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Measuring the Effect of RFID Technology on Movement of U.S. Army Resupply Cargo

Leigh E. Method

MEASURING THE EFFECT OF RFID TECHNOLOGY ON MOVEMENT OF U.S. ARMY RESUPPLY CARGO

THESIS

Leigh E. Method
Captain, USAF

AFIT/GTM/LA/98S-6

DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY
AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

AFIT/GTM/LA/98S-6

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THESIS

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Leigh E. Method

Captain, USAF

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Abstract

This research is an analysis of the effect that the added in-transit visibility (ITV) associated with applying Radio Frequency Identification (RFID) technology to Army resupply cargo makes on total cycle time (from entry into to exit from the system) within the Air Mobility Command (AMC) portion of the Defense Transportation System. Although information technology applications are known to contribute to ITV, there has been no attempt to quantify it despite a perception held by at least part of the DoD community that ITV initiatives will reduce logistics response time by improving cycle time. This study was aimed at quantifying RFID technology's contribution to cycle time by comparing a set of RFID-tagged shipments to a set of non-RFID-tagged shipments moving into the Bosnia-Herzegovina theater of operations. Although there are agencies looking at worldwide implementation of this system, the system under study is currently the only one of its kind. The major finding of this research is that RFID-tagged shipments actually took longer to move through the AMC system. Port Hold Time at the point of embarkation was 2 to 2.5 times longer for RFID-tagged shipments and had a total possession time 19 percent longer than non-RFID-tagged shipments.

MEASURING THE EFFECT OF RFID TECHNOLOGY ON MOVEMENT OF U.S. ARMY RESUPPLY CARGO

I. Introduction

Chapter Overview

From the moment a military unit places a requisition for parts or supplies into the supply system, two things about the shipment--the status and expected arrival date--are of interest to the end user. With the proliferation of computers, information systems, the Internet, and information technology applications such as bar code readers, the visibility of this information is now possible. A powerful way for customers to gain logistics information on their requisitions currently exists on the World Wide Web--the Global Transportation Network (GTN). Now an end user of an expected part or resupply item, located in an austere environment with only a laptop, can *uplink* or connect with an orbiting satellite and connect to the Internet and the GTN website. Once connected, the GTN website provides detailed status and movement information as a shipment moves through the Defense Transportation System (DTS). This is the idea of in-transit visibility (ITV)--visibility of an item, person, or unit en route from origin to destination.

As the Department of Defense (DoD) Executive Agent for ITV, the United States Transportation Command (USTRANSCOM) is taking the idea of in-transit visibility one step further. The U.S. Army is moving cargo through the DTS from the Defense Depot at New Cumberland, Pennsylvania, to the Bosnia-Herzegovina theater of operations using

Radio Frequency Identification (RFID) technology. RFID technology involves a series of electronic tags (attached to the desired item and containing shipping/content information), interrogators (located at key nodes along the route of travel), and a computer-based system to collect the movement information. Shipping information is recorded on the tag at the shipment's origin and may be read by stationary or handheld interrogators using radio frequency energy to activate the tags and transmit information. Once identified by an interrogator, a date and time stamp is recorded and uploaded to an Internet server and a hosted website where it is added to previously collected information.

This research is an analysis of the effect that the added in-transit visibility associated with applying Radio Frequency Identification (RFID) technology to resupply cargo can make on total transit time within the Air Mobility Command (AMC) portion of the DTS. This chapter provides an overview of the issue of ITV, Internet and information technology (IT) applications for cargo movement and tracking, and the systems and standards involved in providing ITV. A background of the issues, the problem statement, research questions, and general methodology is presented along with the scope and limitations of this study. [NOTE: A collection of key definitions is provided at Appendix E and a glossary of acronyms is provided at Appendix F.]

General Issue

In-transit visibility (ITV) is defined by USTRANSCOM as the "ability to track the identity, status, and location of...cargo and passengers...from origin to the consignee or destination...during peace, contingencies, and war" (DoD, 1995:B-1). ITV of resupply (sustainment) material for forward-operating units is one of the most frustrating

problems for logisticians in the field. A significant problem logisticians had to wrestle with during Desert Shield/Desert Storm (DS/DS) was the inability to effectively deal with the arrival of thousands of shipping containers with little or no idea about what was in them. In fact, during DS/DS, approximately 50 percent of the 40,000 containers of military material entering the theater had to be opened, inventoried, and reinserted into the transportation system because military personnel did not know their contents (DoD, 1995:iii). The Center for Army Lessons Learned cited three main reasons for these accountability and visibility problems. Specifically, containers packed at United States depots did not have an adequate description of container contents, they arrived in Southwest Asia faster than the logistics system could process them, and there were no procedures to document arriving containers designated for specific units (GAO, 1992:12).

Recently, the DoD, through U.S. Army Europe (USAREUR) developed a transportation pipeline that uses RFID technology to track supplies from the Defense Depot at New Cumberland, Pennsylvania, to Taszar, Hungary, and Tuzla, Bosnia in support of OPERATION JOINT ENDEAVOR (OJE) and OPERATION JOINT GUARD (OJG) (Figure 1). These containerized or palletized shipments are tracked by attaching RFID tags to the cargo. These tags provide information to a system of interrogators stationed along the route of travel that transmit information through a portable control system into a database. Individual users are able to query this system via an Internet website.

Although the implementation of various IT applications are known to contribute to ITV, there has been no attempt to quantify the contribution these technologies make in terms of shipment cycle time between the requisition source and the end user. Since

there is some perception in the DoD community that "ongoing transportation initiatives, such as ITV, will (result in)...reducing logistics response time by improving transit times" (DoD, 1996a), this study was aimed at comparing the movement of a set of RFID-tagged shipments to a set of non-RFID-tagged shipments as well as a set of DoD standards for timely movement in an attempt to examine RFID technology's contribution to ITV and cycle time.

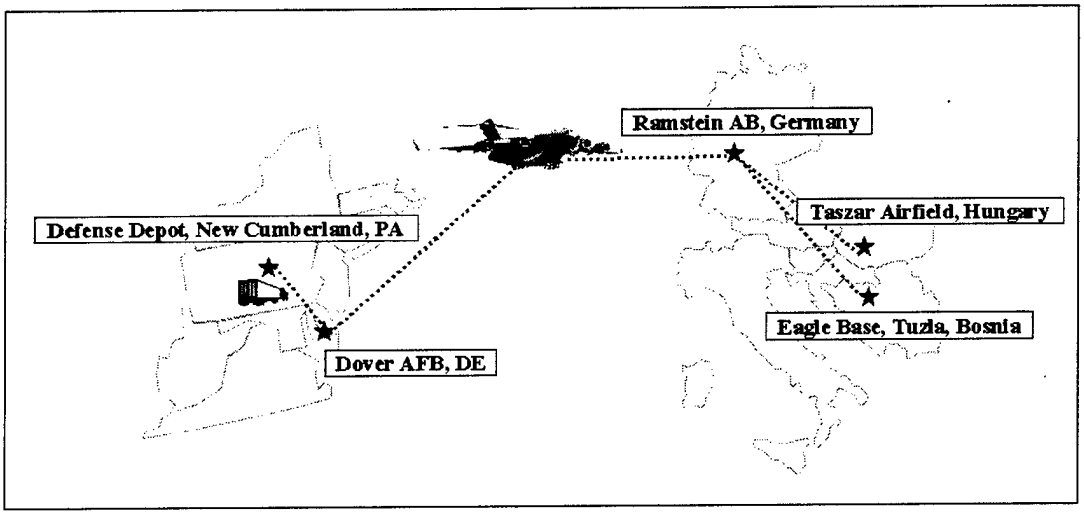

Figure 1 - Routing of Army RFID-tagged Shipments

Supply Chain

The supply chain represents the process of moving an item--material or information--from its requisition source to the customer. The number and type of activities making up the supply chain differ based on the item being moved and the origin and destination of the item. Supply chains can be contained within a single organization or spread around the globe across multiple organizations (Franciose, 1995:6). A seamless

supply chain is where movement of an item between activities is transparent to the customer and consists of a series of well-connected relationships (Figure 2). In a traditional supply chain, movement of a shipment is a sloppy process of staging the item at one activity, scheduling it for movement to the next activity, and repeating the process until it reaches the customer. Conversely, a seamless supply chain creates a free-flowing pipeline for the item to move from its source to its destination. The DoD's version of a seamless supply chain is *Total Asset Visibility (TAV)*.

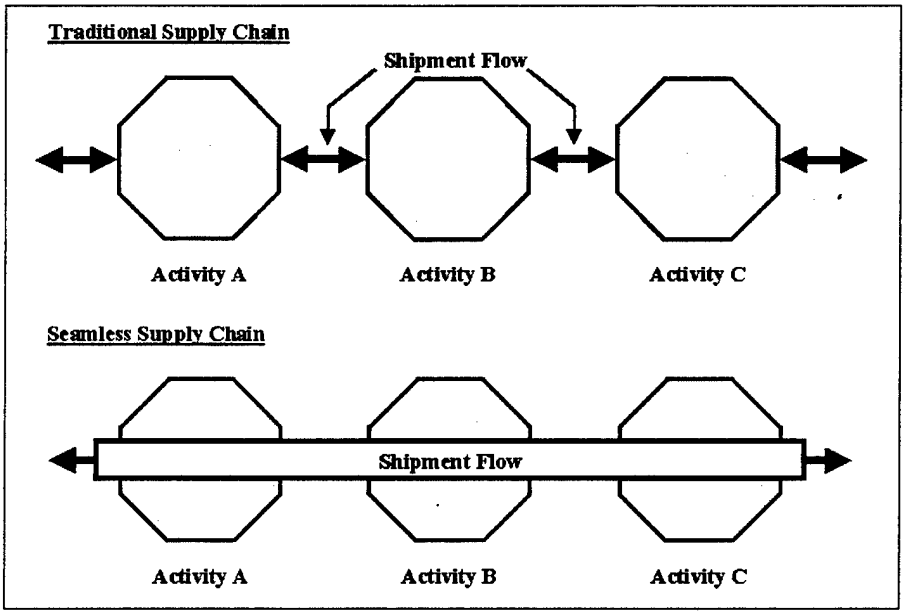

Figure 2 - Traditional versus Seamless Supply Chain
(Adapted from Francoise, 1995)

Total Asset Visibility (TAV) and In-Transit Visibility (ITV)

During DS/DS, units awaiting supplies had only a limited ability to trace their shipments. Concluding this situation was unacceptable, the DoD developed a *Total Asset Visibility Plan* that identified three categories of assets (in-storage, in-transit, and in-

process). Visibility over the status and location of these assets is known as Total Asset Visibility (TAV) (Figure 3). The advent of the Army Total Asset Visibility (ATAV) and, subsequently, Joint Total Asset Visibility (JTAV), provided a forum for testing emerging technologies such as RFID.

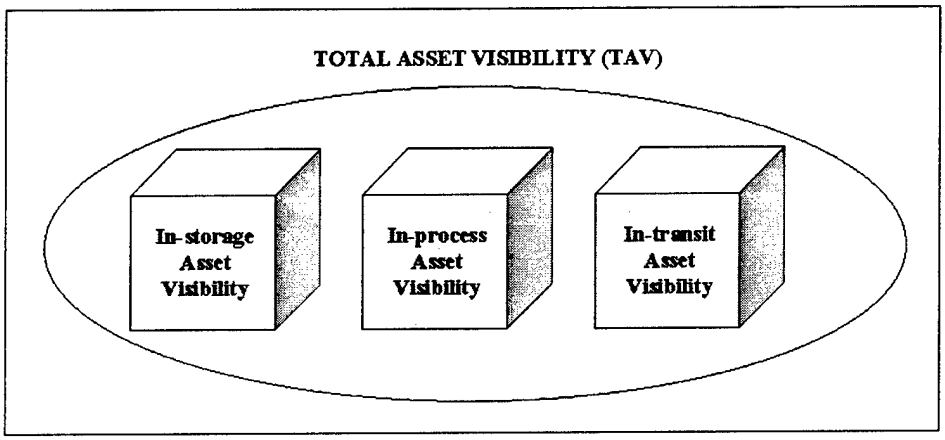

Figure 3 - Components of Total Asset Visibility (TAV)

As a result of DS/DS, Total Asset Visibility (TAV) was born--focusing on "wholesale and transportation logistics" (NDTA, 1994:4-3). The DoD defines TAV as

> the capability that permits operational and logistics managers to determine and act on timely and accurate information about the location, quantity, condition, movement, and status of Defense material. It includes assets that are in-storage, in-process, and in-transit. (DoD, 1995:B-3)

Another common definition used by the DoD states that TAV is

> the ability to gather information from DoD systems on the identification, quantity, condition, location, movement, and status of materiel, units, personnel, equipment, and supplies anywhere in the logistics system at any time, and to apply that information to improve logistics processes. (DoD, 1997)

One of the lessons from DS/DS was that significant benefits from implementing in-transit visibility (ITV) may be gained in the area of resupply cargo. According to the DoD, however, multiple application systems, millions of resupply cargo shipments every year on all modes of transportation, one-third of all shipments originating with commercial vendors, and documentation "using a variety of standard and non-standard formats" present significant implementation challenges (DoD, 1995:vii). Several requirements were identified for ITV of resupply cargo to include identification of a single lead agency, meet a variety of transportation scenarios, create a "seamless interface between strategic and theater transportation movement systems," and possess "common and interchangeable data elements" (DoD, 1995:3-23).

Air Force Doctrine Document (AFDD) 40 describes seven logistics concepts meant to guide Air Force leaders in creating and sustaining our military power. They are pipeline security; total asset visibility; training, education, and exercises; interoperability; availability; transition to and from war; and host nation support. The TAV concept views logistics as an integrated process that enables precisely locating and resolving logistics problems while "knowing with confidence where parts or supplies are located, or when and how they will arrive" in order to meet operational requirements (DAF, 1994:9).

A recent Government Accounting Office (GAO) Report was critical of the federal government's inability to "properly account for and report billions of dollars of property, equipment, materials, and supplies" (GAO, 1998). The report notes that "certain recorded military property had, in fact, been sold or disposed of in prior years--or could not be located--and an estimated $9 billion of known military operating materials and supplies were not reported" (GAO, 1998). The report also criticizes the Pentagon for

being uncertain about how much inventory was in-transit because current information systems in place do not collect that sort of information (Malone, 1998:11A). Furthermore, incomplete or inaccurate information hampers the government's ability to "prevent unnecessary storage and maintenance costs or purchase of assets already on hand" (GAO, 1998).

The size of this problem goes beyond costs. In fact, an estimated 100,000 Military Traffic Management Command (MTMC) containers and 30,000 Army/Air Force Exchange Service (AAFES) containers move every year. In addition, the Defense Logistics Agency (DLA) moves over 1.9 million shipments per year (NDTA, 1994:5-14). Since the logical way to capture the necessary information about these movements is to gather the data at the source and update it as the cargo processes through each node of the transportation system (Miller, 1996:2), USTRANSCOM embarked on an aggressive program of ITV study and development in 1994 "aimed at focusing energy, attention, and resources toward obtaining an ITV capability for the DoD" (Wolford, 1996:6).

Several significant DoD publications have highlighted the need for effective ITV. Joint Vision 2010, a conceptual template for the development of the U.S. Armed Forces, discusses four new operational concepts: dominant maneuver, precision engagement, full dimensional protection, and focused logistics (JCS, 1995:19). In order to optimize the other three concepts, focused logistics must integrate "information, logistics, and transportation technologies to provide rapid crisis response, to track and shift assets even while en route, and to deliver tailored logistics packages and sustainment directly at the strategic, operational, and tactical level of operations" (JCS, 1995:24). The 1998 Air Mobility Master Plan (AMMP) considers achieving ITV the "single most challenging

task" of USTRANSCOM (DAF, 1997a:4-48) and one of AMC's top five modernization priorities (DAF, 1997a:iii).

In the 1996 Annual Report to the President and the Congress, the Office of the Secretary of Defense (OSD) identified "visibility of material in storage and transit and rapidly transporting stocks between theaters" as essential to the National Security Strategy of winning "two nearly simultaneous major regional conflicts" (DoD, 1996a). Furthermore, TAV would enable managers to "offset wholesale procurements with excess retail assets...increase user confidence, reduce duplicate requisitions, and expose supply and transportation system bottlenecks" (DoD, 1996a). The 1998 DoD Logistics Strategic Plan reiterates this through the objective of "full fielding of identified TAV capabilities"--targeting 90 percent implementation by February 2000 with 100 percent capability by February 2004 (DoD, 1998a).

The DoD addressed several ITV system requirements (Table 1) along with nine key considerations. Among these is a need for better data quality and timeliness achieved through new and simplified transportation regulations and policies; compliance with those regulations and policies; and the development of data standards (DoD, 1995:2-5). Also, a joint theater transportation system

> capable of processing shipment information received from port systems; tracking containers and pallets; reading automatic identification technology (AIT) and other devices; interfacing with GTN; and generating documentation for deploying and redeploying unit cargo and personnel, and for retrograde cargo. It should also provide information for intratheater movements. Finally, it should be capable of being deployed in any theater and developed using standard data elements. (DoD, 1995:2-7)

Another need is a system migration strategy to decrease the number of defense transportation systems and the corresponding number of system interfaces required to

support ITV (DoD, 1995:2-8). Finally, an AIT approach using devices that "provide supply content information for receipt and inventory management, and facilitate the collection of transportation information at key nodes for movement, staging, and diversion decisions" (DoD, 1995:2-10) is required. These considerations, along with securing funding and ensuring the support of existing systems while migrating to new ones, represent the necessary elements for effective Total Asset Visibility.

