THEATER AIRLIFT – AN ANALYSIS OF STAR ROUTES vs OPTIMIZED SCHEDULING

GRADUATE RESEARCH PROJECT

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Kevin C. Therrien

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Preface

This project really began almost 8 years ago. I was tasked to support Exercise KEEN EDGE 1995 as a mission executer for theater airlift support in the Joint Air Operations Center (JAOC). For the first few days, prior to the arrival of the Air Mobility Element (AME) and the Director of Mobility Forces (DIRMOBFOR) from Travis Air Force Base, California, we worked hard to schedule theater airlift to meet the validated requirements. Upon the arrival of the Travis contingent, we were informed that we were scheduling our missions completely wrong. All we needed was standard theater airlift routing (STAR) routes for theater airlift. The DIRMOBFOR asked how many airplanes we had (20) and said "Send 10 around one way, and 10 around the other way; that ought to do it." We executed the rest of the exercise that way.

I was flabbergasted. I couldn't believe that we would actually use our limited assets in this way when it came to the real world. I learned later on that indeed we did schedule our theater airlift in this way when I arrived in Oman in the summer of 2001. Flying missions around the United States Central Command (USCENTCOM) area of responsibility (AOR), I learned that our missions were scheduled at least a month in advance with no knowledge of actual requirements. Surely there must be a better way to use our resources, and that will be the focus of this paper.

Abstract

This paper will concentrate on the scheduling of theater airlift in the USCENTCOM AOR. In particular, this paper looks at the scheduling of C-130 missions during the month of August, 2001 and compares the actual missions flown to an optimized schedule. Then the number of sorties flown, flight hours, and cargo moved to accomplish the required airlift is compared in each of the two cases. The results show a greater than 50% reduction in sorties and flight hours with the same level of service and amount of cargo moved. The barriers to the implementation of an optimized schedule such as country clearances, intratheater cargo visibility, current doctrine, and user demands are also discussed with their respective solutions.

Chapter 1 – Introduction

This paper analyzes the current scheduling system for theater airlift and determines if the use of an optimization program would reduce the number of sorties required to move the same amount of cargo.

Background

Theater airlift scheduling appears anecdotally to the author of this paper to be haphazard and having little regard to actual cargo movement requirements. Optimizing a theater airlift schedule that starts with the theater airlift requirements rather than with available airlift assets puts the horse back in front of the cart.

Often, there is great confusion about efficiency and effectiveness and the trade-offs between each. More often than not, you see programs that promise an increase in both effectiveness and efficiency. This can depend on how you define and measure each of these. Efficiency is sometimes measured in the case of intratheater airlift as a utilization rate, for example. If the aircraft flew empty, is this a true measure of efficiency? In the case of measuring effectiveness, does the time it takes to deliver a specific cargo a true measure or is it customer satisfaction? There is a trade-off between efficiency and effectiveness in any logistics problem. The aircraft could be scheduled to fly routinely between two points and whenever there is cargo, it will be moved. However, if there is an insufficient amount of cargo to move and the aircraft uses only a small percentage of its capability, it will be very inefficient. By the same token, if it takes weeks to build up enough cargo to fill an aircraft efficiently, the time delay of the cargo could make it very ineffective. This paper will attempt to balance this trade-off by developing a scheduling scenario that looks at both effectiveness and efficiency. This will be accomplished by maximizing scheduling efficiency with time-based effectiveness constraints.

Research Questions

1. Primary Research Question

Will an optimized schedule for theater airlift reduce the number of sorties required and is an optimized schedule program feasible?

2. Secondary Research Questions

a. What is the history of this problem and have others tried to solve it before?

b. What are the current issues surrounding the problem?

c. What is the current doctrine on how to set up and schedule theater airlift?

c. What are the barriers to implementing an optimized scheduling program?

d. Analyze the data for August, 2001 and determine if an optimized schedule would have reduced the total number of sorties.

Scope

This research focuses on the steady-state planned airlift requests prior to September 11, 2001, specifically the month of August, 2001 for the USCENTCOM AOR. This focus is on the scheduling of theater airlift assets during that period and measuring sortie rates for the following scenarios: the actual sorties flown and the sorties that would have been flown if an optimized schedule had been in place during August, 2001. In addition, this paper will provide a historical background and current issues surrounding the intratheater airlift problem.

Methodology

This paper consolidates research information found on the subject of intratheater airlift from interviews, unclassified publications and reports. The primary sources used in compiling this paper come from the following agencies and organizations:

Air Mobility Command (AMC)

Air University (AU)

United States European Command (USEUCOM)

United States Central Command (USCENTCOM)

Defense Technical Information Center (DTIC)

Organization

Chapter two of this paper reviews the history of the intratheater airlift problem in two parts. The first part is a review of research into the optimization of theater airlift scheduling and computer programs that have been developed to try to solve this problem. The second part of Chapter two deals with the historical development of the doctrine and organization of the theater airlift management function. Neither will be effective without the other.

Chapter three looks at the current issues surrounding theater airlift scheduling to include current organization, doctrine, and initiatives in various theaters to improve the streamlined flow of intertheater cargo to intratheater cargo and to schedule that movement more efficiently.

Chapter four will analyze the data from the month of August, 2001 for the intratheater airlift movement of cargo in the USCENTCOM AOR. It includes a methodology for the analysis and a list of assumptions used in analysis. The sortie rates actually flown are then compared to the sorties that would have flown under an optimized schedule.

Finally, Chapter five contains conclusions from this research and the recommendations for further study based on the research contained in this paper.

Chapter 2 – Literature Review

PART I: Optimization Programs

The MITRE Corporation

The problems associated with the scheduling of intratheater airlift are not new. As early as 1968, in the heart of the Vietnam War, the advent of reliable computer systems caused many analysts to dream of automating theater airlift scheduling. At this time, the MITRE corporation, in conjunction with the Electronic Systems Division of the former Air Force Systems Command, performed a study to determine if the automation of many manual tasks in an airlift control center would improve the management functions of "message processing, Airlift Request processing, Frag Order Processing, airlift mission correlation, message delay detection, aircraft locating, data base file updating and airlift mission control." (Adamcyk, 1968:iii)

In 1968, the intratheater airlift management functions were set up differently than today. (See Chapter 3 for today's setup.) Intratheater airlift was managed by the Airlift Control Center (ALCC) which was a functional part of the Tactical Airlift Control Center. This particular test of the MITRE Semi-Automated ALCC System was conducted against a scenario of a war in Vietnam since "airlift control [had] been recognized more and more as a critical problem as a result of the type of operations being conducted in Southeast Asia." (Adamcyk, 1968:2) The primary task of the ALCC was "the generation of Fragmentary Orders (Frag Orders) for the airlift units." (Adamcyk, 1968:5) In today's war, this task would be the creation of an Air Tasking Order (ATO) even though aircrews today still refer loosely to an airlift tasking as the "Frag". The MITRE system was described in the following manner:

> In the MITRE system, the computer has been programmed to store the incoming Airlift Requests, and when directed by an operator, to combine them and allocate resources against them in such a manner as to optimize utilization. The trial Fragmentary Order is printed out in the ALCC for approval or modification. Once it has been approved, the operational program transmits the Frag Order to the simulation personnel representing the Outside World. (Adamcyk, 1968:5)

The MITRE system was an attempt to begin with the airlift requests and then optimize the use of the theater assets to meet those requests. This was done using the following algorithm:

> 1. Determine if the Airlift Request can be processed as a result of date/time, allocation, weather, airbase integrity, airbase status, and aerial port equipment status of the pick-up and delivery points.
>
> 2. Build a Frag Order as efficiently as possible using the following rules:
>
> > a. choose the smallest aircraft that can carry the cargo
> > b. determine the number of aircraft required
> > c. add other Airlift Requests to the sortie if possible
> > d. search for Airlift Requests and backhaul cargo until each sortie utilizes the aircraft 100%, and if not possible…
> > e. add additional intermediate sorties until efficiency is as high as possible or there are no more backhauls or airlift requests.
>
> 3. Process the Frag Order.
>
> 4. Update the airlift allocation file.
>
> 5. Print the Frag Order for approval. (Adamcyk, 1968:17-18)

As you can see from this early attempt to optimize airlift scheduling and the rules associated with allocating airlift resources to airlift requests, the goal was to improve efficiency to as close as possible to the unattainable goal of 100%. A secondary goal of the program is to reduce the number of operators in the ALCC and still be able to handle the same mission load. At the time of this report, design verification tests were not complete, but it had "become evident that the number of operators can be greatly reduced and still handle the same mission load, and at the same time significantly improve the efficiency of force utilization." (Adamcyk, 1968:3)

Goal Programming Models

In the intervening years since the early studies by the MITRE Corporation, many models have been developed to try to maximize throughput of cargo to determine the force structure requirements for the intratheater airlift problem. The Air Force Institute of Technology (AFIT) research projects along these lines include two conducted in 1984 which attempt to use goal programming models to achieve this maximization of throughput (Cooke, 1984; Tate, 1984).

These models are very complex and use very detailed programming to solve throughput problems. Cooke's model used "a multiobjective optimization based on force goals which interrelate intertheater movement, intratheater movement, and deployable unit capabilities." (Cooke, 1984:130) His model was designed to minimize the waste of resources. Tate, on the other hand, developed an entire program which he called DEPLOY. This program was designed to be user friendly with the ability of the user to define the force structure and the port of debarkation (POD) data. His program performed two types of analysis. The first type was determine how much of the deployment goal could be met with a given amount of airlift assets. The second analysis that could be accomplished with his program is what type of airlift assets would be needed to meet the required deployment goal, in both time and quantity. (Tate, 1984:7-2)

Customer Satisfaction Model

Also, in 1984, AFIT research students attempted to use "user need satisfaction as a basis for tactical airlift scheduling" (Bryant & Gordon, 1984:i). At this time, Military

Airlift Command (MAC) measured effectiveness by departure reliability, aircraft utilization rate, and total cargo tonnage delivered (Bryant & Gordon, 1984:ii). It would seem little has changed today. These research students decided to take the approach that the needs of the Army and how well their supply needs were met should be the measure of effectiveness and developed a model that would maximize customer service (Bryant & Gordon, 1984:ii).

The approach taken in developing their model included research into the resupply requirements for each type of Army unit with the assumption of a constant resupply rate. Then, they asked several Army officers which category of cargo (class) was the most important, for example: POL, ammunition, or food and water. This FORTRAN based program then used these priorities to schedule airlift from a POD to a forward operating location (FOL) and measured their effectiveness based on how well they could supply each of the supply classes rank-ordered by the Army officers. (Bryant & Gordon, 1984)

The one drawback of this model is that it does not take into account a rapidly changing combat situation and assumes a constant use of supplies. Although it is valuable in shifting the focus of AMC (then MAC) to outside measures of effectiveness, it does little to actually aiding in the scheduling of theater airlift since the priorities for movement are constantly changing and need human intervention to reset those priorities.

The Transshipment Model

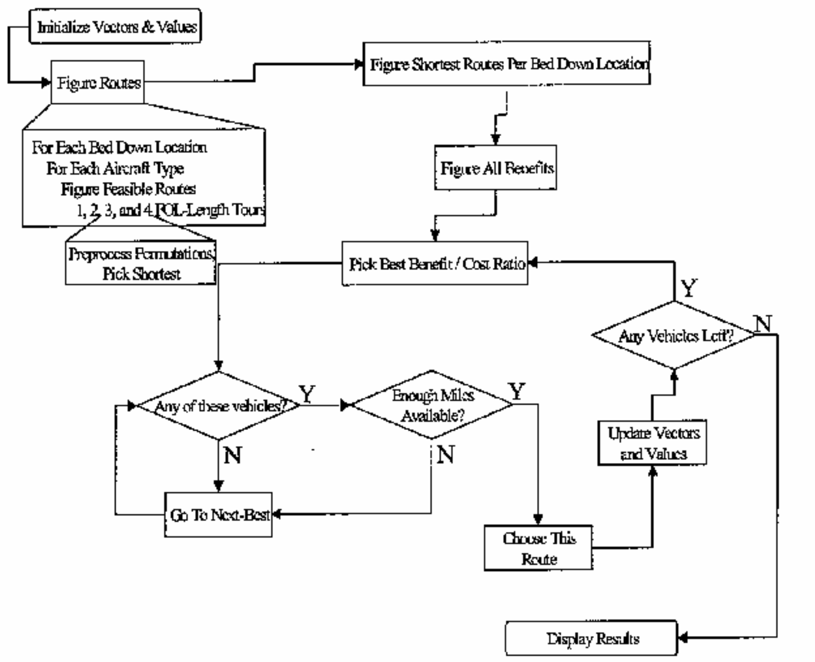
This model was developed by yet another AFIT research student and incorporates the idea of using a “hub and spoke” setup like those used by major airlines to increase the throughput of cargo (Cox, 1998). In this model, the researcher “seeks to strike a more even balance between the tactical and strategic aspects of airlift” (Cox, 1998:4). The basis of this model is to determine when a “hub and spoke” system should be used as opposed to direct delivery for a scenario. The results of his model show that transshipment in a given scenario is advantageous due to multiple visits to destinations are possible due to the more efficient use of Crew Duty Day (CDD) for "Spoke" operations, less tanker support, and less congestion. The disadvantages were that cargo tracking became more difficult, cargo delivery times were delayed by the transshipment time (3 to 4 hours), and that host nation agreement was required to act as a transshipment location. (Cox, 1998:121-122) This summary is based on having the transshipment located between the port of embarkation (POE) and the POD.

The Greedy Knapsack Heuristic

More recently, advanced models have been used to improve the optimization algorithms used in solving the theater airlift scheduling problems. A research student at the Air Force Institute of Technology (AFIT) used a greedy knapsack heuristic approach to solve the allocation of airlift resources problem (Ziesler, 2000). In this approach, the airlift vehicles are seen as "greedy knapsacks" that have both size and weight limitations. The purpose of this heuristic was to maximize throughput in a given theater of operations to better determine the size of the fleet required to fulfill airlift needs. This approach does not necessarily find the optimal solution, since the required time for a computer to solve such a complex problem may be too great, it does find a reasonable solution in a reasonable amount of time (Ziesler, 2000).

This problem becomes very complicated with the addition of several FOLs and PODs. As you can see from the diagram in Figure 1, this model assumes unlimited cargo at the PODs and works to maximize the throughput to the FOLs. Although this problem is useful in some applications, it does not maximize efficiency with limited cargo inputs which would be useful in optimizing a schedule of standard airlift requests.

Figure 1. Greedy Heuristic Problem Flow



Summary of Part I

As you can see from the previous pages, there have been many approaches to this problem, however, none of the above methods looks at actual sortie data and compares that to the optimized schedule. In addition, many of these approaches to solving the problem look only at maximizing throughput, not in reducing sortie generation or maximizing efficiency with effectiveness constraints.

PART II: History of the Intratheater Airlift Doctrine, Organization, and Issues

The theater airlift problem is due in large part to the fact that throughout its history it has been shifted back and forth between the theater commander and AMC (formerly MAC and Military Air Transport Service (MATS)). There has always been a problem with command and control (C2) of theater airlift forces as will be demonstrated in this section. Many of these issues have not been solved and remain a problem today. (See Chapter 3, Current Issues/Problems)

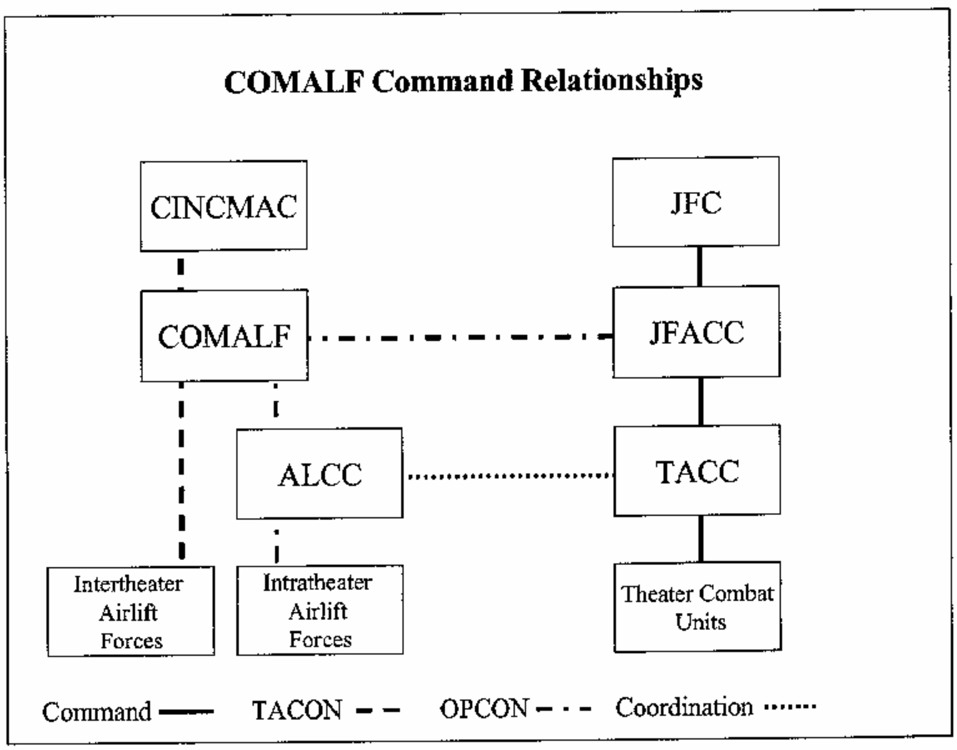
Separation of Command and Control

As far back as World War II, the intratheater airlift forces were separated from the intertheater airlift forces. In March, 1942, Gen Henry H. "Hap" Arnold centralized air mobility operations in the single Air Transport Command (ATC), but he kept theater airlift (troop carrier units) assigned to the Army Air Forces (AAF) commander within the theater. Although this provided the theater commander with dedicated airlift assets, it separated the command and control between strategic and theater airlift assets. (Carter, 2000:6)

This basic separation of C2 functions between the theater and strategic assets remained in place until the Vietnam War and the advent of the C-130E and the C-141. With their longer ranges, the lines between strategic and tactical/theater assets began to blur. Defense Secretary Robert S. McNamara decided to review the MATS organizational structure, specifically the "effects the new C-130s and C-141s would have on the strategic and theater airlift infrastructure, operations, costs considerations, and the need to support theater commanders." (Carter, 2000:8)

This recommendation to consolidate C2 for both theater and strategic airlift was debated from the mid-sixties until 1974 when "Secretary of Defense … James R. Schlesinger finally directed the merger of strategic and theater assets under the single command structure of MAC and designated MAC a specified command." (Carter, 2000:8-10) This meant that the theater airlift scheduling came under the direction of a Commander of Airlift Forces (COMALF) who worked directly for MAC as shown in Figure 2 below:

Figure 2. COMALF Command Relationship



(Carter, 2000:20)

"The primary purposes of the COMALF were to integrate strategic and theater airlift and attend to the caring and feeding of the airlift troops" (Carter, 2000:11). The COMALF remained the primary C2 for theater airlift through the 1991 Gulf War until 1992 when the reorganization of the USAF brought about changes in the organization of theater airlift assets returning them to the theater Joint Forces Air Component Commander (JFACC) and theater commander with coordination responsibility to a Director of Mobility Forces (DIRMOBFOR). This organization caused a “division of the mobility systems [which] created difficulties between strategic and theater airlift systems because of the minimal integration and coordination between those forces coupled with a poor remaining infrastructure for the management of the theater air mobility forces” (Kee). This is the current organization and doctrine in use today and will be covered in the first part of Chapter 3.

Historical Issues

With the USAF reorganization in 1992, theater airlift forces were again returned to their respective theater commanders. This reallocation of forces caused many problems in the theaters since theater airlift is more than just the accepting of the aircraft (Zamzow, 1995:iii). The main problem was that the support forces that make the efficient use of these aircraft possible did not transfer to the theaters. These support forces include command and control elements and enroute support capabilities such as aerial port functions (the loading and unloading of aircraft) (Zamzow, 1995:17).

Recently, however, the United States European Command (USEUCOM) and United States Air Forces Europe (USAFE) have led the way in establishing this support structure for its theater assigned assets. It developed its own C2 node with the Air Mobility Operations Control Center (AMOCC) and its own deployable support assets in the form of the 86th Contingency Response Group (CRG). The CRG “maintains a standing multifunctional air mobility operations, force protection and medical team dedicated to support rapidly unfolding contingencies” (Team Ramstein, 2002:24).

