level supply technicians and the supply squadron controlled every piece of supply operations, from ordering, storing, issuing, and tracking of repair parts, processing, and sourcing all MICAP parts, warehouse replenishing and leveling, to processing and overseeing all equipment on base. During peacetime or contingencies, supply technicians, versed in every aspect of supply operations, supported the warfighter's needs—both at home station and deployed—base-level supply was the focal point for ordering, sourcing, and issuing of parts and supplies needed to meet the mission.

The chief of supply, as the commander and most senior supply individual, had control of the entire supply process, including the standardization of training in all facets of supply operations.

Problem Statement

The challenge today lies in providing the appropriate level (3, 5, and 7-skill level) quality training, upgrade, and core task competency qualifications training to ensure successful training of supply technicians at both regional supply squadrons and base-level supply units, enabling the best support for the warfighter at home station and deployed. This challenge is best summarized by Colonel Michael Yusi, commander of the Headquarters AMC regional supply squadron:

> The Air Force supply career field effectively is now in two basic tiers of core competencies (i.e., base/wing level versus regionalized); this makes supply training definitely a problem and challenge today especially for our enlisted corps. Each tier executes to different functions that really are no longer related. As such, it will require senior logistics readiness officer and CEMs to acknowledge this problem and fix it quickly."[1]

This article is intended to find the appropriate level of training and the best training method to ensure we provide high-quality and standardized training to all our supply technicians.

Old Supply Training Paradigm—Is It Viable Today?

Today, we have four regional supply squadrons in the Air Force, each established between 1997 and 1999 and staffed primarily with 2S0X1, inventory management (supply technicians). With the creation of the regional supply squadron operations, the 2S0X1 career field realized a new clear separation of functions, never before seen in this magnitude. Along with supply technicians, five 2S0X1 core processes and functions transferred from base level to the regional supply squadron—stock fund, stock control, MICAP, records maintenance, and equipment management. Additionally, the majority of the functions in the 2S0X2, systems analysis, also transferred to the regional supply squadron. Yet, systems analysis technicians continue to be assigned to base-level units. They facilitate reports processing, systems analysis of the Standard Base Supply System at base level, user identifications, and passwords and, in many instances, function as small computer trouble shooters. This article concentrates on the 2S0X1-inventory management AFSC (there are future changes to the 2S0X2 career field already planned).

Importance and Relevance

Before the creation of the regional supply squadron, the supply community struggled with the issue of always having a significant number of supply persons assigned outside of the core supply structure. These positions, while valid and authorized, still are required and could vary from recruiting duty to detailed *out of hide* positions in other wing, staff, and unit agencies. Regardless, they are expected to know and understand all facets of their supply career field. From that perspective, the training challenge is not new, but how to best address the issue of quality, standardized training continues to be discussed and argued at all levels. The biggest difference today is that these positions outside regular base-level supply were previously temporary in nature. Limited to a prescribed timeframe, individuals came back to base-level supply to continue working and training in the full spectrum of supply operations.

Before the creation of the regional supply squadron, the supply community struggled with the issue of always having a significant number of supply persons assigned outside the core supply structure.

The supply CFETP gives specific training requirements to be completed at the various stages of a person's career (apprentice, journeyman, and craftsman), and these requirements apply to both regional supply squadron and base-level units. Figure 1 is separated by main functions in regional supply squadrons and base-level supply, followed by functions in both.

Tasks

Based on the graph's total number of tasks (427) and location of functions, 43 percent (181) of these tasks are being accomplished at the regional supply squadron (first six columns), 33 percent (143) are being done at base level (next four columns); with 24 percent (103) at both (last three columns). This would lead one to believe that 3, 5, and 7-level trainees assigned to base-level supply are not getting the same type or level of training as one assigned to the regional supply squadron.

Additionally, paragraph 5.5 of the same CFETP stated that there should be a rotation policy for supply personnel assigned *outside* logistics readiness squadrons and regional supply squadrons to give them the opportunity to learn and perform

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core tasks. However, there is no guidance on how to thoroughly train for each other's processes. The paragraph also warns that "retaining AF Supply personnel outside the logistics readiness squadron or regional supply squadron, where they are not qualifying or retaining proficiency in supply core tasks, adversely affects the individual's career path, and prevents commanders from providing fully qualified supply personnel to unified commands during wartime operations."