Table 1 - DoD Requirements for an ITV System (DoD, 1995:2-1)

1. Track personnel movements
2. Identify shipment contents
3. Determine shipment locations
4. Track requisitions and items
5. Track unit movements
6. Identify, reconstitute, and divert shipments
7. Provide visibility from origin to destination
8. Provide a seamless transition from peace to war
9. Link with operations and logistics communities

Internet and Information Technology (IT)

The private-sector logistics industry has always been very competitive and the use of the Internet for IT applications is a way many companies in the commercial sector are competing. Deregulation of the transportation industry in the 1970s and 1980s opened up the commercial industry for investment in emerging technologies as a way to achieve market dominance. Past desire to manage shipment information and achieve visibility over the entire supply chain is now a necessity. Emerging information technologies such as RFID, bar-coding, electronic data interchange, electronic commerce, and the Internet

are some of the means firms have to compete in an increasingly information-based marketplace.

The Internet provides a host of utilities for gathering and communicating information about a shipment. Some of these utilities are electronic mail, *listservs* (electronic discussion groups), and the World Wide Web (WWW). Indeed, the "Internet is really the sixth form of transportation" (Currie, 1998:91). Using the Internet, government and businesses can conduct their operations faster, cheaper, and easier over the traditional forms of telephone calls, mail, and express delivery.

The availability of storage and transit information is made possible through a variety of IT applications. Powerful information technologies exist to provide any type of asset visibility desired as well as provide it in real-time. Shippers, carriers, and customers now have the ability to track the movement of their shipments as well as know the exact contents of the box or container. This makes the idea of the seamless supply chain possible.

The Internet is linking these information technologies together to provide visibility over the entire supply chain and a comprehensive picture to decision-makers. Some commercial logistics firms are finding that Internet-based IT applications provide an opportunity to reach out to customers around the world as part of a "globalization strategy" (Grant, 1997:160). It also appears to influence a firm's "logistics competence" (Closs and others, 1997:14). The DoD should be able to reap the benefits of IT in both reduced inventories and the ability to centralize decision-making.

The Internet is providing a robust platform for the individual seeking out the information desired while being relatively inexpensive (Cooke, 1996:53S). RFID and

satellite tracking are two technologies that are being *web-enabled* (linked to the Internet) to provide managers real-time shipping information. This information, in turn, allows for rapid decision-making when alternatives are needed.

Commercial Sector Use of Internet and ITV

Use of the Internet and IT applications have exploded in the commercial sector for logistics functions--in some cases, information is more important than the shipment itself.

> The explosion of Internet technologies, aided and abetted by the booming U.S. economy, has coincided with growing demand for (travel and) is forcing fundamental changes in the nature of the transportation business, and IT is the center of those changes. (Wilder, 1997)

Not surprisingly, customers want fast material delivery and information on-demand about their shipments. In turn, this makes the use of IT for logistics companies "more strategic and critical than ever" (Wilder, 1997).

One of the first in the Internet-based, shipment-tracking business was FedEx. FedEx launched its Internet homepage [http://www.fedex.com/] in November 1994, and connected to millions of potential customers. Then, in 1996, it introduced *interNetShip*^{SM} and the first automated shipping transaction available on the Internet (FedEx, 1997b:25). This software allows customers to complete electronic airbills, print shipping labels, request courier pickups, and e-mail shipment status to other parties (FedEx, 1997a:9). Other web-based tracking software touts instant location and estimated time of arrival information (WebTrak, 1998).

Although costs of individual IT applications are continuing to decline, it requires an enormous amount of investment. For instance, FedEx and United Parcel Service are

committed to spending more than $1 billion a year on IT – almost one-tenth of their total revenue (Wilder, 1997). These costs may be mitigated, however, by the "continued decreases in the price of technology" (Murphy, 1995:35) and the capital that is "freed up for more productive uses" (Lappin, 1996).

Continual advancements in IT now allow the end user to track cargo and passengers throughout the DTS. Information technology applications directly support the concept of focused logistics (as presented in Joint Vision 2010) by providing the quantity and quality of information necessary for decision making and reducing the DoD's logistics tail (Shalikashvili, 1996:17). One of these technologies is Radio Frequency Identification (RFID).

Radio Frequency Identification (RFID)

RFID is one form of IT in use by the DoD. It is the concept of "automatically identifying, categorizing, and locating people and assets over relatively short distances (a few inches to hundreds of feet)" (DAF, 1997b). Assets are *tagged* with a *transponder* containing information about the item of interest, and depending on the type of tag, various *read* and *write* capabilities are possible. The transponder communicates with an *interrogator* using radio frequency (RF) energy and the interrogators are linked to provide seamless coverage for a given system--or supply chain.

RFID tags are being used on vehicles, trucks, and other materials handling equipment in order to track their location, weigh them, or even to debit the owner's account when it passes a toll booth. RF technology can also provide drivers with new instructions and priorities on a real-time basis. This, in turn, increases flexibility and

responsiveness. It should be noted that RFID is not meant as a replacement for bar codes; rather, it is meant to complement bar coding technology (Scaling, 1998:59). Logistics functions and firms are using this IT to reroute shipments while in-transit in order to meet customer needs faster. The ability of the Internet to provide quick, accurate data transmission is increasing the overall efficiency of the entire pipeline because managers are receiving better information for decision making and it allows simultaneous access to everyone in the distribution channel (Wooley, 1997:58). Integration of RFID and satellite technology with the capabilities of the Internet makes it possible to relay extensive shipment information such as location, contents, and shipping data (e.g., origin, destination, and priority).

Defense Transportation System (DTS)

> The Defense Transportation System is
>
> that portion of a nation's transportation infrastructure that supports DoD transportation needs in peace and war. The DTS consists of those common-user military and commercial assets, services, and systems organic to, contracted by, or controlled by the DoD. (DoD, 1987:A-3)

AMC functions as the Department of Defense's primary source of cargo airlift. The AMC system is set up on a hub-and-spoke concept. Airlift of cargo and passengers occurs via a series of regularly scheduled (frequency channel) missions or on an *as needed* (requirements channel) basis. AMC's airlift hub system consists of several aerial ports linked by these channel missions to collect cargo from spoke locations and forward it to the end user. AMC's five major aerial ports in the Continental United States (CONUS) are at Charleston AFB, South Carolina; Dover AFB, Delaware; McChord AFB, Washington; McGuire AFB, Delaware; and Travis AFB, California.

Information System Descriptions

There are numerous DoD logistics and transportation systems in place to provide information on a requisition. Three of these systems are used in this research--the Global Air Transportation and Execution System (GATES), Global Transportation Network (GTN), and Logistics On-Line Tracking System (LOTS).

Global Air Transportation and Execution System (GATES). GATES is a migration system designed to consolidate five legacy systems into one program, while interfacing with other migration systems. As one of 23 USTRANSCOM migration systems, GATES provides "oversight of worldwide cargo movement" for the airlift portion of the DTS (AMC CSS, 1998).

Global Transportation Network (GTN). GTN was developed as the main focus of the "DoD transportation enterprise" (Begert, 1996:6) and the "centerpiece of DoD's ITV efforts" (DoD, 1995:v). The system is a database of information accessible via the Internet and is compiled from literally dozens of different DoD (and commercial) systems. The USTRANSCOM developed GTN "to provide ITV over air and surface shipments moving between ports of embarkation and debarkation (POEs and PODs)" (DoD, 1995:iv). GTN provides a "seamless, real-time capability to access--and employ--both classified and unclassified transportation and deployment information" (USTRANSCOM, 1998).

The GTN ITV website [http://www.gtn.transcom.mil/], divides queries into six categories; passengers, cargo, forces (military units), airlift schedules, reference tables, and requisition queries. The system is intended as the integrated transportation portion of the Global Command and Control System (GCCS) and will be DoD's "comprehensive

data base of in-transit shipment information, including all military, government, and vendor documented shipments" (DoD, 1995:v). As an illustration of its size and responsiveness, the ITV capability in GTN was launched in August 1997 and has a data warehouse of over 43 gigabytes with 80 percent of the information received from the various systems posted within 5 minutes of receipt (Honor, 1997:42).

Logistics On-Line Tracking System (LOTS). LOTS is an on-line automated information system designed for processing and storing logistics data to provide TAV about DoD and civilian agency requisitions and related data (DAASC, 1998a).

Uniform Material Movement and Issue Priority System (UMMIPS)

The DoD, through the Defense Logistics Agency (DLA), uses a system of requisition priorities to establish movement standards for all DoD cargo. The UMMIPS time standards are "the maximum amount of time that should elapse during any given pipeline segment for items that are in stock" (DoD, 1998b:AP8.1). The system recognizes the priorities used by both transportation and supply. UMMIPS serves as the "system for allocating resources among competing demands. It shall be used during peacetime and war" (DoD, 1998b:C5.6.1). In May 1998, the Under Secretary of Defense for Acquisition and Technology authorized a new set of UMMIPS time standards (Table 2) as part of the new DoD Materiel Management Regulation, DoD 4140.1-R. [NOTE: Since this study will focus on high-priority cargo, only UMMIPS time standards for transportation priority one (TP1) cargo are provided.] The new standards decreased the maximum time allowed for movement of a shipment as well as redefined the different areas for airlift.

Table 2 - UMMIPS Time Standards for Transportation Priority 1 (TP1) Shipments
(Adapted from DoD 4140.1-R, May 1998)

	AREA[1]					
PIPELINE SEGMENT	CONUS	A	B	C	D	EXP
A. Requisition Submission Time	.5	.5	.5	.5	.5	.5
B. ICP Processing Time	.5	.5	.5	.5	.5	.5
C. Storage Site (or Base) Processing, Packaging and Transportation Hold Time	1	1	1	1	1	1
D. Storage Site to CCP[2] Transportation Time	N/A	1	1	1	1	N/A
E. CCP Processing Time	N/A	.5	.5	.5	1	N/A
F. CONUS[3] In-Transit Time	1	1	1	1	1	N/A
G. POE[4] Processing and Hold Time	N/A	1	1	1	2	N/A
H. In-transit to Theater Time	N/A	1	1	1	1.5	3
I. POD[5] Processing Time	N/A	.5	.5	.5	1	N/A
J. In-Transit, Within-Theater time	N/A	1	1	1	1	1
K. Receipt Take-Up Time	.5	.5	.5	.5	.5	.5
Total Order-to-Receipt Time	3.5	8.5	8.5	8.5	11	6.5

NOTE: All times are in calendar days.

[1]Area refers to "the geographic area (of the activity originating the order)."

Area A - Alaska, Hawaii, North Atlantic, Caribbean, and Central America

Area B - United Kingdom, Northern Europe, and Portugal (Azores)

Area C - Japan, Korea, Guam, Western Mediterranean, and Italy

Area D - Hard lift areas - all other destinations not listed as determined by U.S. Transportation Command. The time standards for port of debarkation (POD) for Area D are lower than the other areas.

EXP - Express service is only for commercial air shipments that are transportation priority 1 with a maximum weight of 150 pounds and an RDD of 999, 777, N__, or E__.

Required Delivery Date (RDD) of 999, N__, or E__ (where "__" is any alphanumeric character) indicates an expedited handling requirement for Non-Mission-Capable-Supply (NMCS) overseas customers or CONUS customers deploying within 30 days.

[2]A Consolidation/Containerization Point (CCP) either consolidates shipments on an air pallet or containerizes shipments in a SEAVAN for transportation to overseas areas.

[3]CONUS is Continental United States

[4]POE is Port of Embarkation

[5]POD is Port of Debarkation

Problem Statement

The purpose of this research is to investigate the Army's use of Internet-based RFID technology for ITV and determine whether there is a difference in cycle time for resources moving through the AMC portion of the DTS. The goal is to evaluate the contribution that Internet-based visibility of high-priority cargo associated with the application of RFID technology can make to total cycle time relative to non-RFID-tagged cargo. The hypothesis of this research is that the visibility of *tagged* items speeds the flow of resources in comparison to *non-tagged* items as they move through the AMC system--from the aerial port of embarkation (APOE) to the aerial port of debarkation (APOD).

Research Questions

1. Do shipments tagged with RFID technology and reported directly to a World Wide Web (WWW) accessible database have an average transit time between the Aerial Port of Embarkation (APOE) and the Aerial Port of Debarkation (APOD) below the average transit time of items not tagged?
2. On average, do RFID-tagged shipments have a smaller average Port Hold Time (PHT) (time between arrival at and departure from an aerial port) than non-tagged shipments?
3. On average, do RFID-tagged shipments have a smaller AMC Possession Time (total time between receipt at the APOE and departure from the APOD) than non-tagged shipments?

4. On average, are RFID-tagged shipments more likely to meet Uniform Material Movement and Issue Priority System (UMMIPS) time standards than non-tagged shipments?

Methodology

Three sets of data were considered. All three sets of data considered were shipments originating in the CONUS with an APOE of Dover AFB, Delaware, and an APOD of either Taszar Airfield, Hungary, or Eagle Base, Tuzla, Bosnia. Additionally, all shipments moved through Ramstein AB, Germany, and were in support of OPERATION JOINT ENDEAVOR (OJE) and OPERATION JOINT GUARD (OJG). Thus, routing for all shipments were either Dover-Ramstein-Taszar or Dover-Ramstein-Tuzla.

The primary data consisted of two sets of Army palletized cargo originating from the consolidation/containerization point (CCP) at the Defense Depot in New Cumberland, Pennsylvania (Figure 1). A list of Lead Transportation Control Numbers (Lead TCNs) that were tagged or *burned in* at the New Cumberland depot were retrieved via a query of the United States Army Europe (USAREUR) Radio Frequency/In-transit Visibility (RF/ITV) website [http://144.170.190.8/ITV_summary.html]. [NOTE: A Lead TCN represents a set of individual shipment TCNs consolidated—physically and systemically—under a single TCN for ease of movement and ITV throughout the DTS.] The Lead TCNs collected were matched with relevant transportation pipeline movement data gathered from two sources—the GATES legacy database and the GTN website.

Transportation movement information for the first population of Army data (Army population #1) was gathered from the GATES legacy database for high-priority TCNs moving through the AMC portion of the DTS during May to November 1997. Transportation information for the second population of Army data (Army population #2) was gathered from the GTN website for high-priority TCNs moving during April to June 1998.

The third (comparative) population is a set of Air Force cargo moving through the same pipeline as both sets of Army cargo. This data set covers the same time period as Army population #2 (April to June 1998) and was not RFID-tagged.

In an attempt to answer the proposed research questions, data analysis encompassed three main areas centered on four transportation pipeline segment calculations derived from the UMMIPS time standards (Table 2). The three areas of analysis are a comparison of:

1. the Air Force population and Army population #2 (Figure 4),
2. Army population #2 and Army population #1 (in order to determine if there is a seasonality effect) (Figure 4), and
3. all three populations against the UMMIPS time standards (Table 2).

The four transportation pipeline segment calculations considered are: PHT at the APOE, transit time between the APOE and the APOD, PHT at the APOD, and AMC Possession Time (total time from receipt of the shipment at the APOE until departure from the APOD).

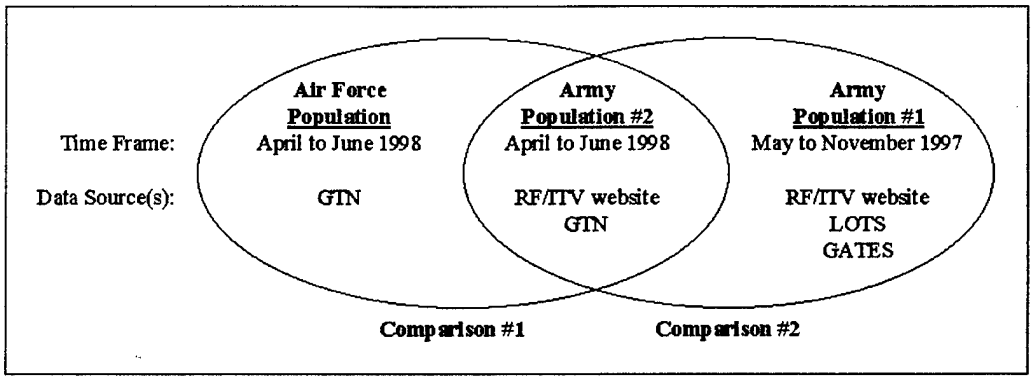

Figure 4 - Illustration of Areas for Data Analysis

Scope and Limitations

This study focuses on a limited aspect of the DTS. Although there are headquarters agencies looking at worldwide implementation of this type of system, the population under study is currently the only one of its kind.

A population of Air Force cargo was used in this analysis to represent the population of cargo moving through the AMC portion of the DTS that was not RFID-tagged. A great deal of effort would have been required to gather a list of Lead TCNs meeting all of the same parameters as the RFID-tagged Army TCNs except without the RFID tag. Since there was no easy way to validate an Army Lead TCN as non-RFID-tagged, an Air Force population of shipments was used.