Another issue that has been a problem for some time is the priority system for the movement of cargo. This abuse of the Joint Chiefs of Staff (JCS) priority system means that almost all cargo becomes the same high priority requiring movement by air. The customer is responsible for determining this priority. However, between units there is very little way to differentiate which cargo should have the higher priority.

In Operations DESERT SHIELD/DESERT STORM, the APOEs in the CONUS started to show a significant backlog of cargo due to everything being coded for air transportation. Customer abuse of the system such as coding all required delivery dates as “999” (the highest priority) meant that there was no way to tell which cargo should be shipped first. (Darden, 1998:20-23)

Once in theater, the problem was equally difficult to solve. However, since there is an in-transit visibility gap between the POD and the final destination, it is very difficult to ascertain the level of abuse and the backlog problems caused by the mis-prioritization of cargo. (Darden, 1998:38)

Summary of Part II

The intra-theater airlift assets have been moved from one command to another several times over the last 30 years. This constant change has made it difficult to establish a set doctrine for the allocation of these assets and for the C2 of these intra-theater assets. Proper theater support such as aerial support functions and established C2 are not always available. Finally, the abuse of the JCS priority system makes the allocation of these resources to the highest priority cargo very difficult.

Chapter 3 –Current Issues/Problems

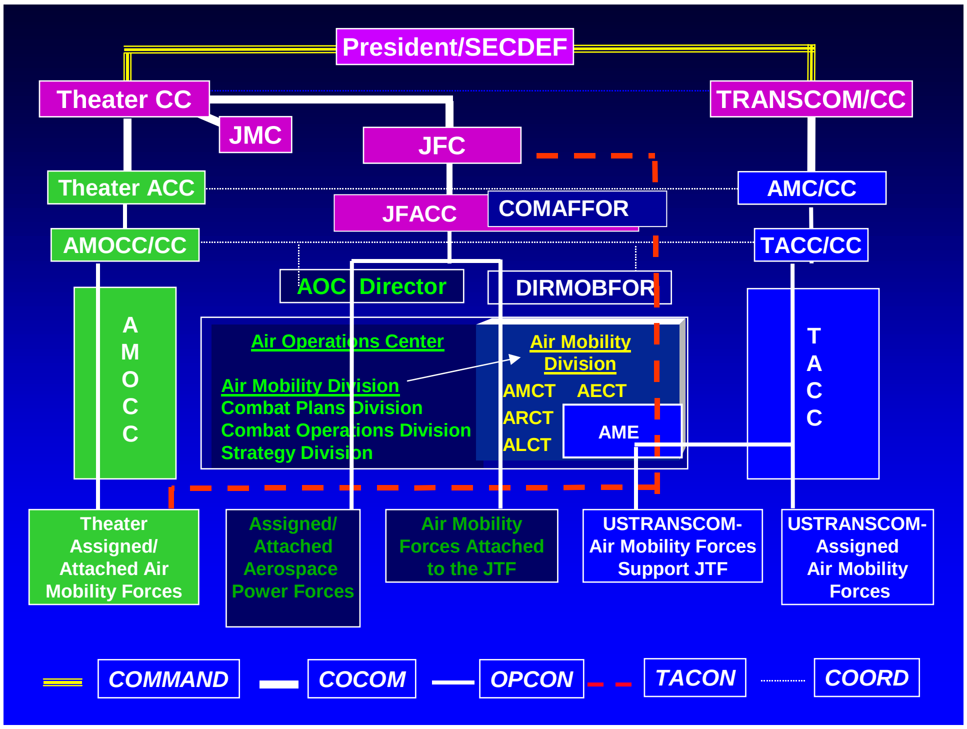
Current Doctrine

The current doctrine for theater airlift operations determines how the scheduling of theater airlift should be accomplished and how the organization will be set up. Both Joint and Air Force doctrine addresses these issues with the Joint doctrine superseding the Air Force doctrine.

Joint doctrine for the scheduling of theater airlift is mainly found in Joint Publication 3-17, Joint Doctrine and Joint Tactics, Techniques, and Procedures for Air Mobility Operations. Intratheater airlift are those air mobility forces that have been allocated to the combatant commander and for which he has combatant command (COCOM) of those forces. He may then give operational control (OPCON) or tactical control (TACON) of those forces to the subordinate commander. In this way, intratheater airlift forces are controlled by the combatant commander through the C2 operations set up in the theater. (JP 3-17, 2002:I-5)

These C2 operations are contained within the JAOC once a Joint Task Force (JTF) has been established. The JAOC, and particularly the air mobility division (AMD), is responsible for the interface with other mobility air forces (MAF) C2 nodes such as the AMOCC and the AMC TACC. Normally, the Director of Mobility Forces (DIRMOBFOR) is responsible for this interface as delegated by the commander of the joint task force (CJTF) through the joint forces air component commander (JFACC). He/she is responsible for tasking those apportioned MAF forces at the combatant commander's disposal to support his operational plan (OPLAN) to "primarily fill theater operational requirements.” (JP 3-17, 2002:I-5) The C2 structure can easily become confusing. This interaction is diagrammed below for clarity.

Figure 3: C2 Structure and Interfaces



(AMWC Det 1, 2003)

The interface between these C2 nodes depends on the use of computer systems that make the successful tracking of cargo and personnel possible such as the Global Transportation Network (GTN). Furthermore, the “[s]uccessful movement and delivery of personnel, materiel, and fuel depend on timely coordination between intertheater and intratheater forces and in-transit visibility (ITV)” (JP 3-17, 2002:I-5).

This publication defines intratheater airlift as “ the air movement of personnel and material within a geographic commander’s AOR.” (JP 3-17, 2002:IV-2) Further, the roles of intratheater airlift are clearly defined as shown in the following figure:

Figure 4: The Five Basic Airlift Missions

(JP 3-17, 2002:IV-3)

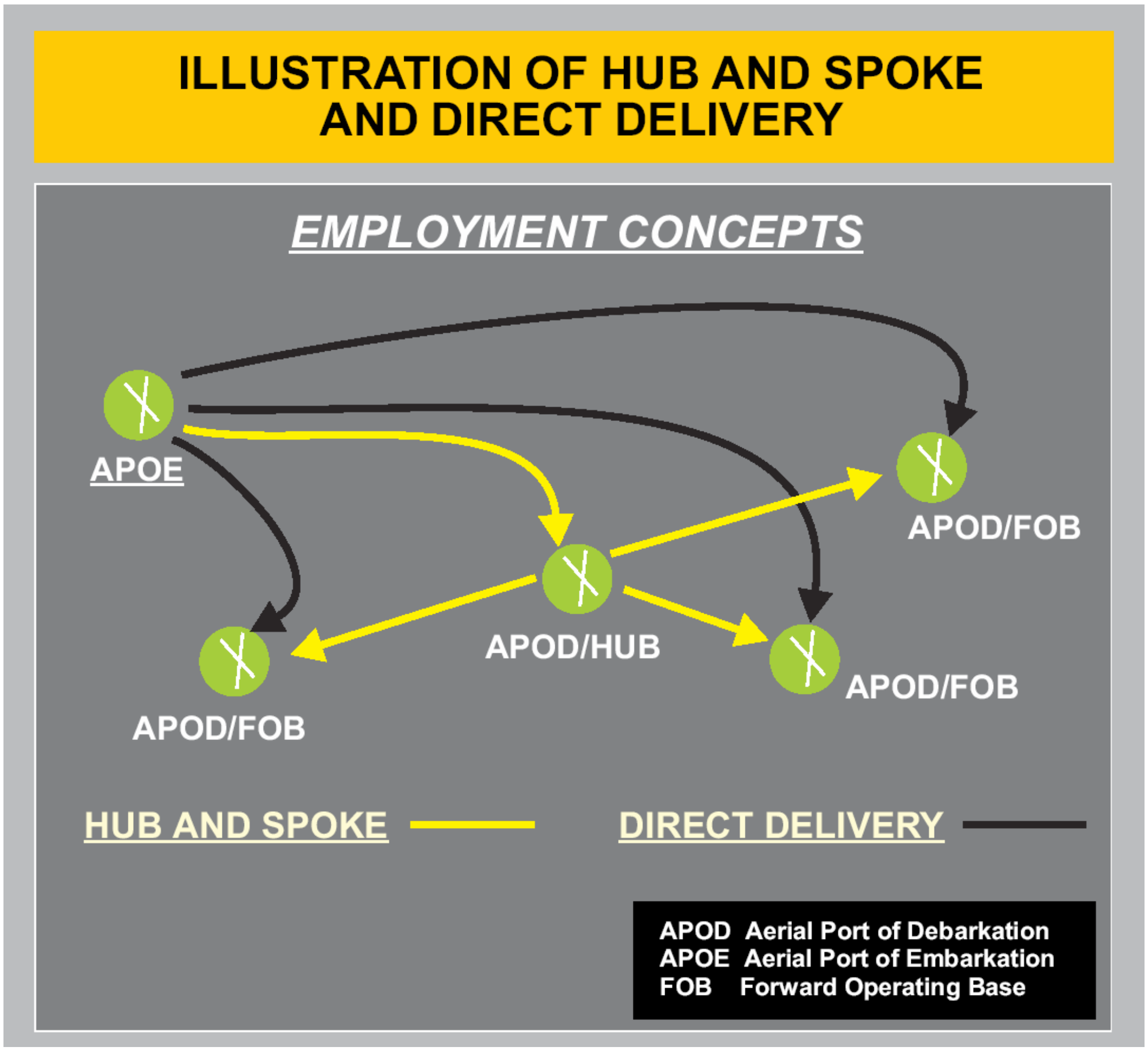
Of these five basic airlift missions, the first two are of importance to this paper. Particularly, the combat employment and sustainment mission which is the focus of this paper. The movement of passengers and cargo, particularly during the sustainment phase is described as "predictable, regular, and quantifiable" JP 3-17, 2002: IV-3) Therefore, requirements are usually satisfied "through regularly scheduled channel missions over fixed route structures with personnel and cargo capacity available to all customers." (JP 3-17, 2002: IV-3)

These regularly scheduled channels should normally be set up with a "hub and spoke" operation (JP 3-17, 2002:I-4). A "hub and spoke" operation is described in this following excerpt:

> Intertheater airland operations normally offload personnel and materiel at a main operating location within the theater. Subsequently, intratheater airlift moves designated personnel and equipment to forward operating locations; an employment concept referred to as a **hub and spoke** operation. Units should consider the required MHE and transportation assets needed to transfer personnel, equipment, and cargo from one aircraft to another. (JP 3-17, 2002:IV-11)

The hub and spoke is the preferred delivery method for theater assigned airlift assets whereas intertheater assigned assets may be able to perform direct delivery of supplies and personnel to the FOB. This is illustrated in the figure below:

Figure 5: Hub and Spoke Operations



(JP 3-17, 2002:IV-12)

United States Air Force doctrine for the establishment of the command and control of theater assigned assets can be found in the Air Force Doctrine Documents (AFDDs). The AFDDs go into further detail about how the air mobility operations should be set up and define the roles of the AMD, AME, and the DIRMOBFOR. AFDD

2.6 is the basic publication for the establishment of the C2 structure for the intratheater and intertheater airlift forces. The AMD is one component of the AOC and is under the command of the JFACC. However, the DIRMOBFOR is responsible for direction of the AMD in making sure it completes its tasking. The AMD "plans, coordinates, tasks, and executes air mobility missions operating in a designated area of responsibility (AOR) or joint operating area (JOA)." (AFDD 2-6) The AMD is comprised of the Air Mobility Control Team (AMCT), the Air Refueling Control Team (ARCT), the Airlift Control Team (ALCT), and the Air Mobility Element (AME). The AMCT is the DIRMOBFOR's command and control element and provides the inter-connectivity to other C2 nodes in order to interface with assets outside the theater that will transit the AOR. The ARCT coordinates air refueling planning, tasking and scheduling to support the JFACC's objectives. The ALCT is the primary scheduler, planner, and executor of all intratheater airlift missions. The AME is the deployed element from the TACC and becomes an extension of the TACC in the AMD whenever AMC aircraft transit the AOR. A list of responsibilities of the AMD are presented below:

> - Integrate and direct the execution of intratheater and USTRANSCOM assigned mobility forces operating in the AOR/JOA and in support of the JFC's requirements/objectives.
> - Maintain the flow of intratheater and USTRANSCOM-assigned air mobility assets in support of JFC objectives.
> - Coordinate air mobility support for mobility requirements identified and validated by the JFC requirements and movement authority as appropriate.
> - Coordinate air refueling planning, tasking, and scheduling to support intertheater and intratheater air operations.
> - Participate in the air and space assessment, planning, and execution process and coordinate with the AOC director to ensure the air mobility mission is incorporated in the ATO.
> - Identify intelligence, surveillance, and reconnaissance (ISR) requirements in support of the air mobility mission.
> - Ensure intratheater air mobility missions are visible in the AMC standard command and control system and reflected in the ATO/ACO.
>
> (AFDD 2-6, 1999: 22)

AFDD 2-6.1 goes into further detail about the types of missions normally flown by MAF forces. In particular, they describe the channel mission which is the primary concern of this paper. There are two types of channel missions:

> A requirement-based channel is established when a specified amount of passengers or cargo destined for one location warrants movement. A frequency-based channel is established to serve locations, including remote sites, at regularly scheduled intervals. Geographic CINCs can also develop requirement- or frequency-based channel missions to support their intratheater movement needs and the majority of airlift sustainment will move on channel missions. Both channel types use the JCS priority system. (AFDD 2.6.1, 1999:20)

As you can see, both Joint and Air Force doctrine advocate the use of channel missions, particularly the use of frequency channel missions, in support of theater airlift sustainment operations. In addition, they expect the AMD to have ITV of cargo and personnel moving into and throughout their AOR in order to coordinate that movement.

Diplomatic Clearance Issues

One of the more difficult issues is that of obtaining diplomatic clearances in a timely manner. According to the International Clearances shop at HQ AMC TACC/XOC, this is the main reason that theater airlift in the CENTCOM AOR is scheduled a month in advance with little attention to the actual cargo that will be moved (Lucas, 2002). The monthly schedule is approved by all the countries in the AOR in advance and takes into account such things as Saudi Arabia’s refusal to grant diplomatic clearances to aircraft originating in the country of Oman. All of the countries in CENTCOM’s AOR have unique clearance requirements and will be covered.

Saudi Arabia has some of the most difficult diplomatic clearance requirements as mentioned above. It requires that “[a]ll requests for diplomatic clearances processed by the JTF-SWA/J3 must be received no later than the 12^{th} of the month prior to the month of flight (e.g. the 12th of Sep for the Oct schedule).” (Foreign Clearance Guide website) Any requests that are not submitted for the monthly schedule must be submitted at least 8 Saudi workdays in advance and short-notice requests are not normally processed by Saudi authorities (Foreign Clearance Guide website).

Kuwait requires that all requests be received at least 15 days in advance and that no flights departing from or destined for each of following countries will be allowed: Israel, Iraq, Sudan, Libya, Jordan, Tunisia, or Yemen. (Foreign Clearance Guide Website)

Bahrain requires one week of lead time to process requests and will not allow any flights originating from or destined for Israel. However, Bahrain does allow blanket AMC clearances for scheduled missions. Generally speaking, aircraft are not allowed to remain overnight. (Foreign Clearance Guide Website)

The United Arab Emirates requires at least one week of lead time and 3 days of lead time for emergency/short-notice requests. However, the only short-notice requests that will be entertained must be for a medical emergency or something of critical national importance. (Foreign Clearance Guide Website)

Oman requires that the clearance request be received at least 3 workdays in advance. In addition, it is valid for only 72 hours and any delays need to be reported in order to maintain that country clearance. (Foreign Clearance Guide Website)

Qatar requires at least 5 workdays in advance in order to grant diplomatic clearances. However, the workweek is only Saturday through Wednesday so really the request must me in a week in advance. (Foreign Clearance Guide Website)

As you can see, there are many difficulties in scheduling flights in the CENTCOM AOR because the countries in that AOR have long lead times for diplomatic clearance requests. However, since most countries in that AOR grant blanket country clearance numbers (except Saudi Arabia) for the monthly schedule and are very open to changes that occur in that schedule, there should be a way to get a blanket clearance for most of these countries. This would enable the airlift planners and schedulers at the AMD to optimize their schedule based on the cargo that needs to be moved. If a country, like Saudi Arabia cannot grant a blanket waiver, then flights to that country should be on a scheduled channel mission. However, the scheduled channel mission should be the exception, not the rule.

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Operation ENDURING FREEDOM (OEF)

Operation ENDURING FREEDOM (OEF) is a recent example of the inefficiencies in theater airlift scheduling. Some of this is by design as described above in the current doctrine. However, recent participants and observers of the AMD operations during OEF were surprised to learn that nothing had really changed in the last decade since Operation SOUTHERN WATCH (OSW) began. In addition, these inefficiencies that were present in OSW made the execution of OEF very difficult since the increased workload made the tracking, planning, scheduling, and executing of theater airlift operations almost impossible (Puentes, 2003).

OSW was an ongoing operation for almost a decade. To understand how the inefficiencies of OEF got started, it is first a requirement to understand the OSW operations to include the tracking of cargo and the planning, scheduling, and executing of theater airlift operations. During OSW (the time in which this paper concentrates for example), theater airlift scheduling was done on a monthly basis by the establishment of frequency channels. These frequency channels flew regardless of cargo requirements and without interface to the JMC or J4 in general. The only time the J4 got involved with the distribution of cargo and the scheduling of theater airlift was when they noticed a backlog of cargo and wanted to know why something hadn't moved. (Smith, 2003) When a known exercise was to take place that required additional airlift, a requirements channel would also be scheduled by exception (Smith, 2003).

This led to much inefficiency in the use of theater airlift assets which often were scheduled to fly nearly 75% of assigned airlift forces. USCENTCOM defined UTE rate as the percentage of aircraft that flew on a given day. For example, if a deployed squadron of C-130s had four assigned aircraft and 3 flew on a given day, they had a UTE rate of 75% and could justify keeping those forces assigned. It did not matter if they flew empty or full, they were needed in the theater. AMC fought for the release of those assigned assets to be returned to the CONUS and to return to the COCOM of USTRANSCOM with OPCON to AMC. AMC was concerned that the C-130 assets assigned to USCENTCOM were being under-utilized. (Schlichenmeyer, 2002)

During OEF, C-130 aircrews estimated that as many as 40% of the missions they flew to Afghanistan were either empty or nearly so (Curtis, 2003). In addition, when they notified the AMD of this situation, the response was to cancel flights for a week until the cargo backed-up, then they restarted the frequency channels. This solved the problem only in the short term and it wasn't long before they were back to flying with very little cargo. The aircrews did not bring this to the AMD's attention since they had discovered that the only thing worse than flying empty, was not flying at all at a deployed location with little else to do. (Curtis, 2003)

The AMD continued to establish frequency channels throughout OEF with no visibility of the cargo that was moving. "There is no such thing as a theater TPFDD"

(Puentes, 2003) to show where cargo is at, it's priority, or where it needs to go. This lack of a theater cargo-movement database was present in OSW as the J4 kept track of cargo by the use of a spreadsheet updated with phone calls to the FOBs asking them what cargo was in their yard (Smith, 2003). This cargo-tracking method continued into OEF. There is no record of cargo movement within the AOR.

This problem was not limited to the USCENTCOM AOR during OEF. Operation ENDURING FREEDOM – PHILLIPINES (OEF-P) was also an example of inefficient theater airlift allocation. However, this came from another source. According to Col Rowayne Schatz, the DIRMOBFOR for OEF-P, the U.S. Marines and the U.S. Army considered the frequency channels their lifeline to the outside world. The JTF commander (non Air Force) directed the use of frequency channels to ensure the morale of his troops. These things must also go into the decision about whether or not to use frequency channels even though they "make it hard to be efficient." (Schatz, 2003) However, if the deployed troops could be convinced that they would have all their cargo within three days of arrival at the APOD instead of a flight every three days, for example, that should be sufficient to keep up morale and still allow for some efficiency in the theater airlift schedule.

Not all of the problems at USCENTCOM's AMD can be traced to OSW. Another concern was the inexperience of the AMD team sent to fulfill its mission. Many of the AMD team, although they worked hard, were inexperienced in theater airlift operations as well as the doctrine they should follow (Murphey, 2003). This is very far from the theater airlift expertise that should be found in an AMD as described in AFDD 2-6. Everything learned in the past decade is constantly be relearned by newly assigned people. The entire task of just getting the airlift schedule into the ATO was all they could do, let alone start thinking about how best to efficiently use the assigned airlift assets (Puentes, 2003).