While Air Force Manual (AFMAN) 23-110 suggested a method for rotating supply technicians internal to the logistics readiness squadron, rotations outside

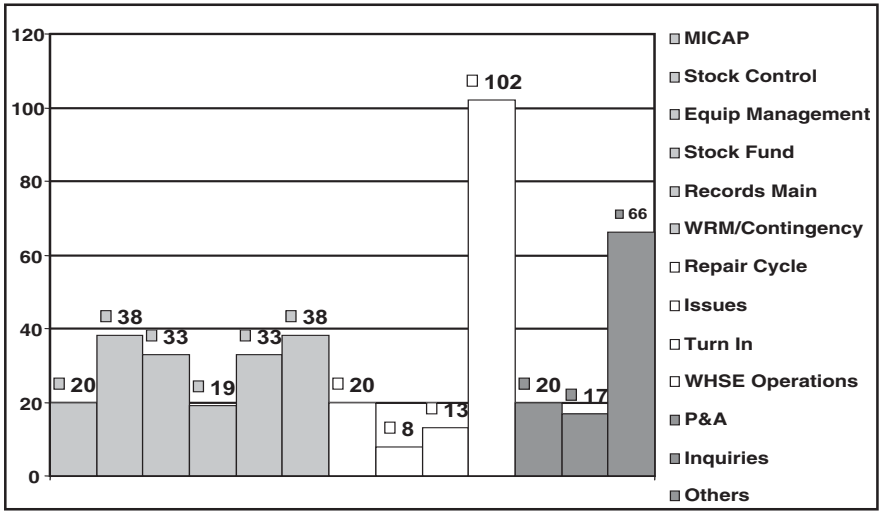

Figure 1. Supply CFETP

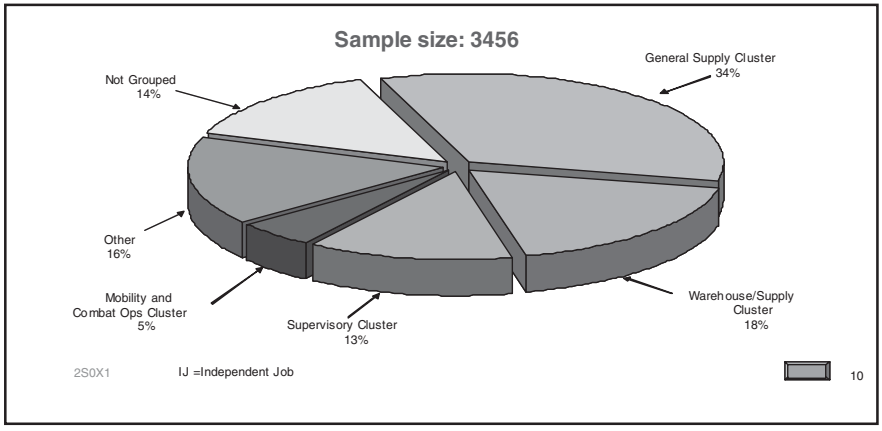

Figure 2, AFOMS Supply OSR

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the squadron are not formally addressed by either a policy letter or directive. Instead, each base is left to develop its own policy. This inconsistency in rotation policies aggravates an already known difficulty to training supply technicians properly.

Per retired Chief Master Sergeant Rosemary Johnston, former HQ Air Force Supply Functional Manager:

> Supply training requirements are established at Utilization and Training workshops, which are primarily attended by MAJCOM functional managers and subject matter experts. These individuals gather to discuss the depth and breadth of training, and their efforts are complemented by the OSR findings that identify the tasks individuals perform at all levels of the organization, the complexity of those tasks, and the report provides analytical data on where training efforts should be concentrated.[2]

According to the latest supply OSR document from AFOMS, the following are the supply jobs breakdown, followed by the training analysis.

- Majority of 3- and 5-skill-level members in General Supply Cluster, which include:
  - Processing inquiries, other than consolidated transaction history (CTH)
  - Processing/researching CTH inquiries
  - Processing issue requests, back orders, or due outs
  - Customer service tech job and production controller job
  - MICAP tech job and materiel control job
  - Customer service supervisor job
  - Regional stock control job
  - Stock control job
- Second highest percentage in Warehouse and Supply Cluster, which include:
  - Placing property in warehouse bins, racks, or bays
  - Preparing property labels or tags
  - Pulling items to be issued, shipped, or transferred
  - Physically receiving property and prepare or correct bin labels
  - Processing inquiries, other than CTH
  - Warehouse technician job and NCOIC warehouse job
  - HAZMAT and mission readiness spares package job
- Members at first 3-skill levels spend more of their time performing tasks in Duty A (Performing General Supply Activities) than any other duty area
- Three-skill-level members spend slightly more time in Performing Warehouse Activities (Duty N) than 5- and 7-skill-level members.
- Tasks being performed by highest percentages of 3-skill-level members (65 percent and below) indicate that career ladder is rather homogeneous at this skill level

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- Tasks being performed by highest percentages of 5-skill-level members very similar to tasks being performed by 3-skill-level members with nearly same degree of homogeneity

The above analysis seemed to suggest the majority (52 percent) of the jobs are in the warehouse and supply (base level) and general supply clusters (combination of both regional supply squadron and base-level processes), and these are performed mostly by people in upgrade training (mostly 3 and 5-levels). This OSR also seemed to praise the CFETP breakout, indicating just how varied, yet similar, supply tasks and jobs are and how split they seemed to be between regional supply squadrons and base-level units (yet a requirement for all). The OSR also gave the following training emphasis (TE) data, which could help in the development of training programs (for example, which tasks to emphasize for entry-level, on-the-job-training (OJT), structured training, and so on). Generally speaking, the higher the training emphasis number, the more resident/OJT training would be needed.