The Army data collected for this analysis covered two separate time periods due to the differences in the databases used to gather transportation movement information. Army population #1 was limited to a 7-month period for two reasons. First, the USAREUR RF/ITV website could not provide information prior to May 1997 (the extent of the on-line database). Second, at the time of this analysis, the GATES legacy database

could only provide pipeline movement information prior to December 1997 and after February 1998 due to an identified problem with the system. Thus, data was collected for a second population (Army population #2) from the GTN website. However, this database was also limited--by system design--to 60 days of historical information.

The shipments included in the Air Force population of data did not arrive at the APOE from a single location (i.e., CCP) as both sets of Army cargo did. Additionally, unlike the Army cargo, Air Force shipments in this study arrived unpalletized (not consolidated) and moved under an individual shipment TCN.

Although this analysis was designed to look at all priorities of cargo, extremely small sample sizes for lower priority cargo limited this analysis to high-priority shipments. Also, this analysis excludes hazardous material as well as classified or green-sheeted (cargo specifically identified to proceed through the airlift system over other priority cargo of the same shipper service) shipments.

Finally, this research attempt is to find out how RFID-tagged shipments perform *relative* to non-RFID-tagged shipments as they move through the transportation pipeline. Although this study produces empirical results, their use is purely for the purpose of comparison. Because of the scope and limitations noted above, calculations should not be considered a reflection of the true population. For similar reasons, the results of comparing the three populations to the UMMIPS time standards should not be taken as absolute performance of the different pipeline segments. Rather, the UMMIPS comparison is used to support the findings of the first comparison and shows the relative performance of the segments between the sample populations studied.

Chapter Summary

This chapter described the overall nature of this research effort and the background driving the need for such a study. It also reviewed the concepts of Total Asset Visibility (TAV) and In-Transit Visibility (ITV) along with supply chains, the Internet, and RFID technology. An overview of the information systems specific to this study, the Defense Transportation System (DTS), and the Uniform Material Movement and Issue Priority System (UMMIPS) were discussed. It defined the specific problem and research questions to be explored, gave a general overview of the methodology used, and the scope and limitations of the study. Chapter II provides the details of data collection.

II. Data Collection

Chapter Overview

This chapter focuses on the methodology used in collecting the data required for this analysis as well as the difficulties encountered in collection. Three sample populations were gathered from various sources. Two populations consist of RFID-tagged Army shipments. The third population consists of non-RFID-tagged Air Force shipments. Sources used for data collection include the Logistics On-Line Tracking System (LOTS), Global Air Transportation and Execution System (GATES), and the Global Transportation Network (GTN). A large majority of the data was collected from the World Wide Web (WWW).

Data Requirements

In order to conduct the proposed analysis, the following data elements were required for each sample population:

1. Transportation Control Number (TCN). This is a "unique 17-position alphanumeric data element assigned to control a shipment unit throughout the transportation pipeline" (DoD, 1995:B-3).
2. Aerial Port of Embarkation (APOE). This is the point of entry into the AMC portion of the DTS. For this research, the APOE is Dover AFB, Delaware (referred to as Dover or DOV).
3. Aerial Port of Debarkation (APOD). This is the point of exit from the AMC portion of the DTS. For this research, the APOD is Taszar Airfield, Hungary

(referred to as Taszar or TZR), or Eagle Base, Tuzla, Bosnia (referred to as Tuzla or TZL).

4. Required Delivery Date (RDD) or Transportation Priority (TP). This is a code that defines the movement priority of a shipment (see Table 2).
5. APOE Receipt Time. This is the time the shipment is received at the APOE via motor carrier.
6. APOE Lift Time. This is the time the shipment departs the APOE via aircraft.
7. Intransit Receipt Time. For this research, this the time the shipment arrives at Ramstein AFB (referred to as Ramstein or RMS) from Dover AFB.
8. Intransit Lift Time. For this research, this is the time the shipment departs Ramstein AFB for the APOD.
9. APOD Receipt Time. This is the time the shipment is received at the APOD.
10. APOD Lift Time. This is the time the shipment departs the APOD, usually via motor carrier.

All shipments collected for analysis were moved through the AMC system between Dover AFB, Delaware, and Ramstein AB, Germany, and then to either Taszar Airfield, Hungary, or Eagle Base, Tuzla, Bosnia (Figure 1).

Initially, this analysis was designed to look at all priorities of cargo. However, due to extremely small sample sizes for lower priority cargo, this analysis was limited to high-priority (i.e., transportation priority one (TP1)) shipments.

Army Data

Two populations of Army data were collected. The first population consists of RFID-tagged shipments moving through the Air Mobility Command (AMC) portion of the Defense Transportation System (DTS) between 9 May 1997 and 29 November 1997. The second population consists of RFID-tagged shipments moving between 21 April 1998 and 26 June 1998.

Army Population #1. Data collection for this population consisted of four stages (Table 3) and resulted in a population of transportation priority one (TP1), RFID-tagged Lead TCNs moving to Taszar and Tuzla in support of OPERATION JOINT ENDEAVOR (OJE) and OPERATION JOINT GUARD (OJG). The movement timeframe for these shipments was 9 May to 29 November 1997. The size of this population was limited to RFID-tagged shipments after May 1997 and historical movement data was only available prior to December 1997.

Table 3 - Army Population #1 (Number of TCNs)

APOD	Stage 1 RFID-tagged TCNs	Stage 2 TP1/9FF TCNs	Stage 3 Movement Data	Stage 4 Final Population
Taszar	293	196	95	81
Tuzla	631	380	144	108
Total	924	476	240	189

The first stage involved gathering a set of RFID-tagged shipments originating from the consolidation/containerization point (CCP) at the Defense Depot, New Cumberland, Pennsylvania, destined for Taszar or Tuzla, and with an APOE of Dover Air

Force Base. Data was gathered from the United States Army Europe (USAREUR) Radio Frequency/ Intransit Visibility (RF/ITV) website [http://144.170.190.8/ITV_summary.html]. This query resulted in 924 Lead TCNs meeting the previously identified criteria and with an APOD of Taszar or Tuzla.

In order to determine the transportation priority and project code of each Lead TCN, stage two involved extracting requisition data on the individual TCNs comprising each Lead TCN from the Defense Automated Addressing System Center (DAASC) Logistics On-Line Tracking System (LOTS).

In this stage, only individual TCNs with a Required Delivery Date (RDD) that indicated TP1 movement (i.e. "999," "N__," or "E__") and movement under the OJE/OJG project code, "9FF," were retained. Further, due to the scope of this analysis, shipments were eliminated if they were classified (lack of requisition information) or expedited (manipulation of the movement priority). This stage ended with a population of 476 Lead TCNs out of the 924 TCNs from stage one.

The third stage gathered transportation pipeline data for each TCN through the Transportation Reporting & Inquiry System (TRAIS) legacy environment (historical database) within GATES. This resulted in pipeline data on 240 of the 476 Lead TCNs found in stage two.

For ease of analysis, stage four eliminated any of the 240 Lead TCNs from stage three that were short of a complete set of pipeline data. This resulted in a final population of 189 Lead TCNs (Appendix A).

Army Population #2. A second query of the USAREUR RF/ITV website for the time frame of 1 April to 26 June 1998 resulted in an initial population of 291 Lead TCNs (Table 4).

In stage two, a query of the GTN website for the Lead TCNs found in stage one yielded 190 shipments to Taszar (TZR) and Tuzla (TZL) that were also TP1 shipments (Figure 5).

Table 4 - Army Population #2 (Number of TCNs)

APOD	Stage 1 RFID-tagged TCNs	Stage 2 GTN Query/ TP1	Stage 3 Movement Data	Stage 4 Final Population
Taszar	103	68	62	46
Tuzla	188	122	111	91
Total	291	190	173	137

Stage three involved the collection of movement data for each shipment. To accomplish this, it was necessary to query GTN for each TCN individually using the same cargo query interface used to gather stage two information (Figure 2). If the shipment followed a routing other than DOV-RMS-TZR or DOV-RMS-TZL, it was eliminated from the population. This stage resulted in a population of 173 TCNs out of the 190 shipments from stage two.

As with the first population of Army data, stage four eliminated any TCNs missing movement data. This reduced the second Army sample population to 137 TCNs out of the 173 from stage three (Appendix B).

Air Force Data

Collection of the Air Force sample population did not require accessing the RF/ITV website, therefore, stage one started with a query of the GTN website for TCNs with TP1 priority and shipped under the OJE/OJG project code (9FF). Figure 5 shows an example of the GTN cargo query interface. In this example, a query is set up to search for all TCNs possessing a partial TCN (SW3123*), specific project code (9FF), and flowing through Dover AFB (KDOV) during the period 1 April 1998 to 26 June 1998.

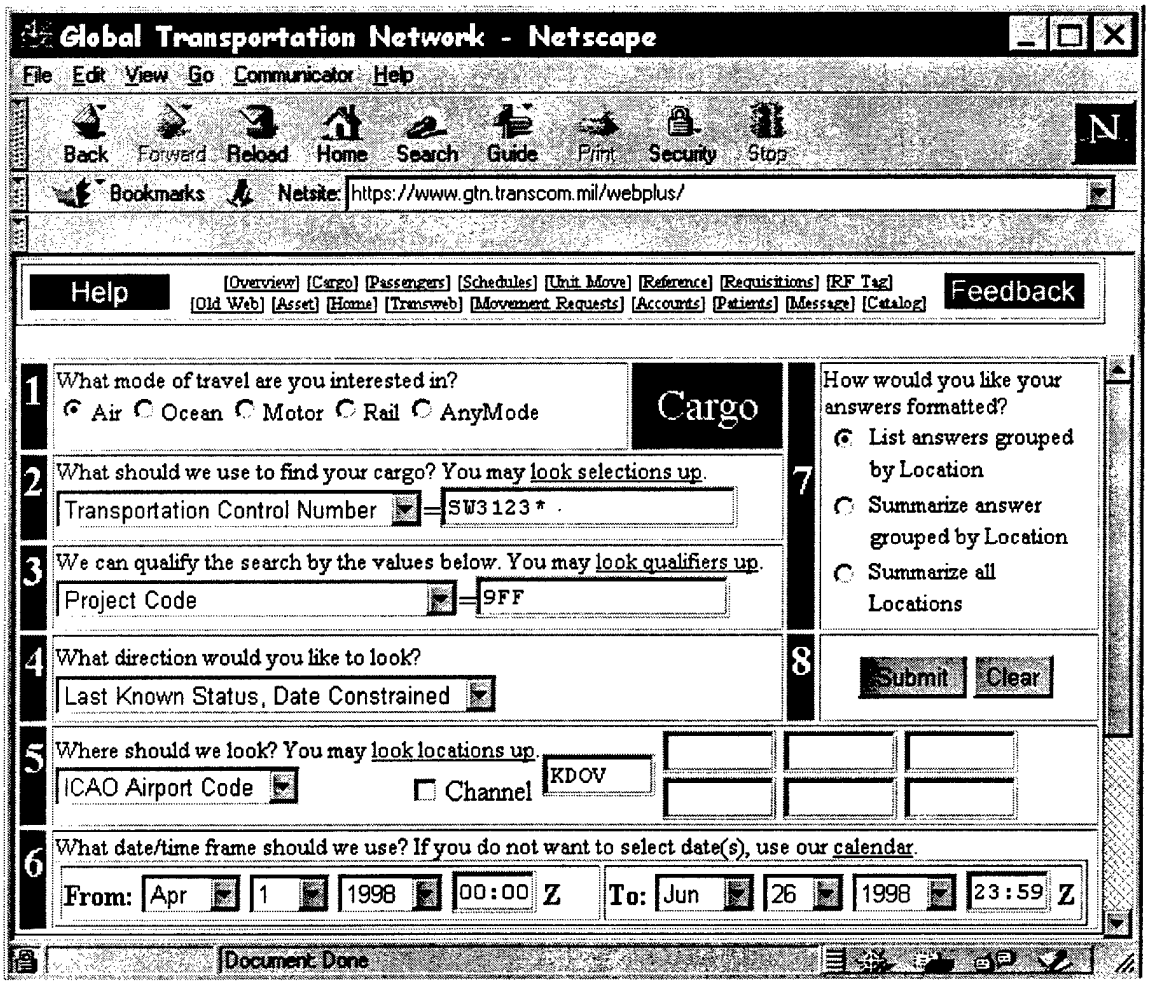

Figure 5 - GTN Cargo Query Interface

The query for Air Force TCNs was conducted using the primary DoD Activity Address Code (DoDAAC) for Taszar (FB5895) and Tuzla (FB5830). Thus, stage one resulted in a population of 145 TCNs (Table 5).

Table 5 - Air Force Population (Number of TCNs)

APOD	Stage 1 GTN Query/TP1/9FF	Stage 2 Movement Data	Stage 3 Final Population
Taszar	84	69	56
Tuzla	61	49	34
Total	145	118	90

In stage two, movement data for each individual shipment was collected. Again, collection of movement data required a separate query for each TCN. If the shipment was found to follow a routing other than DOV-RMS-TZR or DOV-RMS-TZL, it was eliminated from the population. This stage resulted in a population of 118 TCNs out of the 145 found in stage one.

As with the other two sample populations, the final stage involved elimination of any TCNs missing movement data. This reduced the total Air Force sample population to 90 TCNs out of the 118 from stage two (Appendix C).

Data Collection Challenges

Data collection and selection is an expensive process. Several difficulties in locating and capturing source data for this analysis were encountered. Data collection attempts were made through several systems including the Consolidated Aerial Port System II (CAPS II), GATES, GTN, and LOTS.

Difficulties resulted from the inability to accomplish restricted queries for data, obtain search results in an easily usable configuration, and rely on the accuracy of the data received. Several systems were unable to support a search for specific sets of data or were only able to limit the search parameters. To accomplish a large portion of this analysis, data had to be extracted manually from a larger set of data. All four main systems used for data collection--the RF/ITV website, LOTS, GATES, and GTN--had a different configuration for presenting the requested data. The main difficulty encountered was the use of different date and time stamps for the transportation movement data. Finally, doubtful input accuracy of some data elements precluded the use of the data extracted from the system or forced a validation check with a second source.

Chapter Summary

This chapter focused on the data collection process necessary to conduct this analysis. It defined the data elements required, the three populations of data necessary for the analysis, and the process used to limit each population to a set of comparable data. Finally, this chapter described some of the difficulties encountered in collecting data for this analysis. Chapter three will describe the methodology used in this study.

III. Methodology and Data Analysis

Chapter Overview

The purpose of this chapter is to describe the methodology used to conduct the comparisons identified in Chapter I between the three populations described in Chapter II. The areas described include calculations relevant to the key segments of AMC Possession Time, elimination of outliers, comparison of key pipeline segments, and application of the UMMIPS time standards to all three populations.

Calculation of Pipeline Segments

After data collection, pipeline times for each portion of AMC Possession Time (Table 6) were calculated for Army population #1 (Appendix A), Army population #2 (Appendix B), and the Air Force population (Appendix C) of shipments.

Table 6 – AMC Possession Time Pipeline Segments

Segment	1	2	3	4	5	Total
	APOE Receipt to APOE Lift to Intransit Location	APOE Lift to Intransit Location Receipt	Intransit Location Receipt to Intransit Location Lift to APOD	Intransit Location Lift to APOD Receipt	APOD Receipt to Final Lift from APOD	Total AMC Possession Time

NOTE: Segments 2 and 4 are only calculated for the determination of population outliers. For analysis, segments 2, 3, and 4 are combined into the "transit time between APOE and APOD."

In terms of this analysis, the APOE is Dover AFB, in-transit location is Ramstein AB, and the APOD is either Tuzla or Taszar. Therefore, segment 2 represents the transit time between Dover AFB and Ramstein AB, and segment 4 represents the transit time between Ramstein AB and the APOD (Tuzla or Taszar). Also, segments 2, 3, and 4 are combined as the transit time from APOE to APOD to include the Port Hold Time at Ramstein AB.

Elimination of Outliers

An examination of the transit time calculations--segments 2 and 4 from Table 6--revealed the possibility of existing outliers in the populations.

In order to determine the range of acceptable transit times between locations (Dover to Ramstein, Ramstein to Taszar, and Ramstein to Tuzla), average flight times for each mission leg by aircraft type for the past year were obtained from Headquarters AMC Tanker Airlift Control Center (Table 7) (Ashby, 1998).

Using the transit time information calculated for each sample population, an entire TCN was excluded from its respective population if the time sequence of events was out of order (i.e., the shipment left a location before it arrived). Based on the information in Table 7 and histograms of each population, a TCN was also excluded if it had a transit time calculation outside of the following ranges (in days):

- Dover to Ramstein .2900 - .4200
- Ramstein to Taszar .0400 - .1300
- Ramstein to Tuzla .0400 - .1700

Table 7 - Average Flying Time by Mission Leg - 1997

Mission Leg	Aircraft Type	Average Flying Time (in days)
Dover to Ramstein	C-5	.3300
	C-17	.3300
	C-141	.3290
	KC-10	.3150
	KC-135	.3150
	MD-11	.3000
Ramstein to Taszar	C-5	.0625
	C-17	.0670
	C-130	.0875
	C-141	.0625
Ramstein to Tuzla	C-17	.0958
	C-130	.1000
	C-141	.0875

The researcher selected the ranges as representative of all three populations of data. Because the transit time between airlift nodes is stable over time, the goal was to exclude only the most obviously incorrect transit times. From the histograms as well as the raw calculations, the ranges were selected so as to represent the most realistic transit times and retain as many TCNs as possible without compromising the analysis. These ranges resulted in TCNs removed from three of the six population segments (Table 8).