However, if we assume that for a moment that the AMD had the time to optimize the theater airlift schedule, they could not. The one thing they would need is the visibility of theater cargo and passengers in order to schedule the aircraft appropriately. This would require the theater to maintain a database similar to a TPFDD that showed the JMC validated cargo and passengers.

Theater Distribution Management Center (TDMC)

The TDMC is a USEUCOM program that is part of the Strategic Distribution program which is designed to partner the Defense Logistics Agency (DLA) and USTRANSCOM to improve the worldwide distribution system (Ross, 2003:12). The TDMC grew out of concern for the delay in sustainment shipments to Kosovo in 1999 and can be defined as a “[s]ervice component initiative aimed at enhancing theater distribution within the AOR through advance transportation mode decision-making and collaborative cargo management processes to ultimately provide the best logistics sustainment support to theater customers” (Ruiz, 2003). USEUCOM decided that they needed a centralized Distribution Management Center that brought together the different services and organization to make the best modal decisions for the theater distribution of supplies to Kosovo. At that time nearly 90% of all shipments to Kosovo went by air and now only about 30% go by air (Ross, 2003:12).

The most interesting aspect and the most pertinent to this paper is the concept that the TDMC maintains ITV of inbound cargo through the GTN and can make decisions about how best to move that cargo in the future (Ruiz, 2003). In this way, they have the ability to schedule the outbound transportation before the cargo actually arrives in the

USEUCOM theater. This integration of the USA and the USAF in that theater makes a single point of contact for users of the theater transportation system when they want to know where there cargo is and when it will arrive (Ruiz, 2003).

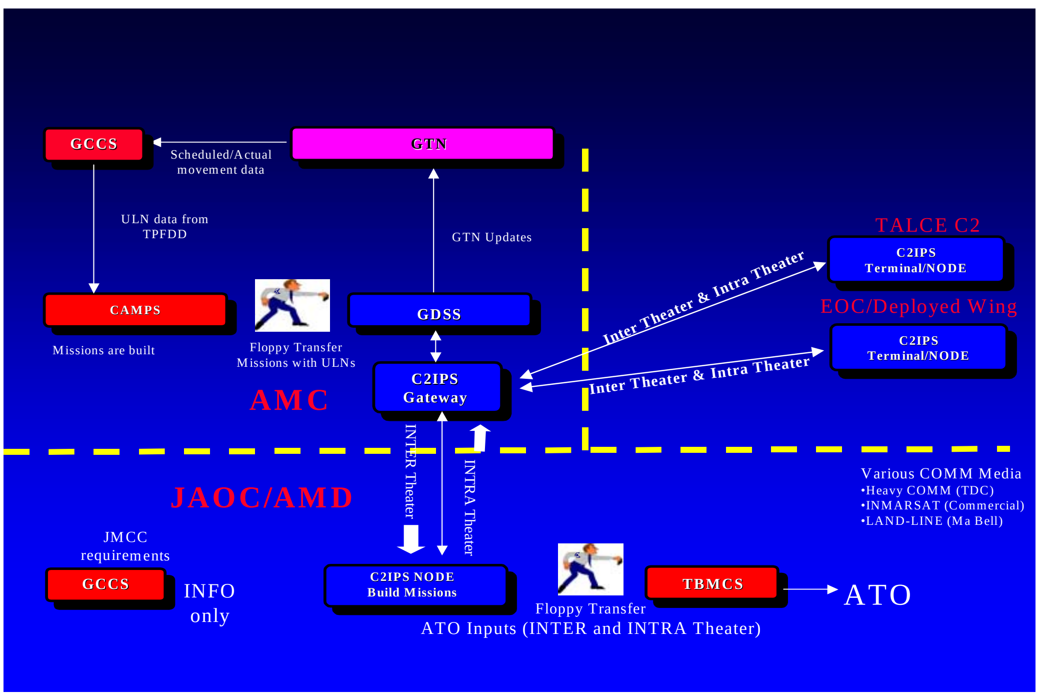
The TDMC is a success in USEUCOM and although it may have limited applications in other theaters where multi-modal transportation is not so readily available, there are some lessons from its practices that are applicable in any theater. USA and USAF theater distribution decision makers in the same location make sense. The separation of the J3 and J4 operations in most theaters makes interaction rare and causes many inefficiencies as demonstrated by OEF.

Deployed Consolidated Air Mobility Planning System (DCAMPS)

DCAMPS is a computer program designed to integrate with existing computer systems to aid in the scheduling of theater airlift scheduling as well as many other applications. DCAMPS will be the deployed version of CAMPS and will be used for theater airlift scheduling at the AMD. The purpose of CAMPS is to become "AMC's primary C2 planning and scheduling system that provides mobility mission planners with an integrated view for planning and scheduling AMC air mobility resources to support peacetime, contingency, humanitarian, and wartime operations" (CAMPS Website, 2003). CAMPS is not scheduled to be fully operational until September, 2006 when it should be able to provide advanced user capabilities such as the allocation of resources and the automatic scheduling of missions to support a myriad of scenarios (CAMPS Website, 2003).

The program is designed to work on both the classified and unclassified levels in order to handle secret deliberate planning as well as ongoing operations. It will send airlift and tanker schedules directly to the Global Decision Support System (GDSS) which along with the Command and Control Information Processing System (C2IPS) are the primary tools for mission management at the TACC and the AMD today. In addition, it will communicate with the Air Force Weather Agency's computer systems to get real time weather and airport information. Finally, it will receive TPFDD data from the Joint Operation Planning and Execution System (JOPES) and send back to JOPES the airlift and tanker schedules. (CAMPS Website, 2003) The figure below shows how CAMPS will interconnect with other existing systems:

Figure 6: Interconnectivity of CAMPS



Another aspect of the completed program is of great interest. By 2006, a planned web-based Intra-Theater Airlift Request System (ITARS) will be developed (CAMPS Website, 2003). ITARS is a "web-based airlift request system as a theater application that captures airlift requirements from theater (joint) customers, are validated by Joint Movement Center (JMC) logisticians by priority, and submit approved requirements to the AMD planners for airlift mission planning in CAMPS" (Meyer, 2003:3). However, this is not only an AMC issue and will need buy in from the other services as well as the joint staff (Meyer, 2003:Attachment 1). This ITARS will solve the problem of a theater database which contains validated cargo requirements and makes the use of an optimizing theater airlift scheduling program like DCAMPS a possibility.

Chapter 3 Summary

This chapter highlights the major issues surrounding the theater airlift problem. Current doctrine, both joint and air force describe a hub and spoke operation for the use of theater airlift assets flying frequency channels in order to move the cargo. Real world constraints from other countries make it difficult to schedule cargo on a daily or even weekly basis. Operation ENDURING FREEDOM highlights many of the problems over the last decade such as flying empty on a frequency channel and the lack of cargo visibility within the theater. Finally, there is hope with the USEUCOM's TDMC and the new airlift scheduling software CAMPS which may solve the optimizing problem. The next chapter takes a look at one month of data from OSW and determines if this would indeed improve the efficient use of theater airlift assets.

Chapter 4 – Data Analysis

This chapter will cover the methodology used to optimize the theater airlift schedule for the month of August, 2001 during OSW. At that time, almost all missions flown by the C-130s in Seeb, Oman were frequency channels. This data analysis will highlight the differences between the actual schedule flown for that month and the schedule that could have been flown by conducting a statistical comparison of the data.

Methodology

Cargo data was very difficult to find for intratheater airlift operations in the CENTCOM AOR. This is because intratheater airlift scheduling and cargo data is not kept by either the J3 or J4 divisions of CENTCOM. As discussed previously, interaction between the J3 and J4 is by exception only when the JMC notices a significant backlog of cargo. The only data I could find for the month of August, 2001 was the C-130 sorties from Seeb, Oman with the number of passengers and cargo weights.

The first step was to come up with a common capacity number with which to compare cargo and passengers. This was accomplished using the idea of pallet equivalents. A pallet equivalent is the pounds of cargo in a typical pallet or the number of people that could sit in a pallet position if it were rigged for seats. This was accomplished for the cargo weight by using the average pallet weight of 5,200 pounds per pallet (Baker, 2003). The pallet equivalent for passengers was determined by using a planning passenger capacity of 80 people (AFPAM 10-1403, 1998:13) for a C-130 and dividing by the number of pallet positions that could be rigged for seats. This produced the result of 16 passengers per pallet position. In order to make sure that there would indeed be enough room for the passengers, I used a total of 15 passengers to equal a pallet equivalent.

Then, as discussed in the previous chapter, I looked at the frequency of the channels and determined that they were no less than three days. This meant that cargo could wait for three days without movement on the frequency channels established during OSW or as long as a week for certain locations. This became my effectiveness constraint that all cargo would be moved within 3 days of arriving at an aerial port. However, since I had no cargo data, I made the assumption that the cargo arrived at the aerial port on the day it was moved by the actual frequency channels. This will not skew the results of this data analysis since I am not comparing actual backlogged cargo to the backlogged cargo under the optimized theater airlift schedule.

Then, I went through the Seeb C-130 data removing those data points that had duplicates or were listed as departing and arriving at the same location. This did not constitute an actual sortie for the delivery of cargo and it was not counted.

Finally, cargo was scheduled each day to optimize the use of theater airlift resources by attempting to minimize sortie generation. Cargo was only scheduled when either there was a full plane load (6 pallet equivalents) or if the cargo had reached the 3 day point in the cargo backlog. All cargo that was not scheduled was entered into the cargo backlog for each day. (See Appendix B for each day's schedule and optimized schedule.) Cargo was scheduled using the following assumptions:

Assumptions:

1. Cargo arrives at the aerial port on the day it was moved by the frequency channel.

2. There is no oversize or outsize cargo moved on the C-130s from Seeb, Oman, and therefore all cargo can be reduced to pallet equivalents using the following data:

    a. Each pallet weighs approximately 5,200 lbs.

    b. It takes 15 passengers to equal a pallet position.

3. Crew duty day is limited to 16 hours.

4. Each stop requires 1 hour to on-load/off-load. (Planning factor used by AMD schedulers in OSW operations (Smith, 2003))

5. The aircraft had to return to Seeb, Oman (OOMS) each night for maintenance and for aircrew rest.

6. Operations into and out of Saudi Arabia (OEKJ) could not originate in Oman due to political constraints. Therefore, all sorties to OEKJ had to go through Bahrain, Kuwait, or Qatar.

7. All sorties scheduled were completed as fragged. (This may seem optimistic at first, but since I am comparing it to actual sorties flown without data on sorties scheduled but not flown, this is the only way to compare the data)

8. There was no information as to the following day's sorties. Each day the schedule was optimized without the knowledge of what future airlift requirements would be.

Results

The results show a significant reduction in the number of sorties and the number of flight hours that would be required to meet the airlift schedule. This can be seen clearly in Figure 7 and 8 on the next page:

Figure 7. Daily Sorties: Scheduled vs. Optimized

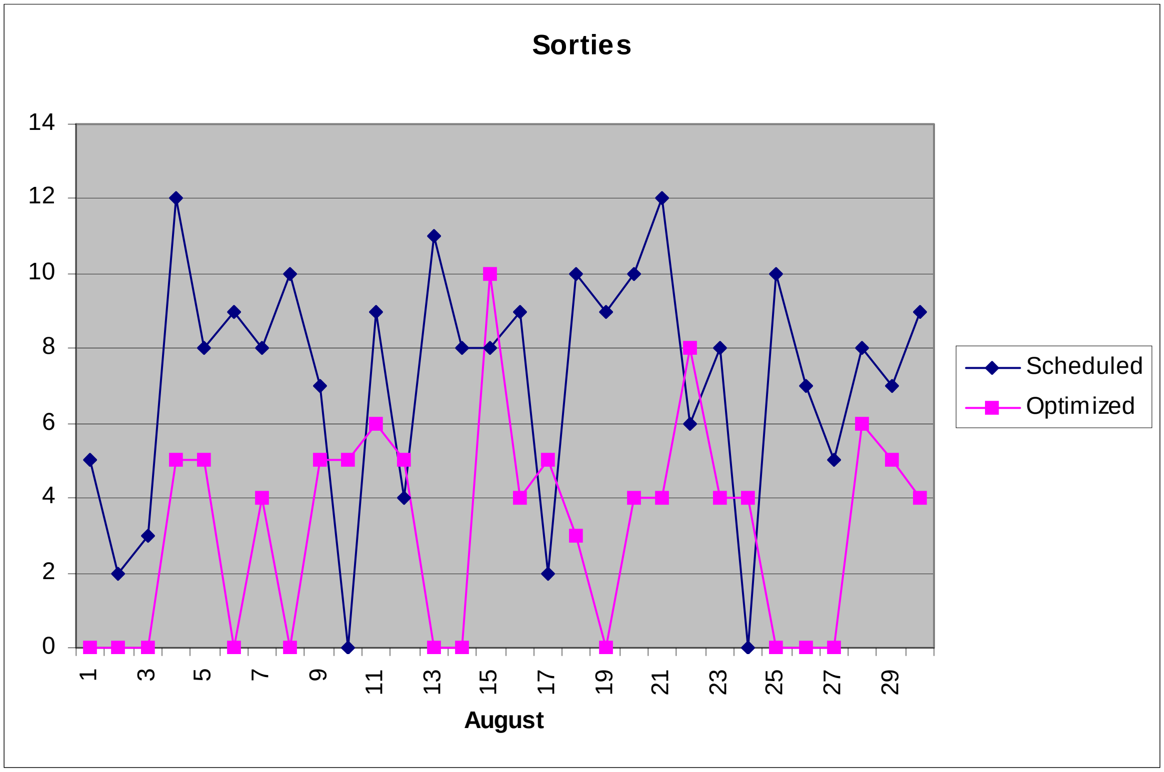
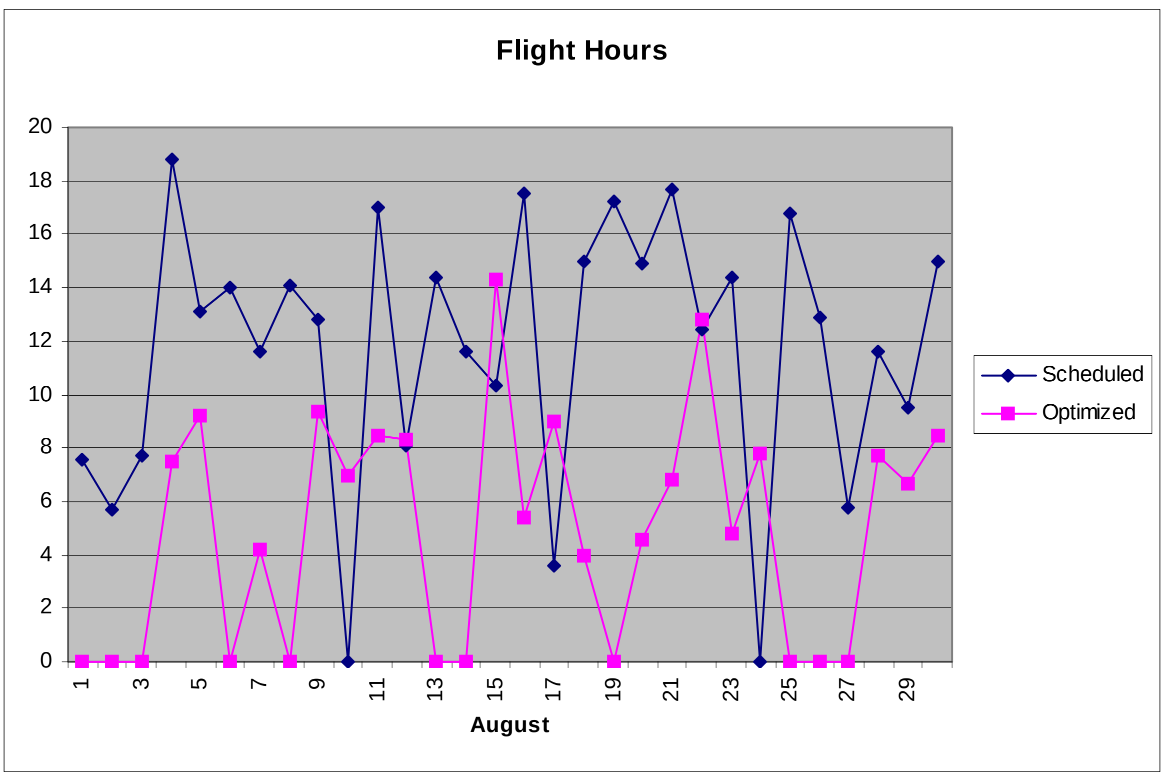


Figure 8. Daily Flight Hours: Scheduled vs. Optimized

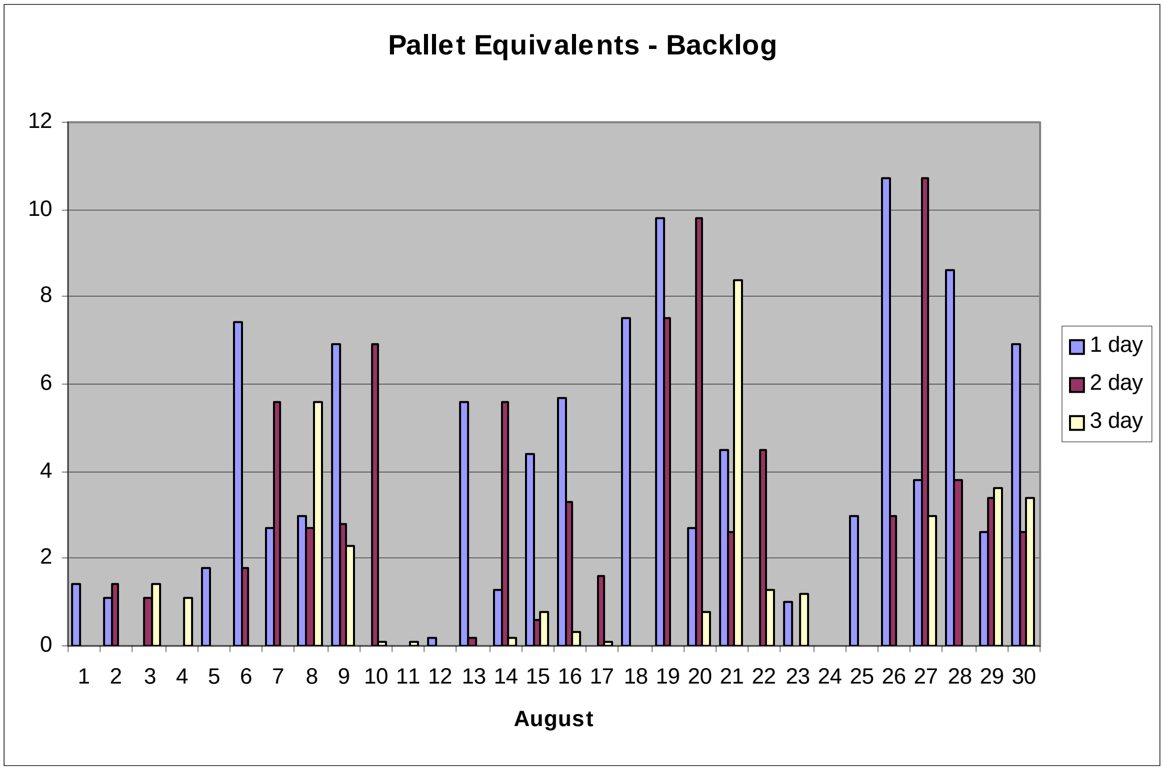


One are of concern is the backlog of cargo that resulting in using an optimized schedule and the assumptions above. As you can see from Table 1 below and Figure 9 on the next page, total backlog was only an average 7.43 pallet equivalents with only 1.12 average pallet equivalents making it to the 3 days in the backlog. All cargo was delivered once it was in the backlog three days.