For comparison purposes, the training emphasis was identified further as base level, regional supply squadron, or both, with the following breakout: 13 (52 percent) identified as base-level process, 5 (20 percent) as regional supply squadron processes, and 7 (28 percent) as a process in both regional supply squadron and base-level units. The training emphasis ratings come from the answers provided to the OSR and may not necessarily correlate to equal CFETP steps or tasks—they rather seem to be supply processes. Further, if you compare job clusters and training emphasis data, this would seem to indicate a preponderance of supply tasks and processes at the base supply level. This is consistent with the original transfer of functions to the regional supply squadron, the number of 3 and 5-levels assigned to base supply, and the keeping (at first) of 3 and mostly 5-level supply technicians at base level. Warehouse operations remained at the base level, and the general supply tasks are performed by both regional supply squadron and base-level supply technicians. The CFETP, the job cluster, and training emphasis combined seemed to provide an appropriate level of training for supply technicians.

Methodology

A qualitative questionnaire was developed with a series of training query/inquiries (eight total) to gather specific data and information from supply units. The questionnaire was designed to obtain specific information on how functional managers (chartered to oversee the welfare and training of the enlisted personnel) and senior logistics readiness officers train and certify individuals for specific supply functions in both regional supply squadrons and base-level units. The questionnaire included examination of the standardization (if any). What are functional managers doing to train personnel on RSS and base level-processes? What is the pass and fail rate for people in training? The questionnaire also asked if functional managers or logistics readiness officers feel upward mobility and career broadening is affected by the current RSS and base-level setup? After a careful review of the answers, a

	Percent Members Performing			
	TNG EMP	1-24 MOS TAFMS	1-48 MOS TAFMS	TSK DIF
Process issue requests (base)	7.23	43	51	3.26
Interpret inquiries (Both)	6.97	33	36	4.45
Process inquiries, other than CTH (Both)	6.75	58	64	3.10
Process back orders or due outs (base)	6.22	32	42	3.54
Process consolidated transaction history (CTH) inquiries (Both)	6.21	52	58	3.41
Process turn-in transactions (base)	6.15	46	46	4.11
Process receipts (base)	5.64	19	18	3.84
Physically receive property (base)	5.54	31	32	3.08
Inventory warehouse assets (base)	5.43	19	19	3.91
Place property in warehouse bins, racks, or bays (base)	5.39	37	33	2.75
Process MICAP lateral support requests or shipments using WINMASS (RSS)	5.37	5	6	5.49
Monitor MICAP status (RSS)	5.34	7	14	4.89
Research CTH inquiries (Both)	5.34	56	63	4.74
Review management notices (Both)	5.29	27	31	4.11
Pull items to be issued, shipped, or transferred (base)	5.25	34	31	2.94
Process or clear rejected inputs (Both)	5.19	28	33	4.31
Prepare or process part number requests (RSS)	5.18	17	22	3.83
Complete MICAP checklists (RSS)	5.16	6	10	5.15
Prepare or correct bin labels (base)	5.15	32	30	3.20
Perform post postoperations (Both)	5.03	45	47	5.19
Research inventory discrepancies (base)	5.03	19	18	5.55
Prepare property labels or tags (base)	5.00	37	35	3.27
Inspect chemical warfare accessories, such as gas masks (base)	4.95	6	8	3.95
Load MICAP status (RSS)	4.92	7	11	4.9
Monitor unserviceable due in from management (DIFM) listings (base)	4.89	13	16	4.57
TE MEAN = 2.21; S.D. = 1.46; HIGH = 3.67				