Table 8 - Population Sizes With/Without Outliers (Number of TCNs)

Location		Army #1	Army #2	Air Force
Taszar	Original Population Size	81	46	56
	Nbr of Outliers Removed	13	2	0
	Size After Removal of Outliers	68	44	56
Tuzla	Original Population Size	108	91	34
	Nbr of Outliers Removed	42	0	0
	Size After Removal of Outliers	66	91	34

A Large-Sample Test of Hypothesis for two samples will be used to compare the means of the different populations. One of the primary assumptions of this test is the normality of the sample populations. This assumption is possible because of the Central Limit Theorem. The Central Limit Theorem states that

> if a random sample of n observations is selected from a population (any population), then, when n is sufficiently large, the sampling distribution of $\bar{x}$ will be approximately a normal distribution. The larger the sample size, n, the better will be the normal approximation to the sampling distribution of $\bar{x}$. (McClave and Benson, 1994:282).

To invoke the Central Limit Theorem, a sample size of $n \geq 30$ is generally required (McClave and Benson, 1994:282). Since each sample population collected (Table 8) has more than 30 observations, the Central Limit Theorem was applied to each population in this analysis. Thus, the Large-Sample Test of Hypothesis may be used to test for differences between the different population means.

Comparison of Shipment Times

Four calculations will be considered for analysis based on their relationship to the UMMIPS time standards (Table 2):

1. Port Hold Time (PHT) at the APOE (Dover AFB) - Segment G of the UMMIPS time standards
2. Transit Time Between the APOE and the APOD (Taszar or Tuzla) - Segment H of the UMMIPS time standards
3. PHT at the APOD - Segment I of the UMMIPS time standards
4. AMC Possession Time - Sum of segments G, H, and I. This calculation reflects the total time a shipment is in the AMC portion of the DTS.

For each of these four calculations, the Large-Sample Test of Hypothesis for two samples will be used. This test has the following characteristics:

H_o: $\mu_1 - \mu_2 = D_o$

H_a: $\mu_1 - \mu_2 \neq D_o$

Test Statistic: $z = [(\bar{x}_1 - \bar{x}_2) - D_o] / \sigma_{(\bar{x}_1 - \bar{x}_2)}$

where $\sigma_{(\bar{x}_1 - \bar{x}_2)} = \left[\left(\sigma_1^2 / n_1\right) + \left(\sigma_2^2 / n_2\right)\right]^{\frac{1}{2}}$

Rejection Region: $z < -z_{\alpha/2}$ or $z > z_{\alpha/2}$

where

H_o = null hypothesis

H_a = alternate hypothesis

μ_1 = population mean of the first distribution

μ_2 = population mean of the second distribution

D_o = hypothesized difference between the population means

$\bar{x}_1$ = sample population mean of the first distribution

$\bar{x}_2$ = sample population mean of the second distribution

$\sigma_{(\bar{x}_1 - \bar{x}_2)}$ = standard deviation of the difference between the sample population means

n_1 = number of sample observations in the first distribution

n_2 = number of sample observations in the second distribution

z = test statistic

$z_{\alpha/2}$ = critical value

To determine if there was any bias created by removing the large number of outliers from Army population #1 (Table 8), a two-sample t-test was conducted between the population before removal of outliers from the population and after the removal of outliers. The results showed that for all four pipeline calculations, there was no significant difference between the means at a 0.01 alpha-level of significance (Table 9). Therefore, although all results are provided, analysis and discussion is restricted to the populations created by the removal of outliers.

Table 9 - Pipeline Segment Calculations Comparing Removal of Outliers (Army #1)

		PHT at APOE		Transit Time from APOE to APOD		PHT at APOD		AMC Possession Time	
		TZR	TZL	TZR	TZL	TZR	TZL	TZR	TZL
With Outliers	MEAN	2.22	2.41	2.70	3.15	0.80	2.15	5.72	7.70
	STD	1.16	1.36	1.36	1.92	1.75	3.47	2.36	4.00
Without Outliers	MEAN	2.24	2.47	2.72	2.78	0.92	2.46	5.88	7.71
	STD	1.16	1.28	1.46	1.59	1.89	3.89	2.47	4.33
Test Statistic		0.95	0.77	0.91	0.19	0.69	0.58	0.69	0.99
Critical Value		±2.61	±2.60	±2.61	±2.60	±2.61	±2.60	±2.61	±2.60
Significant		no	no	no	no	no	no	no	no

NOTE: Units are in days. All significance tests conducted at the 0.01 alpha-level of significance.

Using the four pipeline segment calculations, two-sample t-tests were conducted to compare the Air Force and Army #2 populations (Tables 10 and 11) as well as the Army #1 and Army #2 populations (Tables 12 and 13). Tests were conducted between the populations both before and after outliers were removed from the sample populations. Each table of results provides the mean and standard deviation of each compared sample

population--separated by destination (TZR or TZL) and the four pipeline segments. Also, the calculated test statistic from the Large-Sample Test of Hypothesis described above along with the critical value is included.

The difference between the means of the two sample populations compared is significant if the test statistic falls outside the range described by the critical value. For example, from Table 11, the test to compare average PHT at the APOE for the Air Force and Army #2 populations for Taszar-bound shipments is significant because the test statistic, -6.74, falls outside the range created by the critical value, ±2.65. All tests were conducted at the 0.01 alpha-level of significance. Further discussion will be limited to the results of tests conducted after the removal of outliers (Tables 11 and 13).

Comparison 1: Air Force versus Army Population #2. The results of the test between the Air Force population and Army population #2 (Table 11) indicate there is a statistically significant difference between the two populations in terms of the Port Hold Time at the APOE as well as AMC Possession Time. Additionally, there is a statistically significant difference between the populations for the transit time between the APOE and the APOD for Tuzla-bound shipments. The remaining discussion will focus on the significant differences.

An examination of the means and standard deviations of the compared populations reveals the following:

1. Army cargo had a longer average PHT at the APOE than Air Force cargo for both Taszar- and Tuzla-bound shipments. For Taszar-bound shipments, Army cargo was held at the APOE (Dover) more than 2.5 times longer than Air Force cargo (2.77 days vs. 1.02 days). For Tuzla-bound shipments, Army

Table 10 - Pipeline Segment Calculations Before Removal of Outliers (Air Force vs. Army #2)

		PHT at APOE		Transit Time from APOE to APOD		PHT at APOD		AMC Possession Time	
		TZR	TZL	TZR	TZL	TZR	TZL	TZR	TZL
Air Force	MEAN	1.02	1.18	2.67	2.06	0.29	1.67	3.98	4.90
	STD	0.98	0.79	0.89	0.67	0.47	1.01	1.41	1.30
Army #2	MEAN	2.71	2.32	2.26	2.55	0.14	1.40	5.11	6.27
	STD	1.49	1.46	1.26	1.37	0.27	1.15	1.94	2.44
Test Statistic		-6.62	-5.60	1.89	-2.68	2.00	1.20	-3.38	-4.04
Critical Value		±2.64	±2.62	±2.64	±2.62	±2.63	±2.62	±2.63	±2.62
Significant		yes	yes	no	yes	no	no	yes	yes

NOTE: Units are in days. All significance tests conducted at the 0.01 alpha-level of significance.

Table 11 - Pipeline Segment Calculations After Removal of Outliers (Air Force vs. Army #2)

		PHT at APOE		Transit Time from APOE to APOD		PHT at APOD		AMC Possession Time	
		TZR	TZL	TZR	TZL	TZR	TZL	TZR	TZL
Air Force	MEAN	1.02	1.18	2.67	2.06	0.29	1.67	3.98	4.90
	STD	0.98	0.79	0.89	0.67	0.47	1.01	1.41	1.30
Army #2	MEAN	2.77	2.32	2.19	2.55	0.15	1.40	5.11	6.27
	STD	1.50	1.46	1.13	1.37	0.27	1.15	1.91	2.44
Test Statistic		-6.74	-5.60	2.40	-2.68	1.87	1.20	-3.39	-4.04
Critical Value		±2.65	±2.62	±2.63	±2.62	±2.63	±2.62	±2.63	±2.62
Significant		yes	yes	no	yes	no	no	yes	yes

NOTE: Units are in days. All significance tests conducted at the 0.01 alpha-level of significance.

cargo was held at the APOE almost twice as long as Air Force cargo (2.32 days vs. 1.18 days). Additionally, the standard deviations for Army shipments are at

least one-third larger than for Air Force shipments (1.50 days vs. 0.98 days; 1.46 days vs. 0.79 days).

2. Army cargo had a longer transit time from APOE to APOD than Air Force cargo for Tuzla-bound shipments. Army shipments took 19 percent longer to transit from the APOE (Dover) to the APOD (Tuzla) than Air Force shipments to the same destination (2.55 days vs. 2.06 days). Although the results of the two-sample t-test indicate a significant difference, the test statistic, -2.68, is barely outside the range created by the critical value, ±2.62. Another factor of interest is that the standard deviation for the Army shipments is twice the standard deviation for Air Force shipments (1.37 days vs. 0.67 days).
3. Army cargo had a longer AMC Possession Time than Air Force cargo for both Taszar- and Tuzla-bound shipments. For both destinations, the possession time for Army cargo was 22 percent longer than Air Force cargo (5.11 days vs. 3.98 days; 6.27 days vs. 4.90 days). Furthermore, the standard deviation for Army shipments bound for Taszar is 26 percent larger than for Air Force shipments (1.91 days vs. 1.41 days), and the difference for Tuzla-bound shipments is 47 percent (2.44 days vs. 1.30 days).

Comparison 2: Army Population #2 versus Army Population #1. The results of the test between the two Army populations (Table 12) indicate there is only one statistically significant difference between the two populations in terms of the Port Hold Time at the APOD for Taszar-bound shipments.

An examination of the means and standard deviations of the compared populations reveals that Army #1 cargo had an average PHT at the APOD more than six times that of Army #2 cargo for Taszar-bound shipments (0.80 days vs. 0.14 days). Although test results indicate this is a significant difference, both means are less than one day and unlikely to be significant. However, the difference in the range of PHT data for the Army #1 population runs from 0.0 days to 8.21 days--with only four observations greater than 2.88 days--whereas the range of Army #2 data is 0.0 days to 0.92 days. This may indicate the existence of more outliers not eliminated or a reflection of events at the APOD. As previously discussed, shipments were removed from the sample population for only two reasons: the time sequence of events was out of order, or the transit time for a particular mission leg fell outside the selected range. Thus, shipments were not eliminated as outliers based on Port Hold Time (PHT).

Table 12 - Pipeline Segment Calculations Before Removal of Outliers (Army #2 vs. Army #1)

		PHT at APOE		Transit Time from APOE to APOD		PHT at APOD		AMC Possession Time	
		TZR	TZL	TZR	TZL	TZR	TZL	TZR	TZL
Army #2	MEAN	2.71	2.32	2.26	2.55	0.14	1.40	5.11	6.27
	STD	1.49	1.46	1.26	1.37	0.27	1.15	1.94	2.44
Army #1	MEAN	2.23	2.41	2.70	3.15	0.80	2.15	5.72	7.71
	STD	1.16	1.36	1.36	1.92	1.75	3.47	2.36	4.00
Test Statistic		2.04	-0.42	-1.80	-2.56	-3.32	-2.11	-1.50	-3.11
Critical Value		±2.62	±2.60	±2.62	±2.60	±2.63	±2.61	±2.62	±2.60
Significant?		no	no	no	no	yes	no	no	yes

NOTE: Units are in days. All significance tests conducted at the 0.01 alpha-level of significance.

Table 13 - Pipeline Segment Calculations After Removal of Outliers (Army #2 vs. Army #1)

		PHT at APOE		Transit Time from APOE to APOD		PHT at APOD		AMC Possession Time	
		TZR	TZL	TZR	TZL	TZR	TZL	TZR	TZL
Army #2	MEAN	2.77	2.32	2.19	2.55	0.15	1.40	5.11	6.27
	STD	1.50	1.46	1.13	1.37	0.27	1.15	1.91	2.44
Army #1	MEAN	2.24	2.47	2.72	2.78	0.92	2.46	5.88	7.71
	STD	1.16	1.28	1.46	1.59	1.89	3.89	2.47	4.33
Test Statistic		2.12	-0.65	-2.06	-0.98	-3.32	-2.15	-1.76	-2.44
Critical Value		±2.62	±2.61	±2.62	±2.61	±2.65	±2.64	±2.62	±2.63
Significant?		no	no	no	no	yes	no	no	no

NOTE: Units are in days. All significance tests conducted at the 0.01 alpha-level of significance.

Application of UMMIPS Time Standards

The last area for analysis was a comparison of all three populations against the UMMIPS time standards (Appendix D). The results of this comparison (Table 14) show that 16.7 to 38.6 percent of Army cargo met UMMIPS time standards for AMC Possession Time (4.5 days) whereas 71.4 percent of Taszar-bound Air Force shipments and 29.4 percent of Tuzla-bound Air Force shipments met the standard. Additionally, while 92.9 percent of Taszar-bound and 85.3 percent of Tuzla-bound Air Force cargo met UMMIPS time standards for PHT at the APOE (2 days), only 39.4 to 52.9 percent of Army shipments met the standards. Because the primary comparison of interest is the difference between RFID-tagged and non-RFID-tagged shipments, the remainder of this discussion will focus on the Air Force and Army #2 populations.

Table 14 - Comparison of Populations to UMMIPS Time Standards
(Percent of Shipments Meeting/Exceeding Standards)

Location	Population	PHT at APOE	Transit Time from APOE to APOD	PHT at APOD	AMC Possession Time
Taszar	Army #1	52.9%	16.2%	82.4%	23.5%
	Army #2	43.2%	40.9%	100.0%	38.6%
	Air Force	92.9%	14.3%	92.9%	71.4%
Tuzla	Army #1	39.4%	22.7%	48.5%	16.7%
	Army #2	48.4%	34.1%	47.3%	18.7%
	Air Force	85.3%	38.2%	14.7%	29.4%

NOTE: Reference Table 2 for UMMIPS Time Standards and Appendix D for complete set of calculations.

Several observations may be made about the results listed in Table 14.

1. PHT at APOE. Air Force shipments met the UMMIPS time standards about twice as often as Army shipments for both Taszar- and Tuzla-bound cargo (92.9% vs. 43.2%, and 85.3% vs. 48.4%, respectively).
2. PHT at APOD. Army shipments met the standards more often than Air Force shipments for both destinations (100.0% vs. 92.9%; 47.3% vs. 14.7%). This is the only pipeline segment where RFID-tagged shipments moved faster than non-RFID-tagged shipments for both destinations of cargo.
3. Air Force shipments met the standards for AMC Possession Time about twice as often as Army shipments for Taszar-bound cargo (71.4% vs. 38.6%) and more than 1.5 times as likely for Tuzla-bound cargo (29.4% vs. 18.7%).
4. Throughout the pipeline, Taszar-bound Army shipments met the UMMIPS time standards approximately 40 percent of the time, but at the APOD (Taszar), 100 percent of the shipments met the standard.

5. Air Force Taszar-bound shipments met the UMMIPS time standards for PHT at the APOE and APOD 92.9 percent of the time, yet only 14.3 percent of shipments met the standard for transit time between the APOE and APOD. Additionally, only 71.4 percent of shipments met the standards for AMC Possession Time.
6. Tuzla-bound Army shipments met the UMMIPS time standard for AMC Possession Time less than 20 percent of the time, and never exceeded 48.4 percent in the rest of the pipeline.
7. Tuzla-bound Air Force shipments managed to meet the standard for PHT at APOE 85.3 percent of the time, yet fell below 40 percent for all other pipeline segments. Also, only 14.7 percent (5 of 34 observations) met the standard for PHT at APOD (Tuzla).

Chapter Summary

This chapter presented the methodology used in this analysis. It described how the calculations were made for each of the AMC pipeline segments, method for eliminating outliers, and the comparison of pipeline segment calculations and UMMIPS time standards among the three populations. Chapter IV will present conclusions of this analysis as well as recommendations for future research.

IV. Findings and Conclusions

Chapter Overview

The purpose of this chapter is to synthesize the key findings of this research. It will provide a synopsis of the research conducted, discuss the significant findings and conclusions, and provide suggestions for further research.

Synopsis of Research

The purpose of this research was to study the movement of a set of RFID-tagged shipments to examine the extent this technology affects transportation cycle time through the AMC portion of the Defense Transportation System.

Three populations of data were chosen to examine these areas. Two of the populations consisted of RFID-tagged U.S. Army cargo shipped from the Defense Depot at New Cumberland, Pennsylvania, and shipped to the Bosnia-Herzegovina theater of operations. The third population was used for comparison to the RFID-tagged cargo and consisted of a set of U.S. Air Force shipments destined for the same location. All three populations moved through the same portion of the AMC system--entered the system at Dover AFB, Delaware, transited through Ramstein AB, Germany, and exited the system at either Taszar, Hungary, or Tuzla, Bosnia.