Table 1. Cargo Backlog By Day

	Backlog			
August	Total Daily Backlog	1 day	2 day	3 day
1	1.4	1.4	0	0
2	2.5	1.1	1.4	0
3	2.5	0	1.1	1.4
4	1.1	0	0	1.1
5	1.8	1.8	0	0
6	9.2	7.4	1.8	0
7	8.3	2.7	5.6	0
8	11.3	3	2.7	5.6
9	12	6.9	2.8	2.3
10	7	0	6.9	0.1
11	1.2	0	0	0.1
12	0.2	0.2	0	0
13	5.8	5.6	0.2	0
14	7.1	1.3	5.6	0.2
15	5.8	4.4	0.6	0.8
16	9.3	5.7	3.3	0.3
17	1.7	0	1.6	0.1
18	7.5	7.5	0	0
19	17.3	9.8	7.5	0
20	13.3	2.7	9.8	0.8
21	16.9	4.5	2.6	8.4
22	5.8	0	4.5	1.3
23	2.2	1	0	1.2
24	0	0	0	0
25	3	3	0	0
26	13.7	10.7	3	0
27	17.5	3.8	10.7	3
28	15	8.6	3.8	0
29	9.6	2.6	3.4	3.6
30	12.9	6.9	2.6	3.4
Total Average	7.43	3.42	2.72	1.12

Figure 9. Cargo Backlog: Optimized Schedule



An initial look at the results from optimizing the theater airlift schedule shows dramatic improvements between the actual schedule flown and the optimized schedule. The sorties flown each day and the flight hours per day both were reduced while moving the same average cargo per day. This is summarized in the table below:

Table 2. C-130 Sortie Data for August, 2001

	Sorties		Pallet Equivalents		Flight Hours	
	Scheduled	Optimized	Scheduled	Optimized	Scheduled	Optimized
Total	**216**	**96**	**150.5**	**166.3**	**351.1**	**146.5**
Average	**7.20**	**3.20**	**5.02**	**5.54**	**11.70**	**4.88**

As you can see from Table 2, the average sortie per day was reduced from 7.2 to 3.2 while maintaining approximately the same average cargo per day. Also, flight hours were reduced from 11.7 to 4.88 per day which is over a 50% reduction. In order to validate these results and to give them meaning, a statistical comparison between the two data sets is required.

Statistical Comparison

There are basically three questions that we would like to answer from this data.

1. Is the average sortie rate per day using an optimized schedule less than the average sortie rate of the actual schedule flown?

2. Is the average number of flight hours per day using an optimized schedule less than the average flight hours for the actual schedule flown?

3. Are the average pallet equivalents for both of these scenarios the same?

For each of these questions, I would also like to know how confident I can be in my answer. In order to solve this problem, I will use the one-tailed hypothesis testing for the first two questions and the two tail test for the last question. These questions can be stated mathematically with the following formulas and will be solved in turn.

Question 1: The null hypothesis is stated as:

H_0: $(u_1 - u_2) = 0$

And the alternate hypothesis is stated as:

H_a: $(u_1 - u_2) > 0$ or $u_2 < u_1$

The test statistic (z) was determined using Microsoft Excel's built in statistic functions. z_α was determined using an α of .01 and the normal distribution table (McClave et al, 2001:987). z_α was determined to be 2.33 and the null hypothesis can be rejected if $z > z_\alpha$. In this case, $z = 5.19$ which is greater than the 2.33 and I can reject the null hypothesis and accept the alternate hypothesis with 99 percent confidence that the average number of sorties has declined.

Question 2: The null hypothesis is stated as:

H_0: $(u_1 - u_2) = 0$

And the alternate hypothesis is stated as:

H_a: $(u_1 - u_2) > 0$ or $u_2 < u_1$

The test statistic (z) was determined using Microsoft Excel's built in statistic functions. z_α was determined using an α of .01 and the normal distribution table (McClave et al, 2001:987). z_α was determined to be 2.33 and the null hypothesis can be rejected if $z > z_\alpha$. In this case, $z = 5.73$ which is greater than the 2.33 and I can reject the null hypothesis and accept the alternate hypothesis with 99 percent confidence that the average number of flight hours has declined..

Question 3: The null hypothesis is stated as:

H_0: $(u_1 - u_2) = 0$

And the alternate hypothesis is stated as:

H_a: $(u_1 - u_2) \neq 0$

The rejection region for the two-tailed test is $|z| > z_{\alpha/2}$

The test statistic (z) was determined using Microsoft Excel's built in statistic functions. $z_{\alpha/2}$ was determined using an α of .01 and the normal distribution table (McClave et al, 2001:987). $z_{\alpha/2}$ was determined to be 2.575. Since $z = -.388$, I cannot reject the null hypothesis and must conclude that there is no significant change in the amount of pallet equivalents between the two data sets.

These results are summarized in the table on the next page

:

Table 3: Summary of Hypothesis Testing

Hypothesis	z	z_{α}	Reject or Accept Null	Answer
Question 1: Is the average sortie rate less?	5.19	2.33	Reject	Yes
Question 2: Is the average number of flight hours less?	5.73	2.33	Reject	Yes
Question 3: Are the average pallet equivalents the same?	-.388	2.575	Accept	Yes

As you can see from the above table, even with the variance in the data, I can say with 99% confidence that there is a significant reduction in the number of flight hours and sorties while moving the same amount of cargo and passengers.

Cost Comparison

Although not the primary purpose of this paper, it would be remiss not to discuss briefly the cost savings associated with the reduction in sorties and flight hours. In order to compare costs, I used the AMC special assignment airlift mission (SAAM) rate for internal customers. This rate is $4,130 per flight hour (AMC Website, 2003). Using this rate, cost savings are summarized below:

Table 4: Cost Savings

	Per flight hour:	Per month:	Per year:
Cost Savings:	$4,130	$844,998	$10,139,976

As you can see from the previous table, an optimized scheduling program could reduce flying costs in the USCENCOM AOR by over $10 million annually. This does not even take into account the basing costs, deployment costs, and redeployment costs of deployed personnel which also could be reduced since fewer aircraft and aircrews would need to deploy to support the reduced sortie rate. The greater the demands on theater airlift, the greater the potential for cost savings with an optimized approach.

Chapter 4 Summary

The results show dramatic improvement by using an optimized schedule that will reduce the overall flight hours and sorties required to move the same amount of cargo in the theater of operations. In addition, this was accomplished using the effectiveness constraint of no more than 3 days delay of any cargo at an FOB or APOD. The three main questions that needed to be answered by the data were statistically shown to support this argument.

Chapter 5 – Conclusions and Recommendations

Research Results

The primary research question for this paper was whether or not an optimized schedule would reduce the number of sorties required to move the same amount of cargo and would such an optimizing program be feasible. The answer to the first part of the question is that it definitely would reduce the number of sorties, even with effectiveness constraints like making sure the cargo did not delay more than three days at any aerial port. This was convincingly shown in the last chapter. However, the second part of this question is more difficult and requires a review of the barriers to implementation and feasibility analysis.

There are four main barriers to the implementation of an optimization of theater airlift scheduling. They are country clearances, user demands scheduled service (frequency channels), intratheater cargo visibility, and most difficult of all, a change in the way we approach this problem as shown in our doctrine and accepted practices

The problem of obtaining country clearances in advance of scheduled airlift is a very difficult one, indeed. The only real solution to this is to obtain blanket country clearances for the intratheater movement of cargo. Visibility of intratheater cargo a month in advance would be an impossible task and would make the scheduling of theater airlift non-responsive to user demands. If certain countries do not allow for a relaxation of their country clearance approvals, those countries would still need to be served by frequency channels.

The second barrier to implementation was that the user would demand a regularly scheduled service. Educating the user to the benefits of a requirements channel over a frequency channel could solve this problem. For example, if the user were told that he would have guaranteed delivery within three days as opposed to regularly scheduled service every three days, would they care? This would allow the user to receive the same level of service with the flexibility to optimize a theater airlift schedule.

The third barrier to implementation is the problem of intratheater in-transit visibility (ITV). There is no cargo visibility within the theater which makes it impossible to schedule airlift to meet cargo movement requirements. This problem can be solved by the implementation of ITARS. ITARS provides the intratheater cargo visibility, validated and prioritized by the JMC, which allows for a theater airlift schedule to be optimized.

The final barrier to implementation is the most difficult of all to overcome. It requires a paradigm shift in our doctrine. Although this paper shows the inefficiencies of using frequency channels, our doctrine currently describes the frequency channel as the preferred way of doing business. The Air Force needs to recognize this as a problem first, before any real changes can take place. Doctrine needs to change with changing technology. In this case, technology is making it possible to optimize the theater airlift schedule, but doctrine still advocates the use of frequency channels.

Areas for Further Study

There are three main areas for further study. They are investigations into the potential for other services to "buy-in" into the ITARS program, looking into the actual cargo and passengers moved during a given time period, and a cost-benefit analysis of DCAMPS vs. Optimized Scheduling.

ITARS has the potential to provide all services with intratheater cargo visibility. This has tremendous impact on the ability to properly allocate transportation resources to the movement of cargo and personnel. In addition, this program would allow the JMC to truly prioritize and validate cargo movement within the theater. However, since this program is being developed by AMC and not at a Joint level, it may never receive the attention or resources it needs to become a viable solution. Further research into the possibility of other service "buy-in" and the true potential into whether or not this program will become a reality.

The second area of research is to measure the actual cargo and passengers moved during a given time period to further validate this paper. One limitation of this paper was the need to infer the number of pallet positions used in the movement of cargo and passengers from the cargo weight on each mission segment. In order to accurately measure and compare cargo backlogs, it would also be necessary to obtain the theater cargo backlog, which is not kept as a record in the CENTCOM AOR. This would make it easier to compare future optimization programs.

The final area of research that would benefit from further study is the cost-benefit analysis of the DCAMPS program. This paper looks at the steady-state situation prior to September 11, 2001 and shows a cost savings of over $10 million per year. As theater airlift demands increase, it is possible to infer that cost savings would also increase with the use of an optimized scheduling program. A cost-benefit analysis that looks at the costs of developing DCAMPS and a break-even analysis, given the demand on the theater airlift system, would answer the question as to whether or not DCAMPS is a financially sound solution to this problem.

Summary

The first part of this paper lays the foundation for the data analysis in Chapter 4 by answering the secondary research questions. It starts with a brief history of the theater airlift scheduling problem in two parts. The first part discusses the optimization programs that have been tried since 1968, and although they show the benefits of such a program, they have never been implemented as solutions. One reason for this can be seen in the second part of the history. No one has had long-term responsibility of this problem. Doctrinal history of theater airlift shows a constant change in command and control of theater airlift assigned assets.

Current issues are also covered in this paper and show a continuation of the historical problems with theater airlift scheduling. However, the technology available shows new hope for a solution to the theater airlift scheduling problem through ITV and DCAMPS. The only real barrier to implementation outside of DoD’s control is that of obtaining country clearances on a case-by-case basis and in a timely manner.

Finally, the data from the C-130 sorties in Seeb, Oman prior to September 11, 2001 was analyzed. The data showed that there could be a greater than 50% reduction in total sorties and flight hours while moving the same amount of cargo by optimizing the theater airlift schedule. In this case, there was an effectiveness constraint that required all cargo to be delivered within 3 days instead of a flight every three days. This kept the level of service the same while allowing the flexibility to optimize the schedule.

The benefits of optimizing the theater airlift schedule are substantial. However, implementation still faces some barriers. Of these, only the difficulty in obtaining country clearances lies outside of DoD’s control. In order to successfully implement the newest program, DCAMPS, these barriers will have to be removed.

Appendix A – Raw Flight Data, August 2001

DATE	Mission Number Tail Number Route	Cargo	Pax
1-Aug-01	VMZF006SW213100C130E37857TOEKJ OBBI 1.3VMZF006SW213OBBI	0	19
1-Aug-01	VMZF006SW213200C130E37857TOBBI OOMS2.1VMZF006SW213OOMS	300	0
1-Aug-01	VMZF024SW213100C130E37808TOOMSOOMA0.9VMZF024SW213OOMA	0	0
1-Aug-01	VMZF024SW213200C130E37808TOOMAOOTH 1.5VMZF024SW213OOTH	0	0
1-Aug-01	VMZF024SW213300C130E37808TOOTH OOMS1.8VMZF024SW213OOMS	0	0
2-Aug-01	VMZF006SW214100C130E37839TOOMSOKAS 2.9VMZF006SW214OKAS	0	0
3-Aug-01	VMZF006SW214200C130E37839TOKAS OKAS 1.9VMZF006SW214OKAS	0	0
3-Aug-01	VMZF006SW214400C130E37839TOKAS OOMS 3.VMZF006SW214OOMS	0	0
2-Aug-01	VMZF007SW214100C130E37856TOOMSOKAS 2.8VMZF007SW214OKAS	0	16
3-Aug-01	VMZF007SW214200C130E37856TOKAS OKAS 1.7VMZF007SW214OKAS	0	16
3-Aug-01	VMZF007SW214400C130E37856TOKAS OOMS2.8VMZF007SW214OOMS	0	0
4-Aug-01	VMZF023SW216100C130E37856TOOMSOMAM1.1VMZF023SW216OMAM	0	0
4-Aug-01	VMZF023SW216200C130E37856TOMAMOBBI 2.VMZF023SW216OBBI	0	0
4-Aug-01	VMZF023SW216250C130E37856TOBBI OEKJ 1.7VMZF023SW216OEKJ	24900	0
4-Aug-01	VMZF023SW216300C130E37856TOEKJ OBBI 1.4VMZF023SW216OBBI	0	0
4-Aug-01	VMZF023SW216400C130E37856TOBBI OOMS2.1VMZF023SW216OOMS	0	2
4-Aug-01	VMZF024SW216100C130E37857TOOMSOMAM1.1VMZF024SW216OMAM	0	0
4-Aug-01	VMZF024SW216200C130E37857TOMAMOBBI 1.2VMZF024SW216OBBI	0	0
4-Aug-01	VMZF024SW216300C130E37857TOBBI OTBD 0.7VMZF024SW216OTBD	9438	0
4-Aug-01	VMZF024SW216400C130E37857TOTBD OOMS1.7VMZF024SW216OOMS	114	0
4-Aug-01	VMZF033SW216100C130E37839TOOMSOKAJ 2.7VMZF033SW216OKAJ	0	0
4-Aug-01	VMZF033SW216200C130E37839TOKAJ OBBI 1.1VMZF033SW216OBBI	0	0
4-Aug-01	VMZF033SW216300C130E37839TOBBI OOMS 2.VMZF033SW216OOMS	292	0
5-Aug-01	VMZF006SW217100C130E37839TOOMSOBBI 1.9VMZF006SW217OBBI	0	0
5-Aug-01	VMZF006SW217200C130E37839TOBBI OTBD 0.6VMZF006SW217OTBD	7504	0
5-Aug-01	VMZF006SW217300C130E37839TOTBD OMAM0.9VMZF006SW217OMAM	1216	2
5-Aug-01	VMZF006SW217350C130E37839TOMAMOOMS 1.VMZF006SW217OOMS	4	0
5-Aug-01	VMZF007SW217100C130E37808TOOMSOKAJ 3.2VMZF007SW217OKAJ	0	30
5-Aug-01	VMZF007SW217200C130E37808TOKAJ OEKJ 1.5VMZF007SW217OEKJ	25094	0
5-Aug-01	VMZF007SW217300C130E37808TOEKJ OKAJ 1.4VMZF007SW217OKAJ	0	30
5-Aug-01	VMZF007SW217400C130E37808TOKAJ OOMS2.6VMZF007SW217OOMS	0	0
6-Aug-01	VMZF003SW218100C130E37808TOOMSOMAM 1.VMZF003SW218OMAM	0	0
6-Aug-01	VMZF003SW218200C130E37808TOMAMOBBI 1.2VMZF003SW218OBBI	187	5
6-Aug-01	VMZF003SW218300C130E37808TOBBI OOMS 2.VMZF003SW218OOMS	1894	0
6-Aug-01	VMZF006SW218100C130E37839TOOMSOBBI 1.8VMZF006SW218OBBI	0	3
6-Aug-01	VMZF006SW218200C130E37839TOBBI OTBD 0.6VMZF006SW218OTBD	8333	0
6-Aug-01	VMZF006SW218300C130E37839TOTBD OOMS1.6VMZF006SW218OOMS	0	0
6-Aug-01	VMZF024SW218100C130E37856TOOMSOKAJ 2.7VMZF024SW218OKAJ	25000	0
6-Aug-01	VMZF024SW218200C130E37856TOKAJ OBBI 1.1VMZF024SW218OBBI	0	0
6-Aug-01	VMZF024SW218300C130E37856TOBBI OOMS 2.VMZF024SW218OOMS	0	0
7-Aug-01	VMZF021SW219100C130E37839TOOMSOBBI 1.8VMZF021SW219OBBI	0	24
7-Aug-01	VMZF021SW219200C130E37839TOBBI OMAM1.9VMZF021SW219OMAM	1840	0
7-Aug-01	VMZF021SW219300C130E37839TOMAMOEKJ 2.4VMZF021SW219OEKJ	258	7
7-Aug-01	VMZF021SW219400C130E37839TOEKJ OBBI 1.4VMZF021SW219OBBI	0	24
7-Aug-01	VMZF024SW219100C130E37856TOOMSOBBI 1.8VMZF024SW219OBBI	133	0
7-Aug-01	VMZF024SW219200C130E37856TOBBI OTBD 0.5VMZF024SW219OTBD	16452	0

7-Aug-01VMZF024SW219300C130E37856TOTBD OMAM0.8VMZF024SW219OMAM 13713
7-Aug-01VMZF024SW219400C130E37856TOMAMOOMS 1.VMZF024SW219OOMS 73 0
8-Aug-01VMZF003SW220100C130E37839TOOMSOBBI 1.8VMZF003SW220OBBI 0 0
8-Aug-01VMZF003SW220200C130E37839TOBBI OTBD 0.6VMZF003SW220OTBD 14076 0
8-Aug-01VMZF003SW220300C130E37839TOTBD OOMS1.6VMZF003SW220OOMS 0 0
8-Aug-01VMZF006SW220100C130E37808TOOMSOBBI 1.8VMZF006SW220OBBI 0 0
8-Aug-01VMZF006SW220200C130E37808TOBBI OKAJ 1.1VMZF006SW220OKAJ 110 1
8-Aug-01VMZF006SW220300C130E37808TOKAJ OMAM 2.VMZF006SW220OMAM 819 1
8-Aug-01VMZF006SW220400C130E37808TOMAMOOMS 1.VMZF006SW220OOMS 159 0
8-Aug-01VMZF024SW220100C130E37856TOOMSOOMA0.9VMZF024SW220OOMA 0 0
8-Aug-01VMZF024SW220200C130E37856TOOMAOOTH 1.5VMZF024SW220OOTH 0 0
8-Aug-01VMZF024SW220300C130E37856TOOTH OOMS1.8VMZF024SW220OOMS 0 0
9-Aug-01VMZF003SW221100C130E37856TOOMSOMFJ 0.7VMZF003SW221OMFJ 0 0
9-Aug-01VMZF003SW221200C130E37856TOMFJ OBBI 1.5VMZF003SW221OBBI 5950 0
9-Aug-01VMZF003SW221300C130E37856TOBBI OOMS 2.VMZF003SW221OOMS 111 0
9-Aug-01VMZF004SW221100C130E37857TOOMSOKAS 2.8VMZF004SW221OKAS 0 2
9-Aug-01VMZF004SW221200C130E37857TOKAS OEKJ 1.5VMZF004SW221OEKJ 25532 0
9-Aug-01VMZF004SW221300C130E37857TOEKJ OKAS 1.4VMZF004SW221OKAS 0 2
9-Aug-01VMZF004SW221400C130E37857TOKAS OOMS2.9VMZF004SW221OOMS 1212 7
11-Aug-01VMZF023SW223100C130E37856TOOMSOMAM 1.VMZF023SW223OMAM 0 0
11-Aug-01VMZF023SW223200C130E37856TOMAMOEKJ 2.4VMZF023SW223OEKJ 0 0
11-Aug-01VMZF023SW223300C130E37856TOEKJ OMAM2.5VMZF023SW223OMAM 0 0
11-Aug-01VMZF023SW223400C130E37856TOMAMOOMS 1.VMZF023SW223OOMS 0 0
11-Aug-01VMZF024SW223100C130E37857TOOMSOOMS2.5VMZF024SW223OOMS 164 0
11-Aug-01VMZF024SW223150C130E37857TOOMSOBBI 1.9VMZF024SW223OBBI 0 0
11-Aug-01VMZF024SW223200C130E37857TOBBI OOMS1.9VMZF024SW223OOMS 164 0
11-Aug-01VMZF033SW223100C130E37808TOOMSOBBI 1.9VMZF033SW223OBBI 0 0
11-Aug-01VMZF033SW223150C130E37808TOBBI OOMS1.9VMZF033SW223OOMS 177 0
12-Aug-01VMZF007SW224100C130E37856TOOMSOKAJ 2.5VMZF007SW224OKAJ 0 2
12-Aug-01VMZF007SW224200C130E37856TOKAJ OEKJ 1.4VMZF007SW224OEKJ 0 0
12-Aug-01VMZF007SW224300C130E37856TOEKJ OKAJ 1.6VMZF007SW224OKAJ 0 2
12-Aug-01VMZF007SW224400C130E37856TOKAJ OOMS2.6VMZF007SW224OOMS 0 0
13-Aug-01VMZF003SW225100C130E37808TOOMSOMAM1.1VMZF003SW225OMAM 0 0
13-Aug-01VMZF003SW225200C130E37808TOMAMOBBI 1.3VMZF003SW225OBBI 0 0
13-Aug-01VMZF003SW225300C130E37808TOBBI OOMS1.9VMZF003SW225OOMS 282 0
13-Aug-01VMZF006SW225100C130E37856TOOMSOBBI 0.4VMZF006SW225OBBI 2512
13-Aug-01VMZF006SW225200C130E37856TOBBI OTBD 0.6VMZF006SW225OTBD 20359 0
13-Aug-01VMZF006SW225300C130E37856TOTBD OBBI 0.7VMZF006SW225OBBI 2512
13-Aug-01VMZF006SW225400C130E37856TOBBI OOMS2.1VMZF006SW225OOMS 0 0
13-Aug-01VMZF024SW225100C130E37857TOOMSOBBI 1.9VMZF024SW225OBBI 0 0
13-Aug-01VMZF024SW225150C130E37857TOBBI OKAS 1.3VMZF024SW225OKAS 0 0
13-Aug-01VMZF024SW225200C130E37857TOKAS OBBI 1.1VMZF024SW225OBBI 0 0
13-Aug-01VMZF024SW225300C130E37857TOBBI OOMS 2.VMZF024SW225OOMS 0 0
14-Aug-01VMZF024SW226100C130E37839TOOMSOOMA0.9VMZF024SW226OOMA 0 0
14-Aug-01VMZF024SW226200C130E37839TOOMAOOTH 1.4VMZF024SW226OOTH 0 0
14-Aug-01VMZF024SW226300C130E37839TOOTH OOMS1.9VMZF024SW226OOMS 0 0
14-Aug-01VMZF021SW226100C130E37857TOOMSOMAM1.4VMZF021SW226OMAM 19 0
14-Aug-01VMZF021SW226150C130E37857TOMAMOBBI 1.2VMZF021SW226OBBI 0 4
14-Aug-01VMZF021SW226200C130E37857TOBBI OEKJ 1.6VMZF021SW226OEKJ 16 0
14-Aug-01VMZF021SW226300C130E37857TOEKJ OBBI 1.2VMZF021SW226OBBI 0 4
14-Aug-01VMZF021SW226400C130E37857TOBBI OOMS 2.VMZF021SW226OOMS 463 9
15-Aug-01VMZF003SW227100C130E37857TOOMSOTBD 1.6VMZF003SW227OTBD 32231 0