Table 1. AFORS Supply OSR

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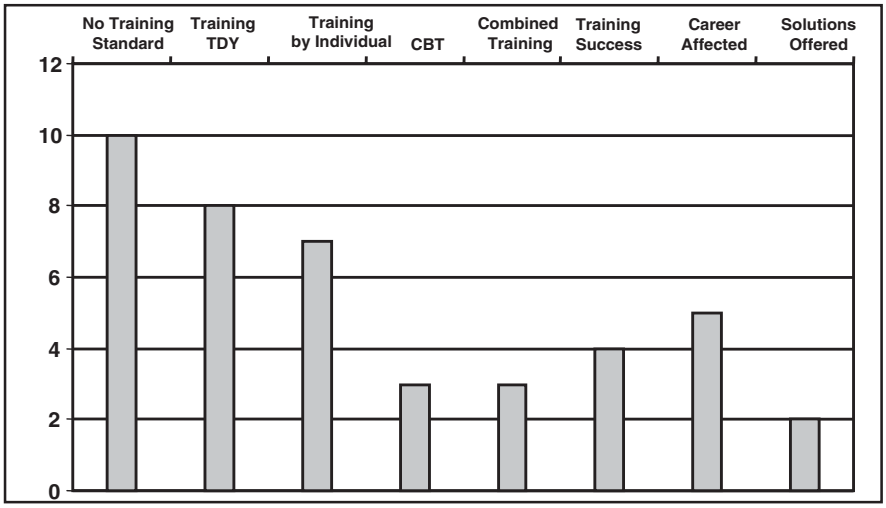

Figure 3. Questionnaire Responses

significant difference in style and direction of the answers was noticeable, which contributed to the belief the questions provided may have been a little too open-ended. This was taken into consideration while reaching a possible conclusion.

The data seemed to indicate a lack of training standardization in the current inventory management supply career field. Based on this questionnaire, compared to CFETP requirements and the latest OSR, the data indicated training requirements were met mostly with temporary duty (TDY) to either unit and by individuals with prior experience and assignments to either RSS or base-level units. Currently, the best training method seems to be TDYs to both RSS and base- level units and training by individuals with appropriate knowledge and past assignment experience. In contrast, only four responses alluded to the success of their unit's training program. (This could be attributed to the format of the question).

The questionnaire also asked for the number of 3-levels assigned and course pass/fail rates. After a careful review of the multiple responses, these data were not used in the analysis, since the actual question was determined to be poorly written. The graph and data also illustrated that five responses seemed to indicate the lack of standardization training and current RSS and base-level setup could adversely impact career progression and upward mobility of supply technicians, but more research is recommended and a better written assessment would be needed to properly develop this notion for investigation.

Even though the questionnaire answers seemed to determine the best method currently in use to train supply technicians, there are several other areas the questionnaire data pointed out that could be further explored for potential solutions. To find an even better method to train supply technicians, perhaps a different format could be to host officially sponsored training sessions routinely at each RSS and a

chosen base-level supply. Individuals or groups could go there for a definite amount of time and train on all necessary core task training and processes (including OJT). Because of the lack of training standardization found in the responses, perhaps an Air Force-level conference could be held (outside utilization and training workshops), where a plan could be developed to fully standardized all the bases. Conversely, since only three responses mentioned computer-based training, perhaps this option also could be explored for standardization at a much lesser cost. If the goal is to find a correlation between training, the number of 3-level people assigned, and course pass/fail rates, a more precise question or survey should be developed for this purpose.

There was one suggestion (based on two responses, one in the questionnaire and one directly to the author) that seemed to propose a different training solution and a new direction in the current structure of supply operations. Chief Master Sergeant Bill Rener, AMC Supply Functional Manager, suggested an AFSC separation in his questionnaire answer, where he stated, "The RSS is suppose to be a *fight in place* organization, which moves forward to another RSS when needed…what we truly need to do is go back to the old X0 and X1 days."[3] In addition, Colonel Michael Yusi, commander of the HQ AMC Regional Supply Squadron, suggested something very similar when referring to the RSS: "I favor *civilianizing* the majority of its operations through MEO (i.e., federal civil-service) in order to build upon the expertise and continuity needed to function materiel management/supply-chains."[4]

Conclusion

As the data from the CFETP, AFMAN 23-110, OSR, and questionnaire seemed to illustrate, supply training processes are varied (TDYs/individuals/computer-based training) and tasks are similar (52 percent are performed in the general supply and warehouse cluster). The same data also seemed to indicate a division of tasks between regional supply squadron and base-level units, yet the requirements are the same for all (CFETP). AFMAN 23-110 also seemed to advise on the need to supply personnel to best support unified commanders in the field.

Because of the numbers of 3- and 5-level jobs, their predominant assignment to base-level units (OSR) and the potential solutions to the findings from the questionnaire, this training challenge is not yet over, and the overall recommendation would be to continue studying and analyzing this in the future. Even though the research was able to find the appropriate level of training and best training method currently in use, because of the separation proposals by the AMC regional supply squadron commander and AMC supply functional manager, this seemed to demonstrate that, at least for now, the old supply-training paradigm of TDYs and individual/computer-based training method is, in fact, viable today.

Notes

1. E-mail between Col Yusi and Capt Quero, 30 Apr 04.
2. E-mail between CMSgt Rosemary Johnston, USAF, Retired, and Capt Quero, 26 Apr 04.
3. Questionnaire answer from CMSgt Rener, AMC Supply Functional Manager, 18 May 04.
4. E-mail between Col Yusi and Capt Quero.