Data collection for the first set of Army cargo required three different information systems. First, a population of RFID-tagged shipments was collected from the USAREUR RF/ITV website. Each of these shipments was a consolidated set of individual shipments identified by a Lead TCN. Therefore, a second information system,

LOTS, was used to limit the population to shipments of high-priority cargo destined for Taszar or Tuzla. Once these TCNs were identified, the third information system, GATES, was used to extract the specific pipeline movement date and time stamps for every portion of the pipeline. Data collected for the first population covered a 7-month timeframe; May to November 1997.

Data collection for the second set of Army cargo was conducted using only two information systems. First, the USAREUR RF/ITV website was used to extract Lead TCNs bound for Taszar and Tuzla. These TCNs were then queried against the GTN website to extract high-priority shipments and the transportation pipeline movement information. The third population of data, Air Force cargo, was extracted completely from the GTN website. Data collected for the second and third populations covered a 60-day period; April to June 1998.

After data collection, outliers were eliminated (Table 8) and key transportation pipeline calculations were made based on UMMIPS pipeline categories (Table 2). Four transportation pipeline calculations were used in this analysis: Port Hold Time (PHT) at the APOE (Dover AFB), transit time between the APOE and the APOD, PHT at the APOD (either Taszar or Tuzla), and AMC Possession Time (total time from entry at the APOE until exit from the APOD).

These four sets of calculations provided the foundation for three sets of comparisons: (1) between non-RFID-tagged (Air Force) cargo versus RFID-tagged (Army) cargo, (2) between the two sets of RFID-tagged Army cargo, and (3) all three populations against the UMMIPS time standards in Table 2.

Summary of Findings

Since the primary comparison of interest is between RFID-tagged and non-RFID-tagged shipments, this discussion will focus on the Air Force and Army #2 populations.

Research Question One. *Do shipments tagged with RFID technology and reported directly to a World Wide Web (WWW) accessible database have an average transit time between the Aerial Port of Embarkation (APOE) and the Aerial Port of Debarkation (APOD) below the average transit time of items not tagged?*

For Taszar-bound shipments, there was no reason (no statistically significant difference) to conclude that non-RFID-tagged (Air Force) shipments had a different average transit time between APOE and APOD than RFID-tagged (Army #2) shipments (Table 10).

For Tuzla-bound shipments, there was a significant difference between the means of the two populations at the 0.01 alpha-level of significance. RFID-tagged (Army #2) shipments had a *longer* average transit time between the APOE and APOD than non-RFID-tagged (Air Force) shipments (2.55 days vs. 2.06 days). However, the results of the two-sample t-test show the test statistic, -2.68, is barely outside the range created by the critical value, ±2.62. Relaxing the alpha-level of significance to 0.05, there would be no statistically significant difference between the means. Thus, it is reasonable to conclude that there is no real difference in the transit time between the two sample populations.

Research Question Two. *On average, do RFID-tagged shipments have a smaller average Port Hold Time (PHT) than non-tagged shipments?*

For both APOEs, RFID-tagged (Army) shipments had a significantly *longer* average PHT (2.77 days for Taszar cargo and 2.32 days for Tuzla cargo) at the Dover APOE than non-RFID-tagged (Air Force) shipments (1.02 days for Taszar cargo and 1.18 days for Tuzla cargo).

A potential reason for this difference may lie in the characteristics of the shipments used in this analysis. Air Force shipments, in general, arrive at the Dover APOE unpalletized whereas Army shipments are consolidated (palletized) at a consolidation/containerization point (CCP) before arriving at the Dover AFB aerial port. One of the last steps made by an aircraft loadplanner in planning a load is the addition of any available (processed) small pieces of cargo for the scheduled destination. In this case, small pieces of cargo (e.g., 1-cube, 5-pound boxes) are added to a mission more readily than an entire pallet (of any type of cargo).

A second possibility for the longer average PHT of Army cargo is the arrival rate of the pallets at the APOE. If pallets arrive with insufficient time to be processed and ready to load, they would not be selected for an outbound aircraft load and may end up waiting until the next day. Along with the arrival rate is the quantity of pallets arriving at the same time. If large quantities of palletized, RFID-tagged cargo arrive at the APOE at the same time, it could take several airlift missions over several days to clear the backlog of cargo. However, since movement priority is first-in, first-out by transportation priority, this reasoning may not add to the explanation of why the Air Force cargo studied

had significantly less PHT. A third possible explanation is the ability of shipping services to *space-block* or reserve space on channel missions. Any one or all of the above possibilities may explain the differences seen in PHT between the RFID-tagged (Army) and non-RFID-tagged (Air Force) cargo as observed in this research.

For both APODs, there was no reason (no statistically significant difference) to conclude that non-RFID-tagged (Air Force) shipments had a different average PHT than RFID-tagged (Army #2) shipments. The average PHT for Army shipments arriving at Taszar was 0.15 days whereas Air Force shipments were held an average of 0.29 days. At Tuzla, Army shipments averaged 1.40 days PHT and Air Force shipments averaged 1.67 days. It is interesting, however, that the PHT for Tuzla is so much larger than the PHT at Taszar.

Research Question Three. *On average, do RFID-tagged shipments have a smaller AMC Possession Time (total time between receipt at the APOE and departure from the APOD) than non-tagged shipments?*

Test results indicated--for both Taszar- and Tuzla-bound shipments--that RFID-tagged (Army) shipments had a *longer* average AMC Possession Time than non-RFID-tagged (Air Force) shipments. Army shipments destined for Taszar had an average AMC Possession Time of 5.11 days and Air Force shipments averaged 3.98 days. Tuzla-bound shipments averaged 6.27 days for Army shipments and 4.90 days for Air Force shipments. Thus, it took more than one day longer for the RFID-tagged (Army) shipments to move through the system than non-RFID-tagged (Air Force) shipments for both destinations of cargo. Because there was no significant difference between the two

populations for either the transit time between the APOE and APOD or the PHT at the APOD, the most likely (and obvious) reason for the difference in AMC Possession Time is the PHT at the APOE as discussed in Research Question Two.

Research Question Four. *On average, are RFID-tagged shipments more likely to meet Uniform Material Movement and Issue Priority System (UMMIPS) time standards than non-tagged shipments?*

In terms of AMC Possession Time, non-RFID-tagged (Air Force) shipments met the UMMIPS time standard (of 4.5 days) more often than RFID-tagged (Army) cargo. As noted previously, non-RFID-tagged (Air Force) Taszar-bound shipments met the standard 71.4 percent of the time and Tuzla-bound shipments met the standard 29.4 percent of the time. Although a poor performance, RFID-tagged (Army) shipments only met the standard 38.6 percent of the time for Taszar-bound shipments and 18.7 percent of the time for Tuzla-bound shipments.

The pipeline segment contributing the most to this difference is PHT at the APOE. Despite being palletized and ready for onward movement upon arrival at the aerial port, RFID-tagged (Army) shipments only met the UMMIPS time standard (of 2 days) 43.2 percent of the time for Taszar-bound and 48.4 percent of the time for Tuzla-bound cargo. In contrast, non-RFID-tagged (Air Force) shipments met the standard 92.9 percent of the time for Taszar-bound and 85.3 percent of the time for Tuzla-bound cargo. See Research Question Two for the discussion of possible explanations.

An examination of PHT at the APOD may provide a partial explanation for the significantly lower percent of Tuzla-bound shipments meeting total AMC Possession

Time UMMIPS standards. At Taszar, significant percentages of both tagged and non-tagged shipments met the UMMIPS standard for PHT at APOD (100.0% and 92.9% respectively) whereas at Tuzla only 47.3 percent of RFID-tagged and a mere 14.7% of non-RFID-tagged cargo met the standard. Although the reason for this difference in PHT between these two locations is unknown, it provides some explanation for the lengthy AMC Possession Time and the inability to meet the UMMIPS time standard.

Areas for Further Research

These outcomes suggest three possible areas for further research: the effects of IT applications on various decision-making functions; an analysis of logistics information systems and information technology applications used to provide in-transit visibility to decision-makers and end users; and an extension of the research presented in this study.

As stated in the introduction, two things about a shipment are of interest to an end user after the placement of a requisition--the status and expected arrival date. One of the fundamental premises of web-enabled information systems and the use of information technology applications such as RFID is an increase in ITV. Implementation of these systems and applications should provide the end user with sufficient in-transit visibility so as to reduce the need for duplicate requisitions and increase the ability to divert or cancel shipments. Quantifying this effect would provide significant insights into different segments of the Defense Transportation System. What may not be known is how customers are using these information systems to accomplish their organization's objectives or their perception of the systems' usefulness. Further, there are several other

information technology applications in use and in development--optical memory cards and satellite tracking systems--that also provide fertile ground for similar analysis.

At perhaps the other end of the spectrum is the high-level decision-maker looking for easily exploited systems that may be used to analyze different portions of the Defense Transportation System. These users are likely to be looking for information that identifies systemic problems such as transportation pipeline bottlenecks. Research into such topics as the ability of the various logistics information systems and technologies to centralize decision-making may reveal the limits of these systems, but may very well identify new needs and abilities since these systems were conceived of and developed. Another area of interest to all types of planners--strategic, operational, and tactical--is the flexibility and responsiveness of these systems as an aid to moving cargo within the DTS. Further, how is all of the extensive shipment information provided by these systems and technologies actually being used in decision-making?

One of the pleasures of research is finding a database of information from which it is easy to extract the specific data required for analysis. In this study, the web-based Global Transportation Network (GTN) was used to collect data for two of the three populations under study. Although there was some frustration in getting to the actual database, this system has a lot of functionality for the end user, and it is getting better for the researcher as well. Query screens (Figure 5) were clear and specific although somewhat technical for those not familiar with logistics community terminology. This is mitigated in part by help screens and a toll-free phone number to a help desk. This system is still in its infancy and several additions and improvements to the system are

planned. It would be interesting to trace the migration of this system to its current state and analyze the impact it has had on movement of DoD material.

Finally, because this research was the first effort to quantify the effects of RFID technology on logistics cycle time, several elements were discarded in an effort to create a baseline for further research--as well as present some initial conclusions. To that end, there are several ways that this particular research effort could be extended. In particular, what are the factors in Port Hold Time (PHT)? What variables, if controlled, would contribute to a lower PHT? What are some specific technologies that could streamline aerial port handling and thus reduce PHT? These questions, along with the following proposed research areas, could extend this baseline research.

First, a continuous and extended collection of the type of data included in the Air Force and Army #2 populations may reveal start-up effects from the implementation of the Radio Frequency/In-Transit Visibility system. As this system has only been operational since December 1995, improvements, additions, and policies are continually being made which may change this study's outcome. Second, no attempt was made to analyze the effect that shipments not considered in this research such as classified or green-sheeted cargo had on the sample populations examined. Third, an examination of populations of cargo moving under lower transportation priorities may yield interesting results. Fourth, because all Army cargo going into the Bosnia-Herzegovina theater of operations is RFID-tagged, non-tagged and palletized Army cargo was not considered for study. Thus, further research should attempt to find a population of this type that would

be comparable in order to discover the effect of palletization prior to arrival at the APOE has on transportation pipeline cycle time.

Conclusions

As discussed in the introduction, there is a perception in DoD that ITV--in the form of Radio Frequency Identification (RFID) technology--will improve transit time through the Air Mobility Command (AMC) portion of the Defense Transportation System (DTS). The results of this research indicate there is some basis for rejecting this notion. The research results point very strongly to the conclusion that RFID-tagged shipments generally move *slower* than non-RFID-tagged shipments.

First, there are differences in terms of PHT at the APOE. RFID-tagged shipments waited 2 to 2.5 times longer than non-RFID-tagged shipments at the APOE and the variability of the PHT for RFID-tagged shipments was 1.5 to 2 times greater than for non-RFID-tagged shipments. Second, shipments of RFID-tagged cargo destined for Tuzla had a 22 percent longer average transit time between the APOE and APOD than non-RFID-tagged cargo and had 2 times greater variability. [NOTE: Since tagged and non-tagged cargo travel on the same aircraft together and transit time between locations is stable over time, it would be reasonable to attribute this variability to the Port Hold Time at Ramstein AB.] Finally, in terms of total average AMC Possession Time, RFID-tagged shipments were in the AMC system 19 percent longer than non-RFID-tagged shipments and also possessed a larger variability.

From these conclusions, several questions remain. First, RFID-tagged cargo met the UMMIPS time standard better than non-RFID-tagged cargo in only one significant

area--PHT at the APOD. Why is this so? Perhaps it is a consequence of the added ITV provided by the RFID technology (the end user knows it has arrived) or it may be a coincidence of the operations at the APOD (neglecting to process the shipment out of the system or a sporadic schedule of pick-ups).

Second, the results of this study may be partially explained by the scope and limitations of this study as identified in Chapter I. Although there is an inclination to suspect that Air Force shipments are given priority over Army shipments at the APOE, the more likely explanation is the characteristics and nature of the cargo being shipped (see explanation under Summary of Findings, Research Question Two). An examination of each area discussed in Chapter I may reveal more possibilities.

Ultimately, the RFID technology described throughout this research is intended to aid the end user; it was not intended to benefit the different transportation nodes. The original purpose behind the implementation of this technology was to enable the requisitioning unit to know where their supplies are and when to expect them; it was not intended to decrease cycle time. However, RFID technology should be expected to help the military plan its shipments, improve readiness and combat capability, and reduce duplicate requisitions. These benefits are a result of the increased shipment visibility RFID technology provides. Technology is frequently called upon to solve problems, but knowing what it may properly be called upon to do can save resources and make a job easier or even possible. Various identification technologies lend themselves to benefit different parts of the supply chain. Decision-makers should be able to use this research

as baseline evidence of the above argument and pursue an analysis of whether this technology delivers on its intended purpose.

Appendix A: Army Population #1 Data

Table 15 - Column Header Definitions for Appendices A, B, and C

Column Header	Definition
TCN	Transportation Control Number
APOE Rcpt	Receipt at Aerial Port of Embarkation (Dover)
APOE Lift	Departure from Aerial Port of Embarkation (Dover)
Intransit Rcpt	Receipt at intransit location (Ramstein)
Intransit Lift	Departure from intransit location (Ramstein)
APOD Rcpt	Receipt at Aerial Port of Debarkation (Taszar or Tuzla)
APOD Lift	Departure from Aerial Port of Debarkation (Taszar or Tuzla)
APOE PHT	Port Hold Time at Aerial Port of Embarkation (Dover) = APOE Lift - APOE Receipt
Transit to RMS	Transit time to Ramstein from Dover = Intransit Receipt - APOE Lift
Intransit PHT	Port Hold Time at intransit location (Ramstein) = Intransit Lift - Intransit Receipt
Transit to APOD	Transit time to Aerial Port of Debarkation (Taszar or Tuzla) from Ramstein = APOD Receipt - Intransit Lift
Intransit Overseas	Total transit time from Aerial Port of Embarkation to Aerial Port of Debarkation = APOD Receipt - APOE Lift
APOD PHT	Port Hold Time at Aerial Port of Debarkation (Taszar or Tuzla) = APOD Lift - APOD Receipt
AMC PT	Air Mobility Command Possession Time = APOD Lift - APOE Receipt

NOTE: Times for Appendices B and C are formatted as a military time followed by a julian date; for example, "1800 8150" translates to "6:00 PM 31 May 98."