15-Aug-01VMZF003SW227150C130E37857TOTBD OBBI 0.5VMZF003SW227OBBI 5980 0
15-Aug-01VMZF003SW227200C130E37857TOBBI OTBD 0.5VMZF003SW227OTBD 32231 0
15-Aug-01VMZF003SW227300C130E37857TOTBD OOMS1.7VMZF003SW227OOMS 137 0
15-Aug-01VMZF006SW227100C130E37839TOOMSOKAS 2.6VMZF006SW227OKAS 0 0
15-Aug-01VMZF006SW227200C130E37839TOKAS OBBI 1.2VMZF006SW227OBBI 16580 0
15-Aug-01VMZF006SW227300C130E37839TOBBI OMAM1.2VMZF006SW227OMAM 29516
15-Aug-01VMZF006SW227400C130E37839TOMAMOOMS 1.VMZF006SW227OOMS 666 0
16-Aug-01VMZF003SW228100C130E37857TOOMSOBBI 1.9VMZF003SW228OBBI 6164 0
16-Aug-01VMZF003SW228200C130E37857TOBBI OMFJ 1.5VMZF003SW228OMFJ 8373 0
16-Aug-01VMZF003SW228300C130E37857TOMFJ OOMS0.7VMZF003SW228OOMS 137 0
16-Aug-01VMZF006SW228100C130E37857TOOMSOKAS 2.8VMZF006SW228OKAS 0 0
16-Aug-01VMZF006SW228200C130E37857TOKAS OKAS 1.2VMZF006SW228OKAS 0 0
17-Aug-01VMZF006SW228400C130E37857TOKAS OBBI 1.5VMZF006SW228OBBI 0 0
17-Aug-01VMZF006SW228650C130E37857TOBBI OOMS2.1VMZF006SW228OOMS 0 0
16-Aug-01VMZF004SW228100C130E37839TOOMSOKAS 2.8VMZF004SW228OKAS 028
16-Aug-01VMZF004SW228200C130E37839TOKAS OEKJ 1.8VMZF004SW228OEKJ 0 4
16-Aug-01VMZF004SW228300C130E37839TOEKJ OKAS 1.6VMZF004SW228OKAS 028
16-Aug-01VMZF004SW228400C130E37839TOKAS OOMS3.2VMZF004SW228OOMS 0 0
18-Aug-01VMZF023SW230100C130E37856TOOMSOOMS0.4VMZF023SW230OOMS 1297 8
18-Aug-01VMZF023SW230150C130E37856TOOMSOMAM 1.VMZF023SW230OMAM 1612
18-Aug-01VMZF023SW230200C130E37856TOMAMOEKJ 2.3VMZF023SW230OEKJ 0 0
18-Aug-01VMZF023SW230300C130E37856TOEKJ OMAM2.3VMZF023SW230OMAM 1612
18-Aug-01VMZF023SW230400C130E37856TOMAMOOMS 1.VMZF023SW230OOMS 1297 8
18-Aug-01VMZF024SW230100C130E37808TOOMSOTBD 1.6VMZF024SW230OTBD 14010 0
18-Aug-01VMZF024SW230200C130E37808TOTBD OBBI 0.5VMZF024SW230OBBI 0 6
19-Aug-01VMZF024SW230300C130E37808TOBBI OOMS1.9VMZF024SW230OOMS 0 0
18-Aug-01VMZF033SW230100C130E37839TOOMSOKBK 2.6VMZF033SW230OKBK 521 0
18-Aug-01VMZF033SW230200C130E37839TOKBK OBBI 1.1VMZF033SW230OBBI 0 1
18-Aug-01VMZF033SW230300C130E37839TOBBI OTBD 0.6VMZF033SW230OTBD 18051 0
18-Aug-01VMZF033SW230400C130E37839TOTBD OOMS1.6VMZF033SW230OOMS 289 0
19-Aug-01VMZF006SW231100C130E37857TOOMSOBBI 1.9VMZF006SW231OBBI 7462 0
19-Aug-01VMZF006SW231200C130E37857TOBBI OMFJ 1.8VMZF006SW231OMFJ 16126 8
19-Aug-01VMZF006SW231300C130E37857TOMFJ OBBI 1.4VMZF006SW231OBBI 7462 0
19-Aug-01VMZF006SW231400C130E37857TOBBI OMFJ 1.4VMZF006SW231OMFJ 16126 8
19-Aug-01VMZF006SW231500C130E37857TOMFJ OOMS0.7VMZF006SW231OOMS 139 0
19-Aug-01VMZF007SW231100C130E37856TOOMSOKAJ 2.6VMZF007SW231OKAJ 8204 2
19-Aug-01VMZF007SW231200C130E37856TOKAJ OEKJ 1.4VMZF007SW231OEKJ 0 0
19-Aug-01VMZF007SW231300C130E37856TOEKJ OKAJ 1.5VMZF007SW231OKAJ 8204 2
19-Aug-01VMZF007SW231400C130E37856TOKAJ OOMS2.6VMZF007SW231OOMS 12 0
20-Aug-01VMZF003SW232100C130E37808TOOMSOMAM 1.VMZF003SW232OMAM 0 0
20-Aug-01VMZF003SW232200C130E37808TOMAMOBBI 1.2VMZF003SW232OBBI 019
20-Aug-01VMZF003SW232300C130E37808TOBBI OMAM1.1VMZF003SW232OMAM 0 0
20-Aug-01VMZF003SW232350C130E37808TOMAMOOMS 1.VMZF003SW232OOMS 454 0
20-Aug-01VMZF006SW232100C130E37839TOOMSOTBD 1.7VMZF006SW232OTBD 23766 0
20-Aug-01VMZF006SW232200C130E37839TOTBD OBBI 0.6VMZF006SW232OBBI 7704 2
20-Aug-01VMZF006SW232300C130E37839TOBBI OOMS2.1VMZF006SW232OOMS 418 0
20-Aug-01VMZF024SW232100C130E37856TOOMSOKAS 2.7VMZF024SW232OKAS 0 0
20-Aug-01VMZF024SW232200C130E37856TOKAS OBBI 1.3VMZF024SW232OBBI 0 0
20-Aug-01VMZF024SW232300C130E37856TOBBI OOMS2.2VMZF024SW232OOMS 0 0
21-Aug-01VMZF003SW233100C130E37839TOOMSOOMS 1.VMZF003SW233OOMS 0 0
21-Aug-01VMZF003SW233150C130E37857TOOMSOKAS 2.8VMZF003SW233OKAS 0 0
21-Aug-01VMZF003SW233200C130E37857TOKAS OBBI 1.2VMZF003SW233OBBI 6300 0

21-Aug-01VMZF003SW233300C130E37857TOBBI OOMS1.9VMZF003SW233OOMS 0 0
21-Aug-01VMZF021SW233100C130E37808TOOMSOBBI 1.8VMZF021SW233OBBI 2 0
21-Aug-01VMZF021SW233200C130E37808TOBBI OEKJ 1.5VMZF021SW233OEKJ 7 0
21-Aug-01VMZF021SW233300C130E37808TOEKJ OBBI 1.5VMZF021SW233OBBI 2 0
21-Aug-01VMZF021SW233400C130E37808TOBBI OOMS1.8VMZF021SW233OOMS 0 0
21-Aug-01VMZF024SW233100C130E37856TOOMSOBBI 1.9VMZF024SW233OBBI 7840 0
21-Aug-01VMZF024SW233200C130E37856TOBBI OTBD 0.5VMZF024SW233OTBD 17305 0
21-Aug-01VMZF024SW233300C130E37856TOTBD OMAM0.8VMZF024SW233OMAM 95 0
21-Aug-01VMZF024SW233400C130E37856TOMAMOOMS 1.VMZF024SW233OOMS 75 0
22-Aug-01VMZF003SW234100C130E37856TOOMSOTBD 1.7VMZF003SW234OTBD 0 0
22-Aug-01VMZF003SW234200C130E37856TOTBD OOMS1.9VMZF003SW234OOMS 0 0
22-Aug-01VMZF003SW234300C130E37856TOOMSOTBD 1.7VMZF003SW234OTBD 0 0
22-Aug-01VMZF003SW234400C130E37856TOTBD OOMS1.9VMZF003SW234OOMS 0 0
22-Aug-01VMZF006SW234100C130E37808TOOMSOBBI 1.8VMZF006SW234OBBI 0 0
22-Aug-01VMZF006SW234200C130E37808TOBBI OOMS3.4VMZF006SW234OOMS 6714 0
23-Aug-01VMZF006SW235100C130E37857TOOMSOKAJ 2.7VMZF006SW235OKAJ 0 0
23-Aug-01VMZF006SW235200C130E37857TOKAJ OBBI 1.2VMZF006SW235OBBI 0 0
23-Aug-01VMZF006SW235300C130E37857TOBBI OMFJ 1.4VMZF006SW235OMFJ 0 0
23-Aug-01VMZF006SW235350C130E37857TOMFJ OOMS0.7VMZF006SW235OOMS 0 0
23-Aug-01VMZF004SW235100C130E37856TOOMSOKAS 2.8VMZF004SW235OKAS 0 0
23-Aug-01VMZF004SW235200C130E37856TOKAS OEKJ 1.5VMZF004SW235OEKJ 4301 2
23-Aug-01VMZF004SW235300C130E37856TOEKJ OBBI 2.1VMZF004SW235OBBI 0 0
23-Aug-01VMZF004SW235500C130E37856TOBBI OOMS 2.VMZF004SW235OOMS 37 3
25-Aug-01VMZF023SW237100C130E37808TOOMSOMAM 1.VMZF023SW237OMAM 0 0
25-Aug-01VMZF023SW237200C130E37808TOMAMOEKJ 2.5VMZF023SW237OEKJ 0 0
25-Aug-01VMZF023SW237300C130E37808TOEKJ OOMS2.8VMZF023SW237OOMS 0 0
25-Aug-01VMZF024SW237100C130E37856TOOMSOBBI 1.8VMZF024SW237OBBI 0 0
25-Aug-01VMZF024SW237200C130E37856TOBBI OTBD 0.7VMZF024SW237OTBD 40 0
25-Aug-01VMZF024SW237300C130E37856TOTBD OOMS1.7VMZF024SW237OOMS15710 0
25-Aug-01VMZF033SW237100C130E37857TOOMSOKAS 2.8VMZF033SW237OKAS 0 0
25-Aug-01VMZF033SW237200C130E37857TOKAS OKAJ 0.4VMZF033SW237OKAJ 0 0
25-Aug-01VMZF033SW237300C130E37857TOKAJ OBBI 1.1VMZF033SW237OBBI 0 0
25-Aug-01VMZF033SW237400C130E37857TOBBI OOMS 2.VMZF033SW237OOMS 0 0
26-Aug-01VMZF006SW238100C130E37856TOOMSOMFJ 2.6VMZF006SW238OMFJ 12997 0
26-Aug-01VMZF006SW238200C130E37856TOMFJ OBBI 1.5VMZF006SW238OBBI 886316
26-Aug-01VMZF006SW238300C130E37856TOBBI OMFJ 1.6VMZF006SW238OMFJ 12997 0
26-Aug-01VMZF006SW238400C130E37856TOMFJ OBBI 1.VMZF006SW238OBBI 886316
26-Aug-01VMZF006SW238500C130E37856TOBBI OOMS 2.VMZF006SW238OOMS 521 0
26-Aug-01VMSF007SW238100C130E37808TOOMSOKAJ 2.7VMSF007SW238OKAJ 0 0
26-Aug-01VMSF007SW238200C130E37808TOKAJ OEKJ 1.5VMSF007SW238OEKJ 0 0
27-Aug-01VMZF024SW239350C130E37856TOBBI OKAJ 1.1VMZF024SW239OKAJ 1918
27-Aug-01VMZF007SW239100C130E37808TOEKJ OKAJ 1.4VMZF007SW239OKAJ 12274 0
27-Aug-01VMZF007SW239200C130E37808TOKAJ OBBI 1.1VMZF007SW239OBBI 178 0
27-Aug-01VMZF007SW239300C130E37808TOBBI OMAM1.2VMZF007SW239OMAM 812 1
27-Aug-01VMZF007SW239400C130E37808TOMAMOOMS 1.VMZF007SW239OOMS 0 0
28-Aug-01VMZF003SW240100C130E37857TOOMSOBBI 2.VMZF003SW240OBBI 0 0
28-Aug-01VMZF003SW240200C130E37857TOBBI OKAS 1.2VMZF003SW240OKAS 0 6
28-Aug-01VMZF003SW240300C130E37857TOKAS OTBD 1.9VMZF003SW240OTBD 3428 0
28-Aug-01VMZF003SW240400C130E37857TOTBD OOMS1.7VMZF003SW240OOMS 709 0
28-Aug-01VMZF024SW240100C130E37839TOOMSOMAM1.1VMZF024SW240OMAM 12034
28-Aug-01VMZF024SW240150C130E37839TOMAMOBBI 1.3VMZF024SW240OBBI 40 0
28-Aug-01VMZF024SW240200C130E37839TOBBI OMAM1.3VMZF024SW240OMAM 12034

28-Aug-01VMZF024SW240	300C130E37839TOMAM	OOMS	1.1VMZF024SW240OOMS		043
29-Aug-01VMZF003SW241	100C130E37856TOOMS	OTBD	1.5VMZF003SW241OTBD	12252	0
29-Aug-01VMZF003SW241	200C130E37856TOTBD	OBBI	0.6VMZF003SW241OBBI	1968	0
29-Aug-01VMZF003SW241	300C130E37856TOBBI	OTBD	0.5VMZF003SW241OTBD	12252	0
29-Aug-01VMZF003SW241	400C130E37856TOTBD	OOMS	2.6VMZF003SW241OOMS	1090	0
29-Aug-01VMZF024SW241	100C130E37857TOOMS	OOTH	1.8VMZF024SW241OOTH	0	0
29-Aug-01VMZF024SW241	200C130E37857TOOTH	OOMA	1.5VMZF024SW241OOMA	0	0
29-Aug-01VMZF024SW241	300C130E37857TOOMA	OOMS	1.VMZF024SW241OOMS	0	0
30-Aug-01VMZF003SW242	100C130E37856TOOMS	OMFJ	0.8VMZF003SW242OMFJ	7469	0
30-Aug-01VMZF003SW242	200C130E37856TOMFJ	OBBI	1.4VMZF003SW242OBBI	2601	0
30-Aug-01VMZF003SW242	300C130E37856TOBBI	OMFJ	1.6VMZF003SW242OMFJ	7469	0
30-Aug-01VMZF003SW242	400C130E37856TOMFJ	OBBI	1.5VMZF003SW242OBBI	2601	0
30-Aug-01VMZF003SW242	500C130E37856TOBBI	OOMS	1.1VMZF003SW242OOMS	108	0
30-Aug-01VMZF004SW242	100C130E37857TOOMS	OKAS	2.6VMZF004SW242OKAS		016
30-Aug-01VMZF004SW242	200C130E37857TOKAS	OEKJ	1.6VMZF004SW242OEKJ	4041	0
30-Aug-01VMZF004SW242	300C130E37857TOEKJ	OKAS	1.5VMZF004SW242OKAS		016
30-Aug-01VMZF004SW242	400C130E37857TOKAS	OOMS	2.9VMZF004SW242OOMS	0	1
31-Aug-01GMZF002RS243	100C130E37808TOOMS	LGSA	7.7GMZF002RS243LGSA	0	0
31-Aug-01GMZ2201RS243	100C130E37839TOOMS	LGSA	8.GMZ2201RS243LGSA	0	0

(Baker, 2003)

Appendix B – Daily Scheduling Sheets

August 1, 2001

Sorties Actually Flown:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Cargo Weight	PAXs	Pallet Equivalents
1-Aug-01	C130E	37857T	OEKJ	OBBI	1.3	0	19	1.3
1-Aug-01	C130E	37857T	OBBI	OOMS	2.1	300	0	0.1
1-Aug-01	C130E	37808T	OOMS	OOMA	0.9	0	0	0.0
1-Aug-01	C130E	37808T	OOMA	OOTH	1.5	0	0	0.0
1-Aug-01	C130E	37808T	OOTH	OOMS	1.8	0	0	0.0

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ				1.3																							
OBBI							0.1																				
OOMS																											
OOMA																											
OOTH																											
OKAS																											
OMAM																											
OTBD																											
OKAJ																											

Optimized Schedule:

No sorties would be scheduled for today.

August 2, 2001

Sorties Actually Flown:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Cargo Weight	PAXs	Pallet Equivalents
2-Aug-01	C130E	37839T	OOMS	OKAS	2.9	0	0	0.0
2-Aug-01	C130E	37856T	OOMS	OKAS	2.8	0	16	1.1

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ					1.3																						
OBBI								0.1																			
OOMS																1.1											
OOMA																											
OOTH																											
OKAS																											
OMAM																											
OTBD																											
OKAJ																											

Optimized Schedule:

No sorties would be scheduled for today.

August 3, 2001

Sorties Actually Flown:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Cargo Weight	PAXs	Pallet Equivalents
3-Aug-01	C130E	37839T	OKAS	OKAS	1.9	0	0	0.0
3-Aug-01	C130E	37839T	OKAS	OOMS	3.	0	0	0.0
3-Aug-01	C130E	37856T	OKAS	OKAS	1.7	0	16	1.1
3-Aug-01	C130E	37856T	OKAS	OOMS	2.8	0	0	0.0

(Note: OKAS to OKAS thrown out at as invalid data point due to cargo movement not required to return to departure location.)