TCN	APOE Rcpt	APOE Lift	Intransit Rcpt	Intransit Lift	APOD Rcpt	APOD Lift
APOD = Teezar (TZR)						
SW3123714230 24XXX	5/27/97 6:00 PM	5/29/97 7:00 AM	5/29/97 3:00 PM	5/30/97 6:00 AM	5/30/97 7:00 AM	5/30/97 3:00 PM
SW3123714330 42XXX	5/29/97 4:00 PM	6/3/97 11:00 PM	6/4/97 7:00 AM	6/6/97 5:00 AM	6/6/97 8:00 AM	6/6/97 11:00 AM
SW3123714430 71XXX	5/28/97 10:00 PM	5/30/97 8:00 AM	5/30/97 4:00 PM	6/1/97 6:00 AM	6/1/97 8:00 AM	6/1/97 12:00 PM
SW3123715031 38XXX	6/3/97 1:00 PM	6/6/97 1:00 AM	6/6/97 10:00 AM	6/7/97 5:00 AM	6/7/97 7:00 AM	6/7/97 10:00 AM
SW3123715131 50XXX	6/2/97 8:00 PM	6/6/97 1:00 AM	6/6/97 10:00 AM	6/8/97 5:00 AM	6/8/97 8:00 AM	6/8/97 10:00 AM
SW3123715732 53XXX	6/9/97 6:00 PM	6/11/97 5:00 AM	6/11/97 2:00 PM	6/13/97 1:00 PM	6/13/97 3:00 PM	6/14/97 6:00 AM
SW3123715832 63XXX	6/9/97 6:00 PM	6/11/97 5:00 AM	6/11/97 2:00 PM	6/14/97 6:00 AM	6/14/97 8:00 AM	6/14/97 9:00 AM
SW3123716734 22XXX	6/18/97 12:00 PM	6/23/97 11:00 PM	6/24/97 7:00 AM	6/25/97 6:00 AM	6/25/97 7:00 AM	6/25/97 11:00 AM
SW3123716734 25XXX	6/19/97 12:00 PM	6/20/97 3:00 AM	6/20/97 11:00 AM	6/21/97 9:00 AM	6/21/97 12:00 PM	6/24/97 9:00 AM
SW3123717034 74XXX	6/21/97 4:00 PM	6/23/97 11:00 PM	6/24/97 7:00 AM	6/26/97 12:00 PM	6/26/97 3:00 PM	6/27/97 6:00 AM
SW3123717034 77XXX	6/21/97 5:00 PM	6/23/97 11:00 PM	6/24/97 7:00 AM	6/26/97 6:00 AM	6/26/97 8:00 AM	6/26/97 12:00 PM
SW3123717034 83XXX	6/23/97 8:00 PM	6/25/97 3:00 AM	6/25/97 12:00 PM	6/26/97 12:00 PM	6/26/97 3:00 PM	6/27/97 6:00 AM
SW3123717435 12XXX	6/25/97 12:00 PM	6/27/97 3:00 AM	6/27/97 12:00 PM	6/29/97 5:00 AM	6/29/97 8:00 AM	6/30/97 7:00 AM
SW3123717535 25XXX	6/26/97 2:00 PM	6/30/97 3:00 AM	6/30/97 11:00 AM	7/1/97 6:00 AM	7/1/97 8:00 AM	7/1/97 10:00 AM
SW3123717535 28XXX	6/26/97 2:00 PM	7/2/97 3:00 AM	7/2/97 12:00 PM	7/4/97 6:00 AM	7/4/97 9:00 AM	7/4/97 9:00 AM
SW3123717535 31XXX	6/26/97 12:00 PM	6/27/97 3:00 AM	6/27/97 12:00 PM	6/29/97 5:00 AM	6/29/97 8:00 AM	6/30/97 7:00 AM
SW3123717735 53XXX	6/28/97 12:00 PM	6/30/97 3:00 AM	6/30/97 11:00 AM	7/1/97 6:00 AM	7/1/97 8:00 AM	7/1/97 10:00 AM
SW3123717835 72XXX	6/30/97 11:00 AM	7/2/97 3:00 AM	7/2/97 12:00 PM	7/4/97 6:00 AM	7/4/97 9:00 AM	7/4/97 9:00 AM
SW3123718436 24XXX	7/7/97 1:00 PM	7/9/97 4:00 AM	7/9/97 12:00 PM	7/12/97 6:00 AM	7/12/97 8:00 AM	7/14/97 6:00 AM
SW3123718436 28XXX	7/7/97 1:00 PM	7/9/97 4:00 AM	7/9/97 12:00 PM	7/11/97 6:00 AM	7/11/97 7:00 AM	7/11/97 8:00 AM
SW3123718836 42XXX	7/9/97 1:00 PM	7/10/97 9:00 AM	7/10/97 5:00 PM	7/12/97 6:00 AM	7/12/97 8:00 AM	7/14/97 6:00 AM
SW3123718836 44XXX	7/9/97 1:00 PM	7/13/97 4:00 AM	7/13/97 1:00 PM	7/15/97 6:00 AM	7/15/97 8:00 AM	7/15/97 3:00 PM
SW3123719136 87XXX	7/12/97 11:00 AM	7/16/97 12:00 AM	7/16/97 8:00 AM	7/19/97 6:00 AM	7/19/97 8:00 AM	7/20/97 6:00 AM
SW3123719136 97XXX	7/12/97 2:00 PM	7/16/97 12:00 AM	7/16/97 8:00 AM	7/18/97 12:00 PM	7/18/97 2:00 PM	7/18/97 3:00 PM
SW3123719837 75XXX	7/18/97 11:00 PM	7/21/97 8:00 PM	7/22/97 5:00 AM	7/24/97 8:00 AM	7/24/97 10:00 AM	7/24/97 12:00 PM
SW3123719937 95XXX	7/19/97 12:00 PM	7/21/97 8:00 PM	7/22/97 5:00 AM	7/24/97 8:00 AM	7/24/97 10:00 AM	7/24/97 12:00 PM
SW3123719938 02XXX	7/21/97 12:00 PM	7/23/97 3:00 AM	7/23/97 11:00 AM	7/27/97 6:00 AM	7/27/97 9:00 AM	7/27/97 11:00 AM
SW3123720238 35XXX	7/22/97 5:00 PM	7/25/97 3:00 AM	7/25/97 12:00 PM	7/27/97 12:00 PM	7/27/97 3:00 PM	7/29/97 7:00 AM
SW3123720238 39XXX	7/22/97 6:00 PM	7/25/97 3:00 AM	7/25/97 12:00 PM	7/27/97 12:00 PM	7/27/97 3:00 PM	7/29/97 7:00 AM
SW3123720338 69XXX	7/24/97 1:00 PM	7/28/97 4:00 AM	7/28/97 12:00 PM	7/31/97 5:00 AM	7/31/97 8:00 AM	7/31/97 10:00 AM
SW3123720338 71XXX	7/24/97 5:00 PM	7/28/97 4:00 AM	7/28/97 12:00 PM	7/30/97 1:00 PM	7/30/97 3:00 PM	7/31/97 6:00 AM
SW3123720639 37XXX	7/28/97 2:00 PM	7/30/97 2:00 AM	7/30/97 10:00 AM	8/2/97 6:00 AM	8/2/97 8:00 AM	8/2/97 9:00 AM
SW3123721139 96XXX	7/31/97 6:00 PM	8/2/97 2:00 AM	8/2/97 10:00 AM	8/6/97 6:00 AM	8/6/97 8:00 AM	8/7/97 5:00 AM
SW3123721140 15XXX	8/1/97 12:00 PM	8/3/97 9:00 PM	8/4/97 6:00 AM	8/6/97 6:00 AM	8/6/97 8:00 AM	8/7/97 5:00 AM
SW3123721741 00XXX	8/6/97 3:00 PM	8/11/97 8:00 AM	8/11/97 4:00 PM	8/13/97 6:00 AM	8/13/97 7:00 AM	8/14/97 1:00 PM

TCN	APOE Rcpt	APOE Lift	Intransit Rcpt	Intransit Lift	APOD Rcpt	APOD Lift
SW312372194143XXX	8/8/97 5:00 PM	8/10/97 2:00 AM	8/10/97 12:00 PM	8/12/97 6:00 AM	8/12/97 9:00 AM	8/12/97 9:00 AM
SW312372194144XXX	8/8/97 5:00 PM	8/10/97 2:00 AM	8/10/97 12:00 PM	8/12/97 6:00 AM	8/12/97 9:00 AM	8/12/97 9:00 AM
SW312372204168XXX	8/9/97 2:00 PM	8/12/97 4:00 AM	8/12/97 12:00 PM	8/14/97 6:00 AM	8/14/97 9:00 AM	8/14/97 10:00 AM
SW312372234205XXX	8/12/97 8:00 PM	8/14/97 8:00 AM	8/14/97 3:00 PM	8/15/97 6:00 AM	8/15/97 9:00 AM	8/15/97 12:00 PM
SW312372254255XXX	8/18/97 1:00 PM	8/20/97 2:00 AM	8/20/97 11:00 AM	8/22/97 7:00 AM	8/22/97 10:00 AM	8/23/97 9:00 AM
SW312372264269XXX	8/18/97 4:00 PM	8/20/97 2:00 AM	8/20/97 11:00 AM	8/22/97 7:00 AM	8/22/97 10:00 AM	8/23/97 9:00 AM
SW312372334370XXX	8/22/97 12:00 PM	8/25/97 4:00 AM	8/25/97 11:00 AM	8/27/97 6:00 AM	8/27/97 9:00 AM	8/27/97 12:00 PM
SW312372384436XXX	8/27/97 4:00 PM	8/30/97 1:00 AM	8/30/97 9:00 AM	9/1/97 5:00 AM	9/1/97 7:00 AM	9/1/97 8:00 AM
SW312372454565XXX	9/3/97 7:00 PM	9/6/97 2:00 AM	9/6/97 10:00 AM	9/7/97 5:00 AM	9/7/97 7:00 AM	9/7/97 8:00 AM
SW312372521040XXX	9/11/97 4:00 PM	9/15/97 12:00 PM	9/15/97 8:00 PM	9/17/97 6:00 AM	9/17/97 9:00 AM	9/17/97 9:00 AM
SW312372551106XXX	9/18/97 7:00 PM	9/21/97 8:00 PM	9/22/97 5:00 AM	9/23/97 7:00 AM	9/23/97 9:00 AM	9/23/97 1:00 PM
SW312372729418XXX	9/30/97 8:00 PM	10/3/97 4:00 AM	10/3/97 12:00 PM	10/4/97 5:00 AM	10/4/97 8:00 AM	10/4/97 8:00 AM
SW312372799516XXX	10/7/97 11:00 AM	10/9/97 3:00 AM	10/9/97 11:00 AM	10/11/97 6:00 AM	10/11/97 8:00 AM	10/12/97 7:00 AM
SW312372819582XXX	10/10/97 12:00 PM	10/12/97 4:00 AM	10/12/97 12:00 PM	10/18/97 12:00 PM	10/18/97 3:00 PM	10/20/97 3:00 PM
SW312372819586XXX	10/10/97 3:00 PM	10/13/97 1:00 AM	10/13/97 10:00 AM	10/18/97 8:00 AM	10/18/97 10:00 AM	10/18/97 11:00 AM
SW312372819588XXX	10/10/97 3:00 PM	10/13/97 1:00 AM	10/13/97 10:00 AM	10/15/97 6:00 AM	10/15/97 8:00 AM	10/15/97 8:00 AM
SW312372849632XXX	10/14/97 12:00 PM	10/16/97 12:00 AM	10/16/97 9:00 AM	10/18/97 12:00 PM	10/18/97 3:00 PM	10/20/97 3:00 PM
SW312372889672XXX	10/17/97 5:00 PM	10/21/97 9:00 PM	10/22/97 5:00 AM	10/24/97 9:00 AM	10/24/97 11:00 AM	10/24/97 12:00 PM
SW31237293D697XXX	10/22/97 2:00 PM	10/26/97 2:00 PM	10/26/97 11:00 PM	10/28/97 7:00 AM	10/28/97 10:00 AM	10/28/97 2:00 PM
SW31237297D774XXX	10/25/97 12:00 PM	10/26/97 9:00 PM	10/27/97 5:00 AM	10/28/97 7:00 AM	10/28/97 10:00 AM	10/28/97 2:00 PM
SW31237297D790XXX	10/25/97 6:00 PM	10/27/97 3:00 PM	10/27/97 11:00 PM	10/31/97 1:00 PM	10/31/97 3:00 PM	10/31/97 3:00 PM
SW31237298D804XXX	10/28/97 8:00 PM	10/30/97 5:00 AM	10/30/97 1:00 PM	11/5/97 7:00 AM	11/5/97 10:00 AM	11/5/97 10:00 AM
SW31237298D810XXX	10/28/97 1:00 PM	10/29/97 12:00 PM	10/29/97 10:00 PM	11/3/97 7:00 AM	11/3/97 9:00 AM	11/4/97 6:00 AM
SW31237298D812XXX	10/28/97 1:00 PM	10/29/97 12:00 PM	10/29/97 10:00 PM	11/1/97 2:00 PM	11/1/97 4:00 PM	11/2/97 7:00 AM
SW31237300D821XXX	10/28/97 8:00 PM	10/30/97 5:00 AM	10/30/97 1:00 PM	11/5/97 7:00 AM	11/5/97 10:00 AM	11/5/97 10:00 AM
SW31237301D832XXX	10/30/97 8:00 PM	11/1/97 6:00 AM	11/1/97 2:00 PM	11/3/97 7:00 AM	11/3/97 9:00 AM	11/4/97 6:00 AM
SW31237301D833XXX	10/30/97 8:00 PM	11/1/97 6:00 AM	11/1/97 2:00 PM	11/7/97 7:00 AM	11/7/97 9:00 AM	11/15/97 2:00 PM
SW31237303D878XXX	11/1/97 1:00 PM	11/2/97 5:00 AM	11/2/97 1:00 PM	11/7/97 7:00 AM	11/7/97 9:00 AM	11/15/97 2:00 PM
SW31237305D925XXX	11/3/97 8:00 PM	11/5/97 3:00 AM	11/5/97 11:00 AM	11/7/97 7:00 AM	11/7/97 9:00 AM	11/15/97 2:00 PM
SW31237305D928XXX	11/3/97 8:00 PM	11/5/97 3:00 AM	11/5/97 11:00 AM	11/8/97 6:00 AM	11/8/97 8:00 AM	11/15/97 2:00 PM
SW31237305D929XXX	11/4/97 2:00 PM	11/7/97 1:00 AM	11/7/97 10:00 AM	11/9/97 6:00 AM	11/9/97 9:00 AM	11/9/97 9:00 AM
SW31237311D024XXX	11/8/97 8:00 PM	11/12/97 5:00 AM	11/12/97 12:00 PM	11/13/97 6:00 AM	11/13/97 9:00 AM	11/13/97 9:00 AM
SW31237321D205XXX	11/19/97 6:00 PM	11/21/97 4:00 AM	11/21/97 1:00 PM	11/29/97 8:00 AM	11/29/97 11:00 AM	11/29/97 11:00 AM

TCN	APOE Rcpt	APOE Lift	Intransit Rcpt	Intransit Lift	APOD Rcpt	APOD Lift
TCNs listed below this line are outliers for the Taszar APOD						
SW312371272785XXX	5/9/97 5:00 PM	5/11/97 5:00 AM	5/11/97 1:00 PM	5/13/97 5:00 AM	5/13/97 2:00 PM	5/13/97 2:00 PM
SW312371402995XXX	5/23/97 1:00 PM	5/25/97 3:00 AM	5/25/97 11:00 AM	5/27/97 5:00 AM	5/27/97 9:00 AM	5/27/97 9:00 AM
SW312371613306XXX	6/11/97 7:00 PM	6/15/97 3:00 AM	6/15/97 11:00 AM	6/17/97 4:00 AM	6/17/97 11:00 AM	6/18/97 8:00 AM
SW312371623335XXX	6/12/97 8:00 PM	6/15/97 3:00 AM	6/15/97 12:00 PM	6/17/97 4:00 AM	6/17/97 11:00 AM	6/18/97 8:00 AM
SW312371713493XXX	6/24/97 12:00 PM	6/26/97 2:00 AM	6/26/97 12:00 PM	6/28/97 5:00 AM	6/28/97 9:00 AM	6/28/97 12:00 PM
SW312372254243XXX	8/14/97 7:00 PM	8/16/97 2:00 AM	8/16/97 10:00 AM	8/17/97 5:00 AM	8/17/97 9:00 AM	8/17/97 12:00 PM
SW312372889671XXX	10/17/97 5:00 PM	10/21/97 9:00 PM	10/21/97 5:00 AM	10/24/97 9:00 AM	10/24/97 11:00 AM	10/24/97 12:00 PM
SW31237296D746XXX	10/24/97 2:00 PM	10/26/97 2:00 PM	10/26/97 11:00 PM	10/30/97 6:00 AM	10/30/97 11:00 AM	10/30/97 3:00 PM
SW31237296D753XXX	10/24/97 6:00 PM	10/29/97 12:00 PM	10/29/97 10:00 PM	11/1/97 6:00 AM	11/1/97 2:00 PM	11/1/97 2:00 PM
SW31237298D808XXX	10/28/97 1:00 PM	10/29/97 12:00 PM	10/29/97 10:00 PM	11/1/97 6:00 AM	11/1/97 2:00 PM	11/1/97 2:00 PM
SW31237300D818XXX	10/28/97 8:00 PM	10/30/97 5:00 AM	10/30/97 1:00 PM	11/1/97 6:00 AM	11/1/97 2:00 PM	11/1/97 2:00 PM
SW31237300D822XXX	10/28/97 4:00 PM	10/29/97 12:00 PM	10/29/97 10:00 PM	11/1/97 6:00 AM	11/1/97 2:00 PM	11/1/97 2:00 PM
SW31237311D026XXX	11/8/97 6:00 PM	11/11/97 4:00 AM	11/11/97 12:00 PM	11/12/97 6:00 AM	11/13/97 12:00 PM	11/13/97 1:00 PM
APOD = Tuzla (TZL)						
SW312371282807XXX	5/10/97 11:00 AM	5/11/97 5:00 AM	5/11/97 1:00 PM	5/12/97 11:00 AM	5/12/97 12:00 PM	5/27/97 7:00 AM
SW312371322848XXX	5/13/97 12:00 PM	5/17/97 1:00 AM	5/17/97 9:00 AM	5/18/97 6:00 AM	5/18/97 8:00 AM	6/6/97 9:00 AM
SW312371332868XXX	5/15/97 11:00 AM	5/18/97 4:00 AM	5/18/97 12:00 PM	5/21/97 11:00 AM	5/21/97 1:00 PM	6/6/97 9:00 AM
SW312371342886XXX	5/15/97 9:00 PM	5/19/97 3:00 AM	5/19/97 11:00 AM	5/23/97 4:00 AM	5/23/97 7:00 AM	5/27/97 7:00 AM
SW312371352898XXX	5/16/97 11:00 AM	5/19/97 3:00 AM	5/19/97 11:00 AM	5/23/97 4:00 AM	5/23/97 7:00 AM	6/6/97 9:00 AM
SW312371352987XXX	5/16/97 11:00 PM	5/19/97 3:00 AM	5/19/97 11:00 AM	5/21/97 11:00 AM	5/21/97 1:00 PM	5/27/97 7:00 AM
SW312371402984XXX	5/22/97 11:00 AM	5/24/97 1:00 AM	5/24/97 10:00 AM	5/26/97 4:00 AM	5/26/97 7:00 AM	5/29/97 11:00 AM
SW312371402987XXX	5/22/97 11:00 AM	5/24/97 1:00 AM	5/24/97 10:00 AM	5/26/97 4:00 AM	5/26/97 7:00 AM	6/6/97 9:00 AM
SW312371433048XXX	5/29/97 4:00 PM	6/6/97 1:00 AM	6/6/97 10:00 AM	6/8/97 4:00 AM	6/8/97 7:00 AM	6/8/97 8:00 AM
SW312371483107XXX	5/30/97 1:00 PM	6/3/97 8:00 AM	6/3/97 5:00 PM	6/4/97 11:00 AM	6/4/97 2:00 PM	6/6/97 9:00 AM
SW312371553203XXX	6/6/97 8:00 AM	6/8/97 3:00 AM	6/8/97 12:00 PM	6/9/97 8:00 AM	6/9/97 12:00 PM	6/9/97 2:00 PM
SW312371563223XXX	6/6/97 7:00 PM	6/9/97 7:00 AM	6/9/97 3:00 PM	6/11/97 12:00 PM	6/11/97 4:00 PM	6/12/97 1:00 PM
SW312371563236XXX	6/7/97 6:00 PM	6/9/97 6:00 AM	6/9/97 2:00 PM	6/10/97 1:00 PM	6/10/97 4:00 PM	6/12/97 9:00 AM
SW312371563240XXX	6/7/97 5:00 PM	6/9/97 6:00 AM	6/9/97 2:00 PM	6/10/97 1:00 PM	6/10/97 4:00 PM	6/12/97 1:00 PM
SW312371573252XXX	6/9/97 6:00 PM	6/11/97 5:00 AM	6/11/97 2:00 PM	6/13/97 5:00 AM	6/13/97 8:00 AM	6/14/97 6:00 AM
SW312371583273XXX	6/10/97 12:00 PM	6/11/97 9:00 AM	6/11/97 6:00 PM	6/12/97 2:00 PM	6/12/97 4:00 PM	6/13/97 11:00 AM
SW312371603284XXX	6/10/97 5:00 PM	6/11/97 7:00 AM	6/11/97 5:00 PM	6/12/97 2:00 PM	6/12/97 4:00 PM	6/13/97 11:00 AM
SW312371613302XXX	6/11/97 7:00 PM	6/15/97 3:00 AM	6/15/97 12:00 PM	6/16/97 5:00 AM	6/16/97 8:00 AM	6/16/97 2:00 PM
SW312371623328XXX	6/12/97 7:00 PM	6/15/97 3:00 AM	6/15/97 12:00 PM	6/16/97 12:00 PM	6/16/97 2:00 PM	6/16/97 5:00 PM
SW312371633356XXX	6/13/97 6:00 PM	6/16/97 2:00 AM	6/16/97 10:00 AM	6/17/97 5:00 AM	6/17/97 7:00 AM	6/17/97 4:00 PM
SW312371633358XXX	6/16/97 12:00 PM	6/18/97 2:00 AM	6/18/97 10:00 AM	6/20/97 4:00 AM	6/20/97 5:00 AM	6/21/97 5:00 AM

TCN	APOE Rcpt	APOE Lift	Intransit Rcpt	Intransit Lift	APOD Rcpt	APOD Lift
SW3123716333362XXX	6/13/97 6:00 PM	6/15/97 3:00 AM	6/15/97 11:00 AM	6/16/97 12:00 PM	6/16/97 2:00 PM	6/16/97 5:00 PM
SW3123716433387XXX	6/14/97 8:00 PM	6/17/97 12:00 AM	6/17/97 8:00 AM	6/19/97 4:00 AM	6/19/97 7:00 AM	6/19/97 2:00 PM
SW3123716934446XXX	6/19/97 12:00 PM	6/25/97 3:00 AM	6/25/97 1:00 PM	6/27/97 5:00 AM	6/27/97 9:00 AM	6/28/97 1:00 PM
SW3123717034471XXX	6/20/97 2:00 PM	6/22/97 11:00 PM	6/23/97 7:00 AM	6/26/97 5:00 AM	6/26/97 8:00 AM	6/27/97 12:00 PM
SW3123717535523XXX	6/26/97 2:00 PM	6/29/97 3:00 AM	6/29/97 12:00 PM	7/1/97 4:00 AM	7/1/97 7:00 AM	7/3/97 1:00 PM
SW3123717835567XXX	6/30/97 6:00 PM	7/2/97 3:00 AM	7/2/97 12:00 PM	7/7/97 4:00 AM	7/7/97 7:00 AM	7/9/97 5:00 PM
SW3123718235594XXX	7/2/97 1:00 PM	7/7/97 3:00 AM	7/7/97 11:00 AM	7/12/97 4:00 AM	7/12/97 7:00 AM	7/15/97 10:00 AM
SW3123720338370XXX	7/24/97 5:00 PM	7/28/97 4:00 AM	7/28/97 12:00 PM	8/1/97 2:00 PM	8/1/97 4:00 PM	8/2/97 1:00 PM
SW3123720739349XXX	7/29/97 4:00 PM	8/1/97 11:00 PM	8/2/97 7:00 AM	8/6/97 4:00 AM	8/6/97 7:00 AM	8/7/97 2:00 PM
SW3123721640960XXX	8/6/97 9:00 PM	8/11/97 8:00 AM	8/11/97 4:00 PM	8/14/97 4:00 AM	8/14/97 7:00 AM	8/14/97 3:00 PM
SW3123721740980XXX	8/6/97 3:00 PM	8/11/97 8:00 AM	8/11/97 4:00 PM	8/15/97 1:00 PM	8/15/97 3:00 PM	8/16/97 2:00 PM
SW3123722041720XXX	8/9/97 2:00 PM	8/12/97 4:00 AM	8/12/97 12:00 PM	8/16/97 5:00 AM	8/16/97 7:00 AM	8/16/97 5:00 PM
SW3123722442250XXX	8/13/97 1:00 PM	8/15/97 2:00 AM	8/15/97 10:00 AM	8/16/97 4:00 AM	8/16/97 7:00 AM	8/16/97 5:00 PM
SW3123722442310XXX	8/13/97 8:00 PM	8/15/97 8:00 PM	8/16/97 4:00 AM	8/18/97 7:00 AM	8/18/97 8:00 AM	8/20/97 8:00 AM
SW3123723343720XXX	8/23/97 12:00 PM	8/25/97 4:00 AM	8/25/97 11:00 AM	8/27/97 4:00 AM	8/27/97 7:00 AM	8/27/97 9:00 AM
SW3123723343830XXX	8/22/97 6:00 PM	8/25/97 4:00 AM	8/25/97 11:00 AM	8/28/97 7:00 AM	8/28/97 9:00 AM	8/30/97 7:00 AM
SW3123723343870XXX	8/25/97 1:00 PM	8/28/97 1:00 AM	8/28/97 10:00 AM	8/30/97 4:00 AM	8/30/97 7:00 AM	9/1/97 12:00 PM
SW3123723444030XXX	8/25/97 5:00 PM	8/28/97 1:00 AM	8/28/97 10:00 AM	8/30/97 5:00 AM	8/30/97 8:00 AM	9/3/97 2:00 PM
SW3123723544080XXX	8/25/97 5:00 PM	8/28/97 1:00 AM	8/28/97 10:00 AM	8/30/97 4:00 AM	8/30/97 7:00 AM	9/1/97 12:00 PM
SW3123723844340XXX	8/27/97 4:00 PM	8/29/97 9:00 PM	8/30/97 5:00 AM	9/1/97 5:00 AM	9/1/97 8:00 AM	9/3/97 2:00 PM
SW3123723844370XXX	8/27/97 4:00 PM	8/29/97 9:00 PM	8/30/97 5:00 AM	9/1/97 12:00 PM	9/1/97 2:00 PM	9/3/97 2:00 PM
SW3123723844450XXX	8/28/97 3:00 PM	8/29/97 9:00 PM	8/30/97 5:00 AM	9/1/97 5:00 AM	9/1/97 8:00 AM	9/3/97 2:00 PM
SW3123724145340XXX	9/2/97 12:00 PM	9/3/97 4:00 AM	9/3/97 1:00 PM	9/4/97 5:00 AM	9/4/97 8:00 AM	9/8/97 4:00 PM
SW3123725811390XXX	9/18/97 6:00 PM	9/20/97 1:00 AM	9/20/97 9:00 AM	9/21/97 12:00 PM	9/21/97 4:00 PM	9/22/97 7:00 PM
SW3123726292260XXX	9/20/97 4:00 PM	9/23/97 9:00 PM	9/24/97 5:00 AM	9/26/97 6:00 AM	9/26/97 7:00 AM	9/27/97 1:00 PM
SW3123726692940XXX	9/25/97 6:00 PM	9/29/97 2:00 AM	9/29/97 9:00 AM	10/1/97 12:00 PM	10/1/97 3:00 PM	10/1/97 6:00 PM
SW3123726793100XXX	9/24/97 7:00 PM	9/28/97 5:00 AM	9/28/97 1:00 PM	10/2/97 12:00 PM	10/2/97 4:00 PM	10/3/97 6:00 AM
SW3123726793140XXX	9/25/97 4:00 PM	9/30/97 4:00 AM	9/30/97 11:00 AM	10/2/97 6:00 AM	10/2/97 8:00 AM	10/2/97 9:00 AM
SW3123726793390XXX	9/26/97 1:00 PM	9/30/97 4:00 AM	9/30/97 11:00 AM	10/2/97 6:00 AM	10/2/97 8:00 AM	10/2/97 9:00 AM
SW3123726893650XXX	9/26/97 7:00 PM	9/28/97 5:00 AM	9/28/97 1:00 PM	9/29/97 1:00 PM	9/29/97 3:00 PM	9/30/97 9:00 AM
SW3123726893680XXX	9/29/97 12:00 PM	10/1/97 2:00 AM	10/1/97 10:00 AM	10/4/97 1:00 PM	10/4/97 2:00 PM	10/5/97 6:00 AM
SW3123726993920XXX	9/27/97 8:00 PM	9/29/97 2:00 AM	9/29/97 9:00 AM	10/2/97 5:00 AM	10/2/97 8:00 AM	10/2/97 10:00 AM
SW3123727094050XXX	9/27/97 9:00 PM	9/30/97 4:00 AM	9/30/97 11:00 AM	10/2/97 12:00 PM	10/2/97 4:00 PM	10/3/97 6:00 AM
SW3123727394390XXX	10/2/97 12:00 PM	10/4/97 12:00 AM	10/4/97 8:00 AM	10/7/97 6:00 AM	10/7/97 10:00 AM	10/7/97 10:00 AM
SW31237290D6860XX	10/20/97 6:00 PM	10/24/97 5:00 AM	10/24/97 12:00 PM	10/26/97 1:00 PM	10/26/97 5:00 PM	10/26/97 6:00 PM
SW31237301D8460XX	10/30/97 4:00 PM	11/1/97 6:00 AM	11/1/97 2:00 PM	11/4/97 4:00 PM	11/4/97 5:00 PM	11/6/97 3:00 PM

TCN	APOE Rcpt	APOE Lift	Intransit Rcpt	Intransit Lift	APOD Rcpt	APOD Lift
SW31237301D857XXX	10/29/97 11:00 PM	11/2/97 9:00 AM	11/2/97 6:00 PM	11/5/97 1:00 PM	11/5/97 4:00 PM	11/8/97 3:00 PM
SW31237303D892XXX	11/1/97 4:00 PM	11/2/97 5:00 AM	11/2/97 1:00 PM	11/4/97 4:00 PM	11/4/97 5:00 PM	11/8/97 3:00 PM
SW31237308D978XXX	11/7/97 5:00 PM	11/10/97 11:00 PM	11/11/97 7:00 AM	11/13/97 2:00 PM	11/13/97 5:00 PM	11/14/97 2:00 PM
SW31237310D000XXX	11/7/97 5:00 PM	11/10/97 11:00 PM	11/11/97 7:00 AM	11/13/97 2:00 PM	11/13/97 5:00 PM	11/14/97 2:00 PM
SW31237310D018XXX	11/8/97 4:00 PM	11/12/97 5:00 AM	11/12/97 12:00 PM	11/15/97 3:00 PM	11/15/97 7:00 PM	11/16/97 11:00 AM
SW31237311D031XXX	11/10/97 2:00 PM	11/11/97 6:00 AM	11/11/97 2:00 PM	11/14/97 8:00 AM	11/14/97 12:00 PM	11/15/97 7:00 AM
SW31237316D103XXX	11/14/97 2:00 AM	11/16/97 4:00 AM	11/16/97 12:00 PM	11/26/97 3:00 PM	11/26/97 7:00 PM	11/29/97 8:00 AM
SW31237319D170XXX	11/17/97 8:00 PM	11/19/97 2:00 AM	11/19/97 12:00 PM	11/27/97 9:00 AM	11/27/97 12:00 PM	11/29/97 8:00 AM
SW31237323D252XXX	11/21/97 2:00 PM	11/25/97 4:00 AM	11/25/97 12:00 PM	11/27/97 7:00 AM	11/27/97 11:00 AM	11/29/97 8:00 AM
TCNs listed below	**this line are outliers for the Tuzla APOD**					
SW3123713529O4XXX	5/16/97 11:00 PM	5/19/97 3:00 AM	5/19/97 11:00 AM	5/21/97 5:00 AM	5/21/97 5:00 AM	6/6/97 9:00 AM
SW3123719537O3XXX	7/15/97 8:00 PM	7/17/97 4:00 AM	7/17/97 12:00 PM	7/18/97 4:00 PM	7/18/97 4:00 PM	7/20/97 3:00 PM
SW3123720338O0XXX	7/24/97 5:00 PM	7/29/97 2:00 AM	7/30/97 7:00 AM	8/8/97 10:00 AM	8/8/97 10:00 AM	8/9/97 5:00 PM
SW3123720639O5XXX	7/26/97 9:00 PM	7/30/97 2:00 AM	7/30/97 10:00 AM	8/3/97 4:00 AM	8/4/97 7:00 AM	8/4/97 1:00 PM
SW3123720939O2XXX	7/30/97 4:00 PM	8/1/97 1:00 AM	8/1/97 9:00 AM	8/2/97 2:00 PM	8/3/97 4:00 PM	8/4/97 1:00 PM
SW3123725511O2XXX	9/16/97 6:00 PM	9/18/97 2:00 AM	9/18/97 10:00 AM	9/19/97 12:00 PM	9/20/97 9:00 AM	9/21/97 6:00 AM
SW3123725611O4XXX	9/15/97 6:00 PM	9/17/97 2:00 AM	9/17/97 9:00 AM	9/19/97 12:00 PM	9/20/97 9:00 AM	9/21/97 6:00 AM
SW3123726692O5XXX	9/25/97 4:00 PM	9/28/97 5:00 AM	9/28/97 1:00 PM	9/30/97 5:00 AM	9/30/97 10:00 AM	9/30/97 10:00 AM
SW3123726993O2XXX	9/30/97 4:00 PM	10/1/97 9:00 PM	10/2/97 8:00 AM	10/5/97 8:00 AM	10/5/97 11:00 AM	10/6/97 11:00 AM
SW3123726994O1XXX	9/27/97 9:00 PM	9/29/97 1:00 AM	9/29/97 9:00 AM	10/3/97 1:00 PM	10/4/97 10:00 AM	10/4/97 10:00 AM
SW3123727394O5XXX	10/1/97 7:00 PM	10/3/97 4:00 AM	10/3/97 12:00 PM	10/8/97 6:00 AM	10/8/97 12:00 PM	10/8/97 3:00 PM
SW3123727494O2XXX	10/3/97 8:00 PM	10/6/97 3:00 AM	10/6/97 10:00 AM	10/8/97 5:00 AM	10/8/97 12:00 PM	10/8/97 2:00 PM
SW3123728896O5XXX	10/17/97 3:00 PM	10/20/97 11:00 AM	10/20/97 8:00 PM	10/21/97 1:00 PM	10/22/97 7:00 AM	10/24/97 6:00 PM
SW3123728996O8XXX	10/18/97 7:00 PM	10/20/97 11:00 AM	10/20/97 8:00 PM	10/22/97 6:00 AM	10/22/97 5:00 PM	10/24/97 6:00 PM
SW31237297D775XXX	10/25/97 12:00 PM	10/27/97 3:00 PM	10/27/97 11:00 PM	10/30/97 2:00 PM	10/31/97 10:00 AM	10/31/97 10:00 AM
SW31237297D788XXX	10/25/97 6:00 PM	10/29/97 4:00 AM	10/29/97 1:00 PM	10/30/97 3:00 PM	10/31/97 10:00 AM	10/31/97 10:00 AM
SW31237298D811XXX	10/28/97 1:00 PM	10/29/97 12:00 PM	10/29/97 10:00 PM	10/31/97 2:00 PM	11/1/97 12:00 PM	11/3/97 7:00 AM
SW31237300D827XXX	10/29/97 3:00 PM	10/31/97 6:00 AM	10/31/97 1:00 PM	11/1/97 7:00 AM	11/3/97 7:00 AM	11/3/97 7:00 AM
SW31237300D831XXX	10/30/97 8:00 PM	11/1/97 6:00 AM	11/1/97 2:00 PM	11/2/97 2:00 PM	11/3/97 7:00 AM	11/3/97 7:00 AM
SW31237301D838XXX	10/29/97 3:00 PM	10/31/97 6:00 AM	10/31/97 1:00 PM	11/1/97 2:00 PM	11/3/97 7:00 AM	11/3/97 7:00 AM
SW31237301D858XXX	10/30/97 1:00 AM	11/2/97 9:00 AM	11/2/97 6:00 PM	11/5/97 6:00 AM	11/5/97 3:00 PM	11/8/97 3:00 PM
SW31237302D866XXX	10/31/97 3:00 AM	11/1/97 6:00 AM	11/1/97 2:00 PM	11/2/97 2:00 PM	11/3/97 7:00 AM	11/3/97 7:00 AM
SW31237303D876XXX	11/1/97 1:00 PM	11/2/97 5:00 AM	11/2/97 1:00 PM	11/5/97 7:00 AM	11/5/97 3:00 PM	11/8/97 3:00 PM
SW31237304D906XXX	11/3/97 5:00 PM	11/5/97 3:00 AM	11/5/97 11:00 AM	11/15/97 9:00 AM	11/15/97 7:00 PM	11/16/97 11:00 AM
SW31237304D912XXX	11/3/97 5:00 PM	11/5/97 3:00 AM	11/5/97 11:00 AM	11/6/97 7:00 AM	11/6/97 2:00 PM	11/8/97 3:00 PM
SW31237304D921XXX	11/3/97 5:00 PM	11/4/97 8:00 AM	11/4/97 4:00 PM	11/10/97 7:00 AM	11/10/97 5:00 PM	11/12/97 8:00 AM