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ						1.3																					
OBBI									0.1																		
OOMS																	1.1										
OOMA																											
OOTH																											
OKAS																											
OMAM																											
OTBD																											
OKAJ																											

Optimized Schedule:

No sorties would be scheduled for today.

August 4, 2001

Sorties Actually Flown:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Cargo Weight	PAXs	Pallet Equivalents
4-Aug-01	C130E	37856T	OOMS	OMAM	1.1	0	0	0.0
4-Aug-01	C130E	37856T	OMAM	OBBI	2.	0	0	0.0
4-Aug-01	C130E	37856T	OBBI	OEKJ	1.7	24900	0	4.8
4-Aug-01	C130E	37856T	OEKJ	OBBI	1.4	0	0	0.0
4-Aug-01	C130E	37856T	OBBI	OOMS	2.1	0	2	0.1
4-Aug-01	C130E	37857T	OOMS	OMAM	1.1	0	0	0.0
4-Aug-01	C130E	37857T	OMAM	OBBI	1.2	0	0	0.0
4-Aug-01	C130E	37857T	OBBI	OTBD	0.7	9438	0	1.8
4-Aug-01	C130E	37857T	OTBD	OOMS	1.7	114	0	0.0
4-Aug-01	C130E	37839T	OOMS	OKAJ	2.7	0	0	0.0
4-Aug-01	C130E	37839T	OKAJ	OBBI	1.1	0	0	0.0
4-Aug-01	C130E	37839T	OBBI	OOMS	2.	292	0	0.1

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ																											
OBBI																											
OOMS																		1.1									
OOMA																											
OOTH																											
OKAS																											
OMAM																											
OTBD																											
OKAJ																											

Optimized Schedule:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Pallet Equivalents
4-Aug-01	C130E	37856T	OOMS	OBBI	2.	0.0
4-Aug-01	C130E	37856T	OBBI	OEKJ	1.7	4.8
4-Aug-01	C130E	37856T	OEKJ	OBBI	1.4	1.3
4-Aug-01	C130E	37856T	OBBI	OTBD	0.7	2.0
4-Aug-01	C130E	37856T	OTBD	OOMS	1.7	0.2
			Crew Duty Day:		13.8	

August 5, 2001

Sorties Actually Flown:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Cargo Weight	PAXs	Pallet Equivalents
5-Aug-01	C130E	37839T	OOMS	OBBI	1.9	0	0	0.0
5-Aug-01	C130E	37839T	OBBI	OTBD	0.6	7504	0	1.4
5-Aug-01	C130E	37839T	OTBD	OMAM	0.9	1216	2	0.4
5-Aug-01	C130E	37839T	OMAM	OOMS	1.	4	0	0.0
5-Aug-01	C130E	37808T	OOMS	OKAJ	3.2	0	30	2.0
5-Aug-01	C130E	37808T	OKAJ	OEKJ	1.5	25094	0	4.8
5-Aug-01	C130E	37808T	OEKJ	OKAJ	1.4	0	30	2.0
5-Aug-01	C130E	37808T	OKAJ	OOMS	2.6	0	0	0.0

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ																											
OBBI																						1.4					
OOMS																											
OOMA																											
OOTH																											
OKAS																											
OMAM																											
OTBD																			0.4								
OKAJ																											

Optimized Schedule:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Pallet Equivalents
5-Aug-01	C130E	37856T	OOMS	OKAS	2.9	3.1
5-Aug-01	C130E	37856T	OKAS	OKAJ	0.8	2.0
5-Aug-01	C130E	37856T	OKAJ	OEKJ	1.5	4.8
5-Aug-01	C130E	37856T	OEKJ	OKAJ	1.4	2.0
5-Aug-01	C130E	37856T	OKAJ	OOMS	2.6	0.0
			Crew Duty Day:		15.5	

August 6, 2001

Sorties Actually Flown:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Cargo Weight	PAXs	Pallet Equivalents
6-Aug-01	C130E	37808T	OOMS	OMAM	1.	0	0	0.0
6-Aug-01	C130E	37808T	OMAM	OBBI	1.2	187	5	0.4
6-Aug-01	C130E	37808T	OBBI	OOMS	2.	1894	0	0.4
6-Aug-01	C130E	37839T	OOMS	OBBI	1.8	0	3	0.2
6-Aug-01	C130E	37839T	OBBI	OTBD	0.6	8333	0	1.6
6-Aug-01	C130E	37839T	OTBD	OOMS	1.6	0	0	0.0
6-Aug-01	C130E	37856T	OOMS	OKAJ	2.7	25000	0	4.8
6-Aug-01	C130E	37856T	OKAJ	OBBI	1.1	0	0	0.0
6-Aug-01	C130E	37856T	OBBI	OOMS	2.	0	0	0.0

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ																											
OBBI							0.4															1.6	1.4				
OOMS				0.2																					4.8		
OOMA																											
OOTH																											
OKAS																											
OMAM				0.4																							
OTBD																				0.4							
OKAJ																											

Optimized Schedule:

No sorties would be scheduled for today.

August 7, 2001

Sorties Actually Flown:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Cargo Weight	PAXs	Pallet Equivalents
7-Aug-01	C130E	37839T	OOMS	OBBI	1.8	0	24	1.6
7-Aug-01	C130E	37839T	OBBI	OMAM	1.9	1840	0	0.4
7-Aug-01	C130E	37839T	OMAM	OEKJ	2.4	258	7	0.5
7-Aug-01	C130E	37839T	OEKJ	OBBI	1.4	0	24	1.6
7-Aug-01	C130E	37856T	OOMS	OBBI	1.8	133	0	0.0
7-Aug-01	C130E	37856T	OBBI	OTBD	0.5	16452	0	3.2
7-Aug-01	C130E	37856T	OTBD	OMAM	0.8	137	13	0.9
7-Aug-01	C130E	37856T	OMAM	OOMS	1.	73	0	0.0

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ				1.6																							
OBBI								0.4											0.4			0.2					
OOMS																										4.8	
OOMA																											
OOTH																											
OKAS																											
OMAM	0.5				0.4																						
OTBD																											
OKAJ																											

Optimized Schedule:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Pallet Equivalents
7-Aug-01	C130E	37839T	OOMS	OBBI	1.9	1.8
7-Aug-01	C130E	37839T	OBBI	OTBD	0.5	6.0
7-Aug-01	C130E	37839T	OTBD	OMAM	0.8	1.3
7-Aug-01	C130E	37839T	OMAM	OOMS	1.	0.0
			Crew Duty Day		9.5	

August 8, 2001

Sorties Actually Flown:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Cargo Weight	PAXs	Pallet Equivalents
8-Aug-01	C130E	37839T	OOMS	OBBI	1.8	0	0	0.0
8-Aug-01	C130E	37839T	OBBI	OTBD	0.6	14076	0	2.7
8-Aug-01	C130E	37839T	OTBD	OOMS	1.6	0	0	0.0
8-Aug-01	C130E	37808T	OOMS	OBBI	1.8	0	0	0.0
8-Aug-01	C130E	37808T	OBBI	OKAJ	1.1	110	1	0.1
8-Aug-01	C130E	37808T	OKAJ	OMAM	2.	819	1	0.2
8-Aug-01	C130E	37808T	OMAM	OOMS	1.	159	0	0.0
8-Aug-01	C130E	37856T	OOMS	OOMA	0.9	0	0	0.0
8-Aug-01	C130E	37856T	OOMA	OOTH	1.5	0	0	0.0
8-Aug-01	C130E	37856T	OOTH	OOMS	1.8	0	0	0.0

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ					1.6																						
OBBI									0.4											0.4		2.7	0.2		0.1		
OOMS																											4.8
OOMA																											
OOTH																											
OKAS																											
OMAM		0.5				0.4																					
OTBD																											
OKAJ																			0.2								

Optimized Schedule:

No sorties would be scheduled for today.

August 9, 2001

Sorties Actually Flown:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Cargo Weight	PAXs	Pallet Equivalents
9-Aug-01	C130E	37856T	OOMS	OMFJ	0.7	0	0	0.0
9-Aug-01	C130E	37856T	OMFJ	OBBI	1.5	5950	0	1.1
9-Aug-01	C130E	37856T	OBBI	OOMS	2.	111	0	0.0
9-Aug-01	C130E	37857T	OOMS	OKAS	2.8	0	2	0.1
9-Aug-01	C130E	37857T	OKAS	OEKJ	1.5	25532	0	4.9
9-Aug-01	C130E	37857T	OEKJ	OKAS	1.4	0	2	0.1
9-Aug-01	C130E	37857T	OKAS	OOMS	2.9	1212	7	0.7

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ			OMFJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ						1.6										0.1														
OBBI																							2.7	0.2		0.1				
OOMS																0.1														
OOMA																														
OOTH																														
OKAS	4.9						0.7																							
OMAM			0.5																											
OTBD																														
OKAJ																														
OMFJ				1.1																										

Optimized Schedule:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Pallet Equivalents
9-Aug-01	C130E	37856T	OOMS	OKAJ	3.2	4.8
9-Aug-01	C130E	37856T	OKAJ	OMAM	2.	0.2
9-Aug-01	C130E	37856T	OMAM	OBBI	1.2	0.4
9-Aug-01	C130E	37856T	OBBI	OMAM	2.	0.4
9 Aug 01	C130E	37856T	OMAM	OOMS	1.	0.0
			Crew Duty Day		15.7	

August 10, 2001

Sorties Actually Flown:

No actual sorties flown on this day.

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ			OMFJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ																	0.1													
OBBI																											0.1			
OOMS																	0.1													
OOMA																														
OOTH																														
OKAS		4.9						0.7																						
OMAM																														
OTBD																														
OKAJ																														
OMFJ						1.1																								

Optimized Schedule:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Pallet Equivalents
10-Aug-01	C130E	37857T	OOMS	OMAM	1.	0.0
10-Aug-01	C130E	37857T	OMAM	OEKJ	2.4	0.5
10-Aug-01	C130E	37857T	OEKJ	OBBI	1.4	1.6
10-Aug-01	C130E	37857T	OBBI	OTBD	0.6	2.9
10-Aug-01	C130E	37857T	OTBD	OOMS	1.6	0.0
			Crew Duty Day		13.3	

August 11, 2001

Sorties Actually Flown:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Cargo Weight	PAXs	Pallet Equivalents
11-Aug-01	C130E	37856T	OOMS	OMAM	1.	0	0	0.0
11-Aug-01	C130E	37856T	OMAM	OEKJ	2.4	0	0	0.0
11-Aug-01	C130E	37856T	OEKJ	OMAM	2.5	0	0	0.0
11-Aug-01	C130E	37856T	OMAM	OOMS	1.	0	0	0.0
11-Aug-01	C130E	37857T	OOMS	OOMS	2.5	164	0	0.0
11-Aug-01	C130E	37857T	OOMS	OBBI	1.9	0	0	0.0
11-Aug-01	C130E	37857T	OBBI	OOMS	1.9	164	0	0.0
11-Aug-01	C130E	37808T	OOMS	OBBI	1.9	0	0	0.0
11-Aug-01	C130E	37808T	OBBI	OOMS	1.9	177	0	0.0

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ			OMFJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ																		0.1												
OBBI																														
OOMS																														
OOMA																														
OOTH																														
OKAS																														
OMAM																														
OTBD																														
OKAJ																														
OMFJ						1.1																								

Optimized Schedule:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Pallet Equivalents
11-Aug-01	C130E	37856T	OOMS	OBBI	2.	0.1
11-Aug-01	C130E	37856T	OBBI	OKAJ	1.1	0.2
11-Aug-01	C130E	37856T	OKAJ	OKAS	0.5	0.1
11-Aug-01	C130E	37856T	OKAS	OEKJ	1.5	5.6
11-Aug-01	C130E	37856T	OEKJ	OBBI	1.4	0.7
11-Aug-01	C130E	37856T	OBBI	OOMS	2.	0.7
			Crew Duty Day		15.8	

August 12, 2001

Sorties Actually Flown:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Cargo Weight	PAXs	Pallet Equivalents
12-Aug-01	C130E	37856T	OOMS	OKAJ	2.5	0	2	0.1
12-Aug-01	C130E	37856T	OKAJ	OEKJ	1.4	0	0	0.0
12-Aug-01	C130E	37856T	OEKJ	OKAJ	1.6	0	2	0.1
12-Aug-01	C130E	37856T	OKAJ	OOMS	2.6	0	0	0.0

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ			OMFJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ																									0.1					
OBBI																														
OOMS																									0.1					
OOMA																														
OOTH																														
OKAS																														
OMAM																														
OTBD																														
OKAJ																														
OMFJ																														

Optimized Schedule:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Pallet Equivalents
12-Aug-01	C130E	37856T	OOMS	OMFJ	0.7	0.0
12-Aug-01	C130E	37856T	OMFJ	OBBI	1.5	1.1
12-Aug-01	C130E	37856T	OBBI	OEKJ	1.5	0.0
12-Aug-01	C130E	37856T	OEKJ	OKAS	1.6	0.1
12-Aug-01	C130E	37856T	OKAS	OOMS	3.	0.0
			Crew Duty Day		14.6	

August 13, 2001

Sorties Actually Flown:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Cargo Weight	PAXs	Pallet Equivalents
13-Aug-01	C130E	37808T	OOMS	OMAM	1.1	0	0	0.0
13-Aug-01	C130E	37808T	OMAM	OBBI	1.3	0	0	0.0
13-Aug-01	C130E	37808T	OBBI	OOMS	1.9	282	0	0.1
13-Aug-01	C130E	37856T	OOMS	OBBI	0.4	25	12	0.8
13-Aug-01	C130E	37856T	OBBI	OTBD	0.6	20359	0	3.9
13-Aug-01	C130E	37856T	OTBD	OBBI	0.7	25	12	0.8
13-Aug-01	C130E	37856T	OBBI	OOMS	2.1	0	0	0.0
13-Aug-01	C130E	37857T	OOMS	OBBI	1.9	0	0	0.0
13-Aug-01	C130E	37857T	OBBI	OKAS	1.3	0	0	0.0
13-Aug-01	C130E	37857T	OKAS	OBBI	1.1	0	0	0.0
13-Aug-01	C130E	37857T	OBBI	OOMS	2.	0	0	0.0

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ			OMFJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ																										0.1				
OBBI							0.1															3.9								
OOMS				0.8																						0.1				
OOMA																														
OOTH																														
OKAS																														
OMAM																														
OTBD				0.8																										
OKAJ																														
OMFJ																														

Optimized Schedule:

No sorties would be scheduled for today.

August 14, 2001

Sorties Actually Flown:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Cargo Weight	PAXs	Pallet Equivalents
14-Aug-01	C130E	37839T	OOMS	OOMA	0.9	0	0	0.0
14-Aug-01	C130E	37839T	OOMA	OOTH	1.4	0	0	0.0
14-Aug-01	C130E	37839T	OOTH	OOMS	1.9	0	0	0.0
14-Aug-01	C130E	37857T	OOMS	OMAM	1.4	19	0	0.0
14-Aug-01	C130E	37857T	OMAM	OBBI	1.2	0	4	0.3
14-Aug-01	C130E	37857T	OBBI	OEKJ	1.6	16	0	0.0
14-Aug-01	C130E	37857T	OEKJ	OBBI	1.2	0	4	0.3
14-Aug-01	C130E	37857T	OBBI	OOMS	2.	463	9	0.7

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ			OMFJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ				0.3																							0.1			
OBBI							0.7	0.1															3.9							
OOMS					0.8																						0.1			
OOMA																														
OOTH																														
OKAS																														
OMAM				0.3																										
OTBD					0.8																									
OKAJ																														
OMFJ																														

Optimized Schedule:

No sorties would be scheduled for today.

August 15, 2001

Sorties Actually Flown:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Cargo Weight	PAXs	Pallet Equivalents
15-Aug-01	C130E	37857T	OOMS	OTBD	1.6	32231	0	6.0
15-Aug-01	C130E	37857T	OTBD	OBBI	0.5	5980	0	1.2
15-Aug-01	C130E	37857T	OBBI	OTBD	0.5	32231	0	6.0
15-Aug-01	C130E	37857T	OTBD	OOMS	1.7	137	0	0.0
15-Aug-01	C130E	37839T	OOMS	OKAS	2.6	0	0	0.0
15-Aug-01	C130E	37839T	OKAS	OBBI	1.2	16580	0	3.2
15-Aug-01	C130E	37839T	OBBI	OMAM	1.2	295	16	1.1
15-Aug-01	C130E	37839T	OMAM	OOMS	1.	666	0	0.1

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ			OMFJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ					0.3																									
OBBI																			1.1											
OOMS						0.8																								
OOMA																														
OOTH																														
OKAS				3.2																										
OMAM					0.3		0.1																							
OTBD																														
OKAJ																														
OMFJ																														

Optimized Schedule:

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Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Pallet Equivalents
15-Aug-01	C130E	37857T	OOMS	OKAJ	3.	0.1
15-Aug-01	C130E	37857T	OKAJ	OEKJ	1.5	0.0
15-Aug-01	C130E	37857T	OEKJ	OKAJ	1.5	0.1
15-Aug-01	C130E	37857T	OKAJ	OOMS	3.	0.0
			Crew Duty Day		14.3	
15-Aug-01	C130E	37839T	OOMS	OTBD	1.6	6.0
15-Aug-01	C130E	37839T	OTBD	OBBI	0.5	2.0
15-Aug-01	C130E	37839T	OBBI	OTBD	0.5	6.0
15-Aug-01	C130E	37839T	OTBD	OBBI	0.5	0.0
15-Aug-01	C130E	37839T	OBBI	OTBD	0.5	4.7
15-Aug-01	C130E	37839T	OTBD	OOMS	1.7	0.8
			Crew Duty Day		12.6	

August 16, 2001

Sorties Actually Flown:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Cargo Weight	PAXs	Pallet Equivalents
16-Aug-01	C130E	37857T	OOMS	OBBI	1.9	6164	0	1.2
16-Aug-01	C130E	37857T	OBBI	OMFJ	1.5	8373	0	1.6
16-Aug-01	C130E	37857T	OMFJ	OOMS	0.7	137	0	0.0
16-Aug-01	C130E	37857T	OOMS	OKAS	2.8	0	0	0.0
16-Aug-01	C130E	37857T	OKAS	OKAS	1.2	0	0	0.0
16-Aug-01	C130E	37839T	OOMS	OKAS	2.8	0	28	1.9
16-Aug-01	C130E	37839T	OKAS	OEKJ	1.8	0	4	0.3
16-Aug-01	C130E	37839T	OEKJ	OKAS	1.6	0	28	1.9
16-Aug-01	C130E	37839T	OKAS	OOMS	3.2	0	0	0.0

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ			OMFJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ						0.3										1.9														
OBBI																												1.6		
OOMS																1.9														
OOMA																														
OOTH																														
OKAS	0.3				3.2																									
OMAM								0.1																						
OTBD																														
OKAJ																														
OMFJ																														

Optimized Schedule:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Pallet Equivalents
16-Aug-01	C130E	37857T	OOMS	OBBI	2.	2.0
16-Aug-01	C130E	37857T	OBBI	OMAM	1.2	1.1
16-Aug-01	C130E	37857T	OMAM	OBBI	1.2	0.3
16-Aug-01	C130E	37857T	OBBI	OOMS	2.	0.0
			Crew Duty Day		11.7	

August 17, 2001

Sorties Actually Flown:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Cargo Weight	PAXs	Pallet Equivalents
17-Aug-01	C130E	37857T	OKAS	OBBI	1.5	0	0	0.0
17-Aug-01	C130E	37857T	OBBI	OOMS	2.1	0	0	0.0

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ			OMFJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ																														
OBBI																													1.6	
OOMS																														
OOMA																														
OOTH																														
OKAS																														
OMAM									0.1																					
OTBD																														
OKAJ																														
OMFJ																														

Optimized Schedule:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Pallet Equivalents
17-Aug-01	C130E	37857T	OOMS	OKAS	3.	1.9
17-Aug-01	C130E	37857T	OKAS	OEKJ	1.5	0.3
17-Aug-01	C130E	37857T	OEKJ	OKAS	1.5	2.2
17-Aug-01	C130E	37857T	OKAS	OBBI	1.	3.5
17-Aug-01	C130E	37857T	OBBI	OOMS	2.	0.0
			Crew Duty Day		15.3	

August 18, 2001

Sorties Actually Flown:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Cargo Weight	PAXs	Pallet Equivalents
18-Aug-01	C130E	37856T	OOMS	OOMS	0.4	1297	8	0.8
18-Aug-01	C130E	37856T	OOMS	OMAM	1.	16	12	0.8
18-Aug-01	C130E	37856T	OMAM	OEKJ	2.3	0	0	0.0
18-Aug-01	C130E	37856T	OEKJ	OMAM	2.3	16	12	0.8
18-Aug-01	C130E	37856T	OMAM	OOMS	1.	1297	8	0.8
18-Aug-01	C130E	37808T	OOMS	OTBD	1.6	14010	0	2.7
18-Aug-01	C130E	37808T	OTBD	OBBI	0.5	0	6	0.4
18-Aug-01	C130E	37839T	OOMS	OKBK	2.6	521	0	0.1
18-Aug-01	C130E	37839T	OKBK	OBBI	1.1	0	1	0.1
18-Aug-01	C130E	37839T	OBBI	OTBD	0.6	18051	0	3.5
18-Aug-01	C130E	37839T	OTBD	OOMS	1.6	289	0	0.1

(Note: First sortie from OOMS discarded.)

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ			OMFJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ																			0.8											
OBBI																						3.5								
OOMS																						2.7								
OOMA																														
OOTH																														
OKAS																														
OMAM																														
OTBD				0.4			0.1																							
OKAJ																														
OMFJ																														

Optimized Schedule:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Pallet Equivalents
18-Aug-01	C130E	37856T	OOMS	OMAM	1.	0.8
18-Aug-01	C130E	37856T	OMAM	OMFJ	1.5	0.9
18-Aug-01	C130E	37856T	OMFJ	OOMS	1.5	2.5
			Crew Duty Day		8.3	

August 19, 2001

Sorties Actually Flown:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Cargo Weight	PAXs	Pallet Equivalents
19-Aug-01	C130E	37808T	OBBI	OOMS	1.9	0	0	0.0
19-Aug-01	C130E	37857T	OOMS	OBBI	1.9	7462	0	1.4
19-Aug-01	C130E	37857T	OBBI	OMFJ	1.8	16126	8	3.6
19-Aug-01	C130E	37857T	OMFJ	OBBI	1.4	7462	0	1.4
19-Aug-01	C130E	37857T	OBBI	OMFJ	1.4	16126	8	3.6
19-Aug-01	C130E	37857T	OMFJ	OOMS	0.7	139	0	0.0
19-Aug-01	C130E	37856T	OOMS	OKAJ	2.6	8204	2	1.7
19-Aug-01	C130E	37856T	OKAJ	OEKJ	1.4	0	0	0.0
19-Aug-01	C130E	37856T	OEKJ	OKAJ	1.5	8204	2	1.7
19-Aug-01	C130E	37856T	OKAJ	OOMS	2.6	12	0	0.0

(Note: Duplicate sortie from OBBI to OMFJ removed.)

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ			OMFJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ																				0.8					1.7					
OBBI																							3.5					3.6		
OOMS				1.4																			2.7		1.7					
OOMA																														
OOTH																														
OKAS																														
OMAM																														
OTBD					0.4			0.1																						
OKAJ																														
OMFJ				1.4																										

Optimized Schedule:

No sorties would be scheduled for today.

August 20, 2001

Sorties Actually Flown:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Cargo Weight	PAXs	Pallet Equivalents
20-Aug-01	C130E	37808T	OOMS	OMAM	1.	0	0	0.0
20-Aug-01	C130E	37808T	OMAM	OBBI	1.2	0	19	1.3
20-Aug-01	C130E	37808T	OBBI	OMAM	1.1	0	0	0.0
20-Aug-01	C130E	37808T	OMAM	OOMS	1.	454	0	0.1
20-Aug-01	C130E	37839T	OOMS	OTBD	1.7	23766	0	4.6
20-Aug-01	C130E	37839T	OTBD	OBBI	0.6	7704	2	1.6
20-Aug-01	C130E	37839T	OBBI	OOMS	2.1	418	0	0.1
20-Aug-01	C130E	37856T	OOMS	OKAS	2.7	0	0	0.0
20-Aug-01	C130E	37856T	OKAS	OBBI	1.3	0	0	0.0
20-Aug-01	C130E	37856T	OBBI	OOMS	2.2	0	0	0.0

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ			OMFJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ																					0.8					1.7				
OBBI																													3.6	
OOMS					1.4																	1.3				1.7				
OOMA																														
OOTH																														
OKAS																														
OMAM				1.3			0.1																							
OTBD																														
OKAJ																														
OMFJ					1.4																									

Optimized Schedule:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Pallet Equivalents
20-Aug-01	C130E	37808T	OOMS	OTBD	1.7	6.0
20-Aug-01	C130E	37808T	OTBD	OBBI	0.6	2.0
20-Aug-01	C130E	37808T	OBBI	OTBD	0.6	3.6
20-Aug-01	C130E	37808T	OTBD	OOMS	1.7	0.2
			Crew Duty Day		9.9	

August 21, 2001

Sorties Actually Flown:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Cargo Weight	PAXs	Pallet Equivalents
21-Aug-01	C130E	37839T	OOMS	OOMS	1.	0	0	0.0
21-Aug-01	C130E	37857T	OOMS	OKAS	2.8	0	0	0.0
21-Aug-01	C130E	37857T	OKAS	OBBI	1.2	6300	0	1.2
21-Aug-01	C130E	37857T	OBBI	OOMS	1.9	0	0	0.0
21-Aug-01	C130E	37808T	OOMS	OBBI	1.8	2	0	0.0
21-Aug-01	C130E	37808T	OBBI	OEKJ	1.5	7	0	0.0
21-Aug-01	C130E	37808T	OEKJ	OBBI	1.5	2	0	0.0
21-Aug-01	C130E	37808T	OBBI	OOMS	1.8	0	0	0.0
21-Aug-01	C130E	37856T	OOMS	OBBI	1.9	7840	0	1.5
21-Aug-01	C130E	37856T	OBBI	OTBD	0.5	17305	0	3.3
21-Aug-01	C130E	37856T	OTBD	OMAM	0.8	95	0	0.0
21-Aug-01	C130E	37856T	OMAM	OOMS	1.	75	0	0.0

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ			OMFJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ																											1.7			
OBBI																						3.3								3.6
OOMS					1.3	1.4																	1.3				1.7			
OOMA																														
OOTH																														
OKAS				1.2																										
OMAM																														
OTBD																														
OKAJ																														
OMFJ						1.4																								

Optimized Schedule:

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Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Pallet Equivalents
21-Aug-01	C130E	37808T	OOMS	OBBI	2.	2.9
21-Aug-01	C130E	37808T	OBBI	OEKJ	1.5	0.0
21-Aug-01	C130E	37808T	OEKJ	OMAM	2.3	0.8
21-Aug-01	C130E	37808T	OMAM	OOMS	1.	1.4
			Crew Duty Day		12.1	

August 22, 2001

Sorties Actually Flown:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Cargo Weight	PAXs	Pallet Equivalents
22-Aug-01	C130E	37856T	OOMS	OTBD	1.7	0	0	0.0
22-Aug-01	C130E	37856T	OTBD	OOMS	1.9	0	0	0.0
22-Aug-01	C130E	37856T	OOMS	OTBD	1.7	0	0	0.0
22-Aug-01	C130E	37856T	OTBD	OOMS	1.9	0	0	0.0
22-Aug-01	C130E	37808T	OOMS	OBBI	1.8	0	0	0.0
22-Aug-01	C130E	37808T	OBBI	OOMS	3.4	6714	0	1.3

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ			OMFJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ																														
OBBI																							3.3							
OOMS																								1.3						
OOMA																														
OOTH																														
OKAS					1.2																									
OMAM																														
OTBD																														
OKAJ																														
OMFJ																														

Optimized Schedule:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Pallet Equivalents
22-Aug-01	C130E	37856T	OOMS	OMFJ	0.8	4.1
22-Aug-01	C130E	37856T	OMFJ	OBBI	1.5	2.7
22-Aug-01	C130E	37856T	OBBI	OMFJ	1.5	4.9
22-Aug-01	C130E	37856T	OMFJ	OOMS	0.8	1.3
			Crew Duty Day		9.9	
22-Aug-01	C130E	37808T	OOMS	OKAJ	2.6	1.7
22-Aug-01	C130E	37808T	OKAJ	OEKJ	1.5	0.0
22-Aug-01	C130E	37808T	OEKJ	OKAJ	1.5	1.7
22-Aug-01	C130E	37808T	OKAJ	OOMS	2.6	0.0
			Crew Duty Day		13.5	

August 23, 2001

Sorties Actually Flown:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Cargo Weight	PAXs	Pallet Equivalents
23-Aug-01	C130E	37857T	OOMS	OKAJ	2.7	0	0	0.0
23-Aug-01	C130E	37857T	OKAJ	OBBI	1.2	0	0	0.0
23-Aug-01	C130E	37857T	OBBI	OMFJ	1.4	0	0	0.0
23-Aug-01	C130E	37857T	OMFJ	OOMS	0.7	0	0	0.0
23-Aug-01	C130E	37856T	OOMS	OKAS	2.8	0	0	0.0
23-Aug-01	C130E	37856T	OKAS	OEKJ	1.5	4301	2	1.0
23-Aug-01	C130E	37856T	OEKJ	OBBI	2.1	0	0	0.0
23-Aug-01	C130E	37856T	OBBI	OOMS	2.	37	3	0.2

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ			OMFJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ																														
OBBI																														
OOMS																														
OOMA																														
OOTH																														
OKAS	1					1.2																								
OMAM																														
OTBD																														
OKAJ																														
OMFJ																														

Optimized Schedule:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Pallet Equivalents
23-Aug-01	C130E	37857T	OOMS	OTBD	1.8	1.3
23-Aug-01	C130E	37857T	OTBD	OBBI	0.6	0.0
23-Aug-01	C130E	37857T	OBBI	OTBD	0.6	3.5
23-Aug-01	C130E	37857T	OTBD	OOMS	1.8	0.2
			Crew Duty Day		10.1	

August 24, 2001

Sorties Actually Flown:

No sorties actually flown today.

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ			OMFJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ																														
OBBI																														
OOMS																														
OOMA																														
OOTH																														
OKAS																														
OMAM																														
OTBD																														
OKAJ																														
OMFJ																														

Optimized Schedule:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Pallet Equivalents
24-Aug-01	C130E	37857T	OOMS	OKAS	2.8	0.0
24-Aug-01	C130E	37857T	OKAS	OEKJ	1.5	2.2
24-Aug-01	C130E	37857T	OEKJ	OBBI	1.5	1.2
24-Aug-01	C130E	37857T	OBBI	OOMS	2.	0.0
			Crew Duty Day		13.1	

August 25, 2001

Sorties Actually Flown:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Cargo Weight	PAXs	Pallet Equivalents
25-Aug-01	C130E	37808T	OOMS	OMAM	1.	0	0	0.0
25-Aug-01	C130E	37808T	OMAM	OEKJ	2.5	0	0	0.0
25-Aug-01	C130E	37808T	OEKJ	OOMS	2.8	0	0	0.0
25-Aug-01	C130E	37856T	OOMS	OBBI	1.8	0	0	0.0
25-Aug-01	C130E	37856T	OBBI	OTBD	0.7	40	0	0.0
25-Aug-01	C130E	37856T	OTBD	OOMS	1.7	15710	0	3.0
25-Aug-01	C130E	37857T	OOMS	OKAS	2.8	0	0	0.0
25-Aug-01	C130E	37857T	OKAS	OKAJ	0.4	0	0	0.0
25-Aug-01	C130E	37857T	OKAJ	OBBI	1.1	0	0	0.0
25-Aug-01	C130E	37857T	OBBI	OOMS	2.	0	0	0.0

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ			OMFJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ																														
OBBI																														
OOMS																														
OOMA																														
OOTH																														
OKAS																														
OMAM																														
OTBD							3.0																							
OKAJ																														
OMFJ																														

Optimized Schedule:

No sorties would be scheduled for today.

August 26, 2001

Sorties Actually Flown:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Cargo Weight	PAXs	Pallet Equivalents
26-Aug-01	C130E	37856T	OOMS	OMFJ	2.6	12997	0	2.5
26-Aug-01	C130E	37856T	OMFJ	OBBI	1.5	8863	16	2.8
26-Aug-01	C130E	37856T	OBBI	OMFJ	1.6	12997	0	2.5
26-Aug-01	C130E	37856T	OMFJ	OBBI	1.	8863	16	2.8
26-Aug-01	C130E	37856T	OBBI	OOMS	2.	521	0	0.1
26-Aug-01	C130E	37808T	OOMS	OKAJ	2.7	0	0	0.0
26-Aug-01	C130E	37808T	OKAJ	OEKJ	1.5	0	0	0.0

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ			OMFJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ																														
OBBI							0.1																					2.5		
OOMS																												2.5		
OOMA																														
OOTH																														
OKAS																														
OMAM																														
OTBD								3.0																						
OKAJ																														
OMFJ				5.6																										

Optimized Schedule:

No sorties would be scheduled for today.

August 27, 2001

Sorties Actually Flown:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Cargo Weight	PAXs	Pallet Equivalents
27-Aug-01	C130E	37856T	OBBI	OKAJ	1.1	19	18	1.2
27-Aug-01	C130E	37808T	OEKJ	OKAJ	1.4	12274	0	2.4
27-Aug-01	C130E	37808T	OKAJ	OBBI	1.1	178	0	0.0
27-Aug-01	C130E	37808T	OBBI	OMAM	1.2	812	1	0.2
27-Aug-01	C130E	37808T	OMAM	OOMS	1.	0	0	0.0

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ			OMFJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ																									2.4					
OBBI								0.1											0.2						1.2				2.5	
OOMS																													2.5	
OOMA																														
OOTH																														
OKAS																														
OMAM																														
OTBD									3.0																					
OKAJ																														
OMFJ					5.6																									

Optimized Schedule:

No sorties would be scheduled for today.

August 28, 2001

Sorties Actually Flown:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Cargo Weight	PAXs	Pallet Equivalents
28-Aug-01	C130E	37857T	OOMS	OBBI	2.	0	0	0.0
28-Aug-01	C130E	37857T	OBBI	OKAS	1.2	0	6	0.4
28-Aug-01	C130E	37857T	OKAS	OTBD	1.9	3428	0	0.7
28-Aug-01	C130E	37857T	OTBD	OOMS	1.7	709	0	0.1
28-Aug-01	C130E	37839T	OOMS	OMAM	1.1	120	34	2.3
28-Aug-01	C130E	37839T	OMAM	OBBI	1.3	40	0	0.0
28-Aug-01	C130E	37839T	OBBI	OMAM	1.3	120	34	2.3
28-Aug-01	C130E	37839T	OMAM	OOMS	1.1	0	43	2.9

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ			OMFJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ																										2.4				
OBBI																0.4			2.3	0.2						1.2				
OOMS																			2.3											
OOMA																														
OOTH																														
OKAS																						0.7								
OMAM							2.9																							
OTBD																														
OKAJ																														
OMFJ						2.6																								

Optimized Schedule:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Pallet Equivalents
28-Aug-01	C130E	37857T	OOMS	OMFJ	2.6	5.5
28-Aug-01	C130E	37857T	OMFJ	OTBD	0.8	6.0
28-Aug-01	C130E	37857T	OTBD	OBBI	0.5	3.0
28-Aug-01	C130E	37857T	OBBI	OMFJ	1.0	2.6
28-Aug-01	C130E	37857T	OMFJ	OTBD	0.8	0.1
28-Aug-01	C130E	37857T	OTBD	OOMS	2.0	3.2
			Crew Duty Day		15.0	

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August 29, 2001

Sorties Actually Flown:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Cargo Weight	PAXs	Pallet Equivalents
29-Aug-01	C130E	37856T	OOMS	OTBD	1.5	12252	0	2.4
29-Aug-01	C130E	37856T	OTBD	OBBI	0.6	1968	0	0.4
29-Aug-01	C130E	37856T	OBBI	OTBD	0.5	12252	0	2.4
29-Aug-01	C130E	37856T	OTBD	OOMS	2.6	1090	0	0.2
29-Aug-01	C130E	37857T	OOMS	OOTH	1.8	0	0	0.0
29-Aug-01	C130E	37857T	OOTH	OOMA	1.5	0	0	0.0
29-Aug-01	C130E	37857T	OOMA	OOMS	1.	0	0	0.0

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ			OMFJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ																											2.4			
OBBI																	0.4					2.4					1.2			
OOMS																				2.3										
OOMA																														
OOTH																														
OKAS																							0.7							
OMAM																														
OTBD							0.2																							
OKAJ																														
OMFJ																														

Optimized Schedule:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Pallet Equivalents
29-Aug-01	C130E	37857T	OOMS	OMFJ	2.6	2.4
29-Aug-01	C130E	37857T	OMFJ	OTBD	0.8	5.0
29-Aug-01	C130E	37857T	OTBD	OBBI	0.5	3.0
29-Aug-01	C130E	37857T	OBBI	OMAM	1.3	2.6
29-Aug-01	C130E	37857T	OMAM	OOMS	1.5	2.5
			Crew Duty Day		13.0	

August 30, 2001

Sorties Actually Flown:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Cargo Weight	PAXs	Pallet Equivalents
30-Aug-01	C130E	37856T	OOMS	OMFJ	0.8	7469	0	1.4
30-Aug-01	C130E	37856T	OMFJ	OBBI	1.4	2601	0	0.5
30-Aug-01	C130E	37856T	OBBI	OMFJ	1.6	7469	0	1.4
30-Aug-01	C130E	37856T	OMFJ	OBBI	1.5	2601	0	0.5
30-Aug-01	C130E	37856T	OBBI	OOMS	1.1	108	0	0.0
30-Aug-01	C130E	37857T	OOMS	OKAS	2.6	0	16	1.1
30-Aug-01	C130E	37857T	OKAS	OEKJ	1.6	4041	0	0.8
30-Aug-01	C130E	37857T	OEKJ	OKAS	1.5	0	16	1.1
30-Aug-01	C130E	37857T	OKAS	OOMS	2.9	0	1	0.1

Cargo Backlog:

	OEKJ			OBBI			OOMS			OOMA			OOTH			OKAS			OMAM			OTBD			OKAJ			OMFJ		
Days in Delay	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
OEKJ																1.1														
OBBI																		0.4					2.4					1.4		
OOMS																1.1					2.3							1.4		
OOMA																														
OOTH																														
OKAS	0.8						0.1																	0.7						
OMAM																														
OTBD								0.2																						
OKAJ																														
OMFJ				1.0																										

Optimized Schedule:

Date	Mds	Tail Id	Dpt ICAO	Arr ICAO	FH	Pallet Equivalents
30-Aug-01	C130E	37856T	OOMS	OBBI	2.0	0.0
30-Aug-01	C130E	37856T	OBBI	OEKJ	2.0	1.2
30-Aug-01	C130E	37856T	OEKJ	OKAJ	1.5	3.6
30-Aug-01	C130E	37856T	OKAJ	OOMS	3.0	0.0
			Crew Duty Day		14.8	

Appendix C – Summary Table

August	Backlog				Sorties		Pallet Equivalents		Flight Hours		Cargo % Used	
	Total Daily Backlog	1 day	2 day	3 day	Scheduled	Optimized	Scheduled	Optimized	Scheduled	Optimized	Scheduled	Optimized
1	1.4	1.4	0	0	5	0	1.4	0	7.6	0	4.67%	N/A
2	2.5	1.1	1.4	0	2	0	1.1	0	5.7	0	9.17%	N/A
3	2.5	0	1.1	1.4	3	0	0	0	7.7	0	0.00%	N/A
4	1.1	0	0	1.1	12	5	6.8	8.3	18.8	7.5	9.44%	27.67%
5	1.8	1.8	0	0	8	5	10.6	11.9	13.1	9.2	22.08%	39.67%
6	9.2	7.4	1.8	0	9	0	7.4	0	14	0	13.70%	N/A
7	8.3	2.7	5.6	0	8	4	8.2	9.1	11.6	4.2	17.08%	37.92%
8	11.3	3	2.7	5.6	10	0	3	0	14.1	0	5.00%	N/A
9	12	6.9	2.8	2.3	7	5	6.9	5.8	12.8	9.4	16.43%	19.33%
10	7	0	6.9	0.1	0	5	0	5	0	7	N/A	16.67%
11	1.2	0	0	0.1	9	6	0	7.4	17	8.5	0.00%	20.56%
12	0.2	0.2	0	0	4	5	0.2	1.2	8.1	8.3	0.83%	4.00%
13	5.8	5.6	0.2	0	11	0	5.6	0	14.4	0	8.48%	N/A
14	7.1	1.3	5.6	0.2	8	0	1.3	0	11.6	0	2.71%	N/A
15	5.8	4.4	0.6	0.8	8	10	17.6	19.7	10.3	14.3	36.67%	32.83%
16	9.3	5.7	3.3	0.3	9	4	6.9	3.4	17.5	5.4	12.78%	14.17%
17	1.7	0	1.6	0.1	2	5	0	7.9	3.6	9	0.00%	26.33%
18	7.5	7.5	0	0	10	3	9.3	4.2	15	4	15.50%	23.33%
19	17.3	9.8	7.5	0	9	0	9.8	0	17.2	0	18.15%	N/A
20	13.3	2.7	9.8	0.8	10	4	7.7	11.8	14.9	4.6	12.83%	49.17%
21	16.9	4.5	2.6	8.4	12	4	6	5.1	17.7	6.8	8.33%	21.25%
22	5.8	0	4.5	1.3	6	8	1.3	16.4	12.4	12.8	3.61%	34.17%
23	2.2	1	0	1.2	8	4	1.2	5	14.4	4.8	2.50%	20.83%
24	0	0	0	0	0	4	0	3.4	0	7.8	N/A	14.17%
25	3	3	0	0	10	0	3	0	16.8	0	5.00%	N/A
26	13.7	10.7	3	0	7	0	10.6	0	12.9	0	25.24%	N/A
27	17.5	3.8	10.7	3	5	0	3.8	0	5.8	0	12.67%	N/A
28	15	8.6	3.8	0	8	6	8.6	20.4	11.6	7.7	17.92%	56.67%
29	9.6	2.6	3.4	3.6	7	5	5.3	15.5	9.5	6.7	12.62%	51.67%
30	12.9	6.9	2.6	3.4	9	4	6.9	4.8	15	8.5	12.78%	20.00%
Total					**216**	**96**	**150.5**	**166.3**	**351.1**	**146.5**		
Average	7.43	3.42	2.72	1.12	7.20	3.20	5.02	5.54	11.70	4.88	10.94%	27.92%

Pallet Equivalents/Flight Hour	
Sched	0.43
Opt	1.14

Appendix D – CAMPS Memorandum

20 Feb 2003

MEMORANDUM FOR HQ AMC/DORA/DOPC/SCPC
/DOR/DOP/SCP
IN TURN

FROM: CAMPS Functional Manager Support (FMS)

Subject: Trip Report on CAMPS Demo at AMWC Det 1

1. Purpose: The CAMPS FMS in conjunction with the CAMPS Program Manager (PM) and representatives from Northrop-Grumman IT visited the AMWC Det 1 on 4-5 Feb to demonstrate the CAMPS software destined for AMOS use, conduct a pre-delivery site survey, and introduce the Employment Mating and Ranging Planner (EMARP) component of the Combined Mating and Ranging Planning System (CMARPS). EMARP was demonstrated to tanker planners in response to a request to review "what's available for automated tanker planning." Attachment 1 contains the Det 1 coordinated comments on this trip report.

2. Unit Personnel Contacted:
   Lt Col David Meyer, AMWC Det 1/CC
   Maj Paul Richardson, Tanker Planner
   Maj Doyle Smith, Tanker Planner
   Maj Patrick Poon, Airlift Planner
   Maj Christopher Banks, Airlift Planner
   Maj Todd Whitlow, C2 Battle Laboratory
   MSgt Miguel Villanueva, Jr.
   SSgt Shawn Granger
   Mr William Rutter, 505th Ops Squadron

3. HQ AMC Visitors:
   Maj Robert Borja, HQ AMC/SCPC, CAMPS PM
   MSgt Mike Wilson, HQ AMC/DOPC
   Mr Devery Miller, CAMPS FMS (CHM)
   Mr Steve Soteropoulos, CAMPS Program Management Office (PMO) (CHM)
   Mr Tim Slater, CAMPS for AMOS Integration (DPSI)
   Mr Robert Hardy, CAMPS for AMOS Integration (DPSI)
   Mr Steve Safford, EMARP (NGIT)

Mr Jim Reed, CAMPS Training (NGIT)

4. The visit began with introductions and comments by Maj Paul Richardson on the recent 21 AF/CV email discussions concerning the problems facing tanker planners in the AOC using TBMCS tanker applications. The after actions report from Internal Look highlight the issue of meeting a compressed time schedule to produce a large number of tanker missions in TBMCS. Maj Smith presented slides of the TBMCS screens depicting where some of the problems are occurring.

a. Current Tanker Planners processes:

- Graphically depict the receiver requests into AR Track Groupings on paper worksheets
- Coordinate changes with Strike Package in order to coalesce "similar" AR requirements
- Match available tanker assets against those groupings on paper and then,
- Manually build each tanker mission in TBMCS for future "linking actions"
- Once linking actions begin in TBMCS, there is NO ability to correct linking errors without having to delete both receiver and tanker missions and then create each mission from scratch again
- Monitor decrement of fuel and assets from tanker bases in TBMCS as aircraft are allocated to tanker missions
- Complete planning actions within 6 hours (8hrs max) for 150-200 tanker sorties

b. The planners also made the following observations:

- Never enough terminals and time to meet ATO requirements (a chronic problem), especially without improved automation support
- Tanker planning features in TBMCS do not support an efficient or effective process for planners and they perceive little support to correct these deficiencies without large amounts of money, and a higher ranking in "must do" fixes overall
- They need a solution that allows them to extract receiver requests from TBMCS, match tankers to receivers, and then push the schedules back to TBMCS

c. Requested features for a tanker planning application:

- "Automate" the ability to electronically depict all AR Receiver requirements in a rainbow fashion where Events are grouped and then matched with available tanker resources. The rainbow needs to depict, by track and time, the type receiver aircraft, the air refueling control time (ARCT), and required tanker off-load.
- Capability, using a "drag and drop" feature, to match up the receiver(s) with a tanker, based upon known tanker bed down location, flight to the AR Track, time on station and return to base
- A way to flag missions that have on load requirements that are below minimal refueling requirements (the example provided was an F-14 that may require an on-load of only 1500 pounds of fuel)
- Insight into aircraft and aircrew "ute rates"

- The ability to toggle a track from “available” to “unavailable”, depending on the threat to tankers
- Communications with each Wing Operations Center obtains aircraft availability and any aircraft offload constraints for the ATO; but would want automated method for WOCs to pass this to tanker planners (not certain if TBMCS-UL is to do this in the future)
- Access Modes, Codes, Call-signs early in the process
- Provide method to visually check (rainbow) the whole picture (receiver linked with tankers and show carry over into next ATO cycle for tankers)
- Must dramatically improve the receiver to tanker link process

5. Mr Safford (NGIT) presented the EMARP demo by showing the information contained in the AR Receiver request to include combinations of strike packages associated with the active planset. Planners could see how receiver aircraft could be modified and adjusted from previously determined characteristics/performance for pre- and post-strike refueling. Creation of AR Tracks and no-fly areas were shown on graphic displays. Once the automated scheduler is executed, the planner has an ability to review several reports associated with overall schedule execution, tanker utilization, receiver/tanker fuel resources accounting, etc. Mr Miller requested the tanker planners view the “functionality” presented against current business processes and external/internal requests for information. The tanker planners clarified that they were not as inclined to jump right to a completely “computer automated” solution to building tanker schedules, but would prefer some kind of semi-automated capability whereby the planners could adjust the initial automated tanker schedule using planning factors for which the computer program has not accounted. However, they supported employing proofs of concept in large scale JCS CPX exercises. Such a semi-automated, or “Phase One”, approach would consist of the first two tanker planning application features requested above. Tanker planners were given documentation and slides on EMARP for further study. The exact fine-tuning of EMARP that the AMWC Det 1 tanker planners require before they will accept the system remains to be determined.

6. Maj Todd Whitlow, USAF C2 Battlelab presented the development of the Master Air Attack Plan (MAAP) toolkit that “mines” data from the TBMCS AODB and allows faster production of strike packages against targets. This application can create the AR Event request that is shown in TBMCS Theater Air Planner (TAP) for tanker mission linkage. MAAP tool kit originated from a GOTS software package called WEB TAS, and that TBMCS permitted the extraction and submission of the MAAP toolkit missions back to the database because these are “parent” records. Tanker mission records are considered “child” records at the present time. MAAP Toolkit is projected to be added to the TBMCS baseline in late FY 2004 or early FY 2005.

7. The lengthy timeline to incorporate within the TBMCS baseline an external system or new capability that provides warfighter-required functionality is a problem systemic to the TBMCS program. In addition, since tanker planning automation requirements carry a lower priority than CAF requirements for development of an improved tanker planning capability within TBMCS, an external system is the most expedient solution to support tanker planning requirements. However, the lack of a capability to exchange data

between TBMCS and external systems hamstrings the ability of the MAF to provide its critical inputs to the ATO. 3

8. The AMWC Det 1 tanker planners and CAMPS representatives discussed the likelihood of gaining access to the TBMCS data (AODB) by systems external to TBMCS. The MAF-CAF Working Group has taken up the issue of synchronization between the TBMCS and external MAF databases to gain visibility of MAF and CAF missions. The working group should add receiver-tanker data interoperability to the XML data transfer discussions.

9. Mr Jim Reed (NGIT) introduced the CAMPS for AMOS requirements and planning applications to the Detachment airlift planners.

- The Intra-theater Airlift Request System (ITARS): Introduced the web-based airlift request system as a theater application that captures airlift requirements from theater (joint) customers, are validated by Joint Movement Center (JMC) logisticians by priority, and submit approved requirements to the AMD planners for airlift mission planning in CAMPS.
- Next, the CAMPS software was demonstrated by taking that requirement and building the airlift mission and showing the CAMPS validation process to ensure guidance and directives are followed for aircraft, aircrew, and airfield restrictions.

10. Mr Devery Miller (FMS) briefed the airlift planners on the CAMPS for AMOS suite of applications being provided to the Detachment as a result of the JEFX 00 initiatives to provide automated planning tools for the Air Mobility Element and Air Mobility Division. Discussions continued on aspects of Det 1 Cadre training and integrating CAMPS into the formal courses by 1 Aug 2003. Formal accreditation is to begin in Jan 2004. Mr Reed continued the demonstration of the CAMPS Flowing Planning tools showing how TPFDD or individual ULN requirements are allocated to airlift missions with either the automated scheduler or the manual scheduler process.

11. The visit included CAMPS PMO discussions with Det 1 system administration support personnel to determine equipment, system, and support requirements. To summarize the results, Detachment personnel agreed to set up with the 16th Civil Engineering Squadron a power survey of Building 90061 to ensure sufficiency and availability of power before installing CAMPS hardware and software. To facilitate this survey, the CAMPS PMO will provide the AMWC Det 1 technical point of contact with a detailed equipment list that includes amperage of the items on the list.

12. Sufficient IP address space exists to accommodate CAMPS. For Det 1 IOC, CAMPS will operate only in the unclassified mode. Connectivity requirements for CAMPS beyond the LAN segment controlled by the AMWC Det 1 are being investigated. Should such requirements arise, the CAMPS PMO will seek a Certificate to Operate (CtO) from the AFSOC/SC CtO issuing authority. AMWC Det 1 personnel will control the training database for CAMPS. This database will be shared with the 615 and 621 AMOSs and the CAMPS developer at Scott AFB. HQ AMC/DORA/DOPC/SCPC will work with Detachment cadre to align delivery of CAMPS equipment and schedule “train the trainer” instruction within currently scheduled Detachment activities.

13. Summary:
- The HQ Staff emphasis being given this initiative to get CAMPS fielded to the Detachment and to the AMOS is greatly appreciated. All agreed to keep extra emphasis towards getting training and integration of the software by Aug 03.
- In the area of Formal Courseware development
    - The Det will work with HQ AMC/DOP on determining training proficiency levels
    - Confirmation of the CAMPS resources/manpower to support initiative
    - Focus the goal of getting CAMPS integrated into the Field Training Unit (FTU) by the start of the FTU Validation Course that begins in Aug 2003. This will require a classified CAMPS connection to the SIPRNET. Currently, Building 90061, which houses AMWC Det 1, does not have SIPRNET access, though it is planned for later this year.
    - Work with MSgt Dan Pello on TBMCS issues
- Appreciated the demo on current software coming with the CAMPS suite to include the tanker planning capability, but will continue the evaluation of its current functionality and what tanker planners prefer in a solution—and that is to stay within TBMCS or a single system to complete planning actions.

14. HQ AMC/DORA/DOPC/SCPC will publish additional action items to the CAMPS Fielding Plan to meet training, fielding, and resource setups at AMWC Det 1.

<Signed>
Devery S. Miller
CAMPS Functional Management Spt
HQ AMC/DORA

<Signed>
Steve Soteropoulos
CAMPS Fielding and Sustainment Manager
HQ AMC/SCPC

Attachment 1
AMWC Det 1/CC Comments on Trip Report, 17 March 2003

Cc: AMWC Det 1/CC
MAF-CAF Working Group

Attachment 1

AMWC AAR Attachment: 17 March 2003

1. Para 7: DOR needs to make fixing the TBMCS tanker autoplanner a priority. There is a lot of visibility in the shortcomings of tanker planning as stated above. Fixing TBMCS could be the most expedient if it had enough push. It is arguably the most appropriate system for autoplanning. Autoplanning exists in TBMCS because its need was identified during the development of TBMCS. The problem is that it was not programmed well enough to fulfill the requirements the tanker autoplanner needs to provide. (OPR Maj Brummett)

2. Para 9: ITARS is a great tool, but it needs buy-in from the theater J4 (JMC, theater logistics, ...) and the customers (Army, Navy, ...). If approved, who's going to train them? Who is going to establish policy at each theater? How is this going to be implemented and by whom? Who will develop, implement and enforce the process? I continue to ask how is standardization and continuity going to happen? This is not only a MAF issue or a command-to-command issue, it's a service to service issue. I think TRANSCOM is the right agency to sell this to the rest of the world. (OPR MSgt Villanueva)

3. Para 10: When the FTU development issue was brought up, SMSgt Wilson stated he would like for CAMPS for AMOS to be taught in the August 03 class. I told him this would be very difficult because we were already in the courseware development phase of the FTU and C2IPS and GDSS were the systems identified. I indicated that once the systems were in place and our instructors were trained, we would need at least 6 months for courseware development and implementation. The contractors stated it would take them 2 weeks to teach us the systems once they were here. I indicated they needed to get with Det 1 and setup an installation date ASAP. I also indicated that our calendar is filling up fast with FTU and other commitments and they needed to establish a date of installation and instruction soon. (OPR MSgt Villanueva)

4. Para 10: AMWC Det 1: Between 21 Feb and 31 Jul, the Det is scheduled to teach more than 15 formal courses. In addition to these courses, the Det is preparing for the upcoming FTU. This workload, coupled with support for real-world taskings, has greatly reduced the Det's availability to take on the integration of a new C2 system such as CAMPS. Recommend CAMPS be fielded at the Det in FY03 with implementation into the FTU in 4th quarter of FY04. Additional time is needed for the Det instructors to fully prepare FTU lesson plans and an overall AOC integration plan. (OPR Maj Murphey)

5. Para 13: August 03 is referenced several times in this report. Before AMWC will teach CAMPS, it will have to be officially incorporated into the AMD. Using proper Instructional Systems Design, developing courseware by Aug 03 may be unattainable. The Det does not have a

timeframe in mind of when CAMPS should be installed at Hurlburt, or when training should begin. (OPR Maj Murphey)

6. POC for further CAMPS discussions will be Maj Poon or MSgt Villanueva. You can contact them at DSN 579-5510 or email Patrick.poon@hurlburt.af.mil or Miguel.Villanueva@hurlburt.af.mil

<SIGNED>
DAVID L. MEYER Lt Col USAF
AMWC Det 1/CC

Abbreviations

AFIT	Air Force Institute of Technology
ALCC	Airlift Control Center
AMC	Air Mobility Command
AMD	Air Mobility Division
AME	Air Mobility Element
AMOCC	Air Mobility Operations Control Center
AMWC	Air Mobility Warfare Center
AOC	Air Operations Center
AOR	Area of Responsibility
APOD	Aerial Port of Debarkation
APOE	Aerial Port of Embarkation
ATO	Air Tasking Order
AU	Air University
C2	Command and Control
COMALF	Commander of Airlift Forces
CDD	Crew Duty Day
DCAMPS	Deployed Consolidated Air Mobility Planning System
DIRMOBFOR	Director of Mobility Forces
DTIC	Defense Technical Information Center
FOL	Forward Operating Location
JAOC	Joint Air Operations Center
JFACC	Joint Forces Air Component Commander
JMC	Joint Movement Center
MAC	Military Airlift Command
MATS	Military Air Transport Service
OEF	Operation ENDURING FREEDOM
POD	Port of Debarkation
POE	Port of Embarkation
STAR	Standard Theater Airlift Routes
TDMC	Theater Distribution Management Center
TPFDD	Time Phased Force Deployment Database
TRANSCOM	United States Transportation Command
USA	United States Army
USAF	United States Air Force
USCENTCOM	United States Central Command
USEUCOM	United States European Command

Glossary

Command and Control (C2)-

The exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. (JP 1-02, 2001:80)

Channel airlift-

Common user airlift service provided on a scheduled basis between two points. There are two types of channel airlift. A requirements channel serves two or more points on a scheduled basis depending upon the volume of traffic; a frequency channel is time-based and serves two or more points at regular intervals. (JP 1-02, 2001:65)

Director of Mobility Forces (DIRMOBFOR)-

Normally a senior officer who is familiar with the area of responsibility or joint operations area and possesses an extensive background in airlift operations. (JP 1-02, 2001:128)

Forward Operating Base (FOB)-

An airfield used to support tactical operations without establishing full support facilities. The base may be used for an extended time period. (JP 1-02, 2001:169)

Joint Air Operations Center (JAOC)-

A jointly staffed facility established for planning, directing, and executing joint air operations in support of the joint force commander's operation or campaign objectives. (JP 1-02, 2001:220)

Joint Movement Center (JMC)-

The center established to coordinate the employment of all means of transportation (including that provided by allies or host nations) to support the concept of operations. (JP 1-02, 2001:226)

Theater airlift-

That airlift assigned or attached to a combatant commander other than Commander in Chief, US Transportation Command, that provides air movement and delivery of personnel and equipment directly into objective areas through air landing, airdrop, extraction, or other delivery techniques; and the air logistic support of all theater forces, including those engaged in combat operations, to meet specific theater objectives and requirements. (JP 1-02, 2001:429)

Theater distribution-

The flow of personnel, equipment, and materiel within theater to meet the geographic combatant commander's missions. (JP 1-02, 2001:430)

Theater distribution management-

The function of optimizing the distribution networks to achieve the effective and efficient flow of personnel, equipment, and materiel to meet the combatant commander's requirements.. (JP 1-02, 2001:430)

Time-Phased Force and Deployment Data (TPFDD)-

The Joint Operation Planning and Execution System database portion of an operation plan; it contains time-phased force data, non-unit-related cargo and personnel data, and movement data for the operation plan, including the following; a. In-place units; b. Units to be deployed to support the operation plan with a priority indicating the desired sequence for their arrival at the port of debarkation; c. Routing of forces to be deployed; d. Movement data associated with deploying forces; e. Estimates of non-unit-related cargo and personnel movements to be conducted concurrently with the deployment of forces; and f. Estimate of transportation requirements that must be fulfilled by common-user lift resources as well as those requirements that can be fulfilled by assigned or attached transportation resources. (JP 1-02, 2001:432

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14. ABSTRACT
This paper will concentrate on the scheduling of theater airlift in the USCENTCOM AOR. In particular, this paper looks at the scheduling of C-130 missions during the month of August, 2001 and compares the actual missions flown to an optimized schedule. Then the number of sorties flown, flight hours, and cargo moved to accomplish the required airlift is compared in each of the two cases. The results show a greater than 50% reduction in sorties and flight hours with the same level of service and amount of cargo moved. The barriers to the implementation of an optimized schedule such as country clearances, intratheater cargo visibility, current doctrine, and user demands are also discussed with their respective solutions.

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