TCN	APOE Rcpt	APOE Lift	Intransit Rcpt	Intransit Lift	APOD Rcpt	APOD Lift
SW31237307D965XXX	11/5/97 8:00 PM	11/10/97 11:00 PM	11/11/97 7:00 AM	11/13/97 6:00 AM	11/13/97 3:00 PM	11/14/97 2:00 PM
SW31237309D994XXX	11/6/97 9:00 PM	11/10/97 3:00 AM	11/10/97 11:00 AM	11/13/97 7:00 AM	11/13/97 3:00 PM	11/14/97 2:00 PM
SW31237309D997XXX	11/6/97 9:00 PM	11/10/97 3:00 AM	11/10/97 11:00 AM	11/13/97 7:00 AM	11/13/97 3:00 PM	11/14/97 2:00 PM
SW31237310D002XXX	11/7/97 5:00 PM	11/13/97 11:00 PM	11/14/97 12:00 PM	11/15/97 2:00 PM	11/15/97 7:00 PM	11/16/97 11:00 AM
SW31237310D019XXX	11/8/97 4:00 PM	11/13/97 11:00 PM	11/14/97 12:00 PM	11/16/97 4:00 PM	11/16/97 7:00 PM	11/17/97 12:00 PM
SW31237311D022XXX	11/8/97 8:00 PM	11/13/97 11:00 PM	11/14/97 12:00 PM	11/16/97 4:00 PM	11/16/97 7:00 PM	11/17/97 12:00 PM
SW31237311D026XXX	11/8/97 4:00 PM	11/14/97 2:00 AM	11/14/97 1:00 PM	11/16/97 6:00 AM	11/16/97 3:00 PM	11/17/97 12:00 PM
SW31237311D038XXX	11/10/97 2:00 PM	11/13/97 11:00 PM	11/14/97 12:00 PM	11/16/97 4:00 PM	11/16/97 7:00 PM	11/17/97 12:00 PM
SW31237312D041XXX	11/12/97 3:00 PM	11/14/97 2:00 AM	11/14/97 1:00 PM	11/17/97 1:00 PM	11/17/97 5:00 PM	11/22/97 2:00 PM
SW31237312D054XXX	11/12/97 3:00 PM	11/13/97 5:00 AM	11/13/97 2:00 PM	11/15/97 9:00 AM	11/15/97 7:00 PM	11/16/97 11:00 AM
SW31237314D081XXX	11/13/97 2:00 PM	11/14/97 3:00 AM	11/14/97 2:00 PM	11/17/97 6:00 AM	11/17/97 5:00 PM	11/22/97 2:00 PM
SW31237314D082XXX	11/13/97 3:00 PM	11/14/97 3:00 AM	11/14/97 2:00 PM	11/17/97 6:00 AM	11/17/97 5:00 PM	11/22/97 2:00 PM
SW31237317D127XXX	11/14/97 8:00 PM	11/16/97 4:00 AM	11/16/97 1:00 PM	11/26/97 12:00 PM	11/26/97 7:00 PM	11/29/97 8:00 AM
SW31237319D181XXX	11/18/97 3:00 PM	11/21/97 4:00 AM	11/21/97 1:00 PM	11/26/97 12:00 PM	11/26/97 7:00 PM	11/29/97 8:00 AM
SW31237321D190XXX	11/18/97 3:00 PM	11/21/97 4:00 AM	11/21/97 1:00 PM	11/26/97 12:00 PM	11/26/97 7:00 PM	11/29/97 8:00 AM
SW31237325D288XXX	11/22/97 4:00 PM	11/25/97 4:00 AM	11/25/97 12:00 PM	11/28/97 8:00 AM	11/29/97 8:00 AM	11/29/97 8:00 AM

TCN	APOE PHT	Transit to RMS	Intransit PHT	Transit to APOD	Intransit Overseas	APOD PHT	AMC PT
APOD = Taszar (TZR)							
SW3123714230 24XXX	1.54	0.33	0.63	0.04	1.00	0.33	2.88
SW3123714330 42XXX	5.29	0.33	1.92	0.13	2.38	0.13	7.79
SW3123714430 71XXX	1.42	0.33	1.58	0.08	2.00	0.17	3.58
SW3123715031 38XXX	2.50	0.38	0.79	0.08	1.25	0.13	3.88
SW3123715131 50XXX	3.21	0.38	1.79	0.13	2.29	0.08	5.58
SW3123715732 53XXX	1.46	0.38	1.96	0.08	2.42	0.63	4.50
SW3123715832 63XXX	1.46	0.38	2.67	0.08	3.13	0.04	4.63
SW3123716734 22XXX	5.46	0.33	0.96	0.04	1.33	0.17	6.96
SW3123716734 25XXX	0.63	0.33	0.92	0.13	1.38	2.88	4.88
SW3123717034 74XXX	2.29	0.33	2.21	0.13	2.67	0.63	5.58
SW3123717034 77XXX	2.25	0.33	1.96	0.08	2.38	0.17	4.79
SW3123717034 83XXX	1.29	0.38	1.00	0.13	1.50	0.63	3.42
SW3123717435 12XXX	1.63	0.38	1.71	0.13	2.21	0.96	4.79
SW3123717535 25XXX	3.54	0.33	0.79	0.08	1.21	0.08	4.83
SW3123717535 28XXX	5.54	0.38	1.75	0.13	2.25	0.00	7.79
SW3123717535 31XXX	0.63	0.38	1.71	0.13	2.21	0.96	3.79
SW3123717735 53XXX	1.63	0.33	0.79	0.08	1.21	0.08	2.92
SW3123717835 72XXX	1.67	0.38	1.75	0.13	2.25	0.00	3.92
SW3123718436 24XXX	1.63	0.33	2.75	0.08	3.17	1.92	6.71
SW3123718436 28XXX	1.63	0.33	1.75	0.04	2.13	0.04	3.79
SW3123718836 42XXX	0.83	0.33	1.54	0.08	1.96	1.92	4.71
SW3123718836 44XXX	3.63	0.38	1.71	0.08	2.17	0.29	6.08
SW3123719136 87XXX	3.54	0.33	2.92	0.08	3.33	0.92	7.79
SW3123719136 97XXX	3.42	0.33	2.17	0.08	2.58	0.04	6.04
SW3123719837 75XXX	2.88	0.38	2.13	0.08	2.58	0.08	5.54
SW3123719937 95XXX	2.33	0.38	2.13	0.08	2.58	0.08	5.00
SW3123719938 02XXX	1.63	0.33	3.79	0.13	4.25	0.08	5.96
SW3123720238 35XXX	2.42	0.38	2.00	0.13	2.50	1.67	6.58
SW3123720238 39XXX	2.38	0.38	2.00	0.13	2.50	1.67	6.54
SW3123720338 69XXX	3.63	0.33	2.71	0.13	3.17	0.08	6.88
SW3123720338 71XXX	3.46	0.33	2.04	0.08	2.46	0.63	6.54
SW3123720639 37XXX	1.50	0.33	2.83	0.08	3.25	0.04	4.79
SW3123721139 96XXX	1.33	0.33	3.83	0.08	4.25	0.88	6.46
SW3123721140 15XXX	2.38	0.38	2.00	0.08	2.46	0.88	5.71
SW3123721741 00XXX	4.71	0.33	1.58	0.04	1.96	1.25	7.92

TCN	APOE PHT	Transit to RMS	Intransit PHT	Transit to APOD	Intransit Overseas	APOD PHT	AMC PT
SW3123721941 43XXX	1.38	0.42	1.75	0.13	2.29	0.00	3.67
SW3123721941 44XXX	1.38	0.42	1.75	0.13	2.29	0.00	3.67
SW3123722041 68XXX	2.58	0.33	1.75	0.13	2.21	0.04	4.83
SW3123722342 05XXX	1.50	0.29	0.63	0.13	1.04	0.13	2.67
SW3123722542 55XXX	1.54	0.38	1.83	0.13	2.33	0.96	4.83
SW3123722642 69XXX	1.42	0.38	1.83	0.13	2.33	0.96	4.71
SW3123723343 70XXX	2.67	0.29	1.79	0.13	2.21	0.13	5.00
SW3123723844 36XXX	2.38	0.33	1.83	0.08	2.25	0.04	4.67
SW3123724545 65XXX	2.29	0.33	0.79	0.08	1.21	0.04	3.54
SW3123725210 40XXX	3.83	0.33	1.42	0.13	1.88	0.00	5.71
SW3123725511 06XXX	3.04	0.38	1.08	0.08	1.54	0.17	4.75
SW3123727294 18XXX	2.33	0.33	0.71	0.13	1.17	0.00	3.50
SW3123727995 16XXX	1.67	0.33	1.79	0.08	2.21	0.96	4.83
SW3123728195 82XXX	1.67	0.33	6.00	0.13	6.46	2.00	10.13
SW3123728195 86XXX	2.42	0.38	4.92	0.08	5.38	0.04	7.83
SW3123728195 88XXX	2.42	0.38	1.83	0.08	2.29	0.00	4.71
SW3123728496 32XXX	1.50	0.38	2.13	0.13	2.63	2.00	6.13
SW3123728896 72XXX	4.17	0.33	2.17	0.08	2.58	0.04	6.79
SW31237293D6 97XXX	4.00	0.38	1.33	0.13	1.83	0.17	6.00
SW31237297D7 74XXX	1.38	0.33	1.08	0.13	1.54	0.17	3.08
SW31237297D7 90XXX	1.88	0.33	3.58	0.08	4.00	0.00	5.88
SW31237298D8 04XXX	1.38	0.33	5.75	0.13	6.21	0.00	7.58
SW31237298D8 10XXX	0.96	0.42	4.38	0.08	4.88	0.88	6.71
SW31237298D8 12XXX	0.96	0.42	2.67	0.08	3.17	0.63	4.75
SW31237300D8 21XXX	1.38	0.33	5.75	0.13	6.21	0.00	7.58
SW31237301D8 32XXX	1.42	0.33	1.71	0.08	2.13	0.88	4.42
SW31237301D8 33XXX	1.42	0.33	5.71	0.08	6.13	8.21	15.75
SW31237303D8 78XXX	0.67	0.33	4.75	0.08	5.17	8.21	14.04
SW31237305D9 25XXX	1.29	0.33	1.83	0.08	2.25	8.21	11.75
SW31237305D9 28XXX	1.29	0.33	2.79	0.08	3.21	7.25	11.75
SW31237305D9 29XXX	2.46	0.38	1.83	0.13	2.33	0.00	4.79
SW31237311D0 24XXX	3.38	0.29	0.75	0.13	1.17	0.00	4.54
SW31237321D2 05XXX	1.42	0.38	7.79	0.13	8.29	0.00	9.71

TCN	APOE PHT	Transit to RMS	Intransit PHT	Transit to APOD	Intransit Overseas	APOD PHT	AMC PT
TCNs listed below this line are outliers for the Taszar APOD							
SW3123712727 85XXX	1.50	0.33	1.67	0.38	2.38	0.00	3.88
SW3123714029 95XXX	1.58	0.33	1.75	0.17	2.25	0.00	3.83
SW3123716133 06XXX	3.33	0.33	1.71	0.29	2.33	0.88	6.54
SW3123716233 35XXX	2.29	0.38	1.67	0.29	2.33	0.88	5.50
SW3123717134 93XXX	1.58	0.42	1.71	0.17	2.29	0.13	4.00
SW3123722542 43XXX	1.29	0.33	0.79	0.17	1.29	0.13	2.71
SW3123728896 71XXX	4.17	-0.67	3.17	0.08	2.58	0.04	6.79
SW3123729 6D746XXX	2.00	0.38	3.29	0.21	3.88	0.17	6.04
SW3123729 6D753XXX	4.75	0.42	2.33	0.33	3.08	0.00	7.83
SW3123729 8D808XXX	0.96	0.42	2.33	0.33	3.08	0.00	4.04
SW3123730 0D818XXX	1.38	0.33	1.71	0.33	2.38	0.00	3.75
SW3123730 0D822XXX	0.83	0.42	2.33	0.33	3.08	0.00	3.92
SW3123731 1D028XXX	2.42	0.33	0.75	1.25	2.33	0.04	4.79
APOD = Tuzla (TZL)							
SW3123712828 07XXX	0.75	0.33	0.92	0.04	1.29	14.79	16.83
SW3123713228 48XXX	3.54	0.33	0.88	0.08	1.29	19.04	23.88
SW3123713328 68XXX	2.71	0.33	2.96	0.08	3.38	15.83	21.92
SW3123713428 86XXX	3.25	0.33	3.71	0.13	4.17	4.00	11.42
SW3123713528 98XXX	2.67	0.33	3.71	0.13	4.17	14.08	20.92
SW3123713529 87XXX	2.17	0.33	2.00	0.08	2.42	5.75	10.33
SW3123714029 84XXX	1.58	0.38	1.75	0.13	2.25	3.17	7.00
SW3123714029 87XXX	1.58	0.38	1.75	0.13	2.25	11.08	14.92
SW3123714330 48XXX	7.38	0.38	1.75	0.13	2.25	0.04	9.67
SW3123714831 07XXX	3.79	0.38	0.75	0.13	1.25	1.79	6.83
SW3123715532 03XXX	1.79	0.38	0.83	0.17	1.38	0.08	3.25
SW3123715632 23XXX	2.50	0.33	1.88	0.17	2.38	0.88	5.75
SW3123715632 36XXX	1.50	0.33	0.96	0.13	1.42	1.71	4.63
SW3123715632 40XXX	1.54	0.33	0.96	0.13	1.42	1.88	4.83
SW3123715732 52XXX	1.46	0.38	1.63	0.13	2.13	0.92	4.50
SW3123715832 73XXX	0.88	0.38	0.83	0.08	1.29	0.79	2.96
SW3123716032 84XXX	0.58	0.42	0.88	0.08	1.38	0.79	2.75
SW3123716133 02XXX	3.33	0.38	0.71	0.13	1.21	0.25	4.79
SW3123716233 28XXX	2.33	0.38	1.00	0.08	1.46	0.13	3.92
SW3123716333 56XXX	2.33	0.33	0.79	0.08	1.21	0.38	3.92
SW3123716333 58XXX	1.58	0.33	1.75	0.04	2.13	1.00	4.71

TCN	APOE PHT	Transit to RMS	Intransit PHT	Transit to APOD	Intransit Overseas	APOD PHT	AMC PT
SW3123716333362XXX	1.38	0.33	1.04	0.08	1.46	0.13	2.96
SW3123716433387XXX	2.17	0.33	1.83	0.13	2.29	0.29	4.75
SW3123717033446XXX	5.63	0.42	1.67	0.17	2.25	1.17	9.04
SW3123717033471XXX	2.38	0.33	2.92	0.13	3.38	1.17	6.92
SW3123717533523XXX	2.54	0.38	1.67	0.13	2.17	2.25	6.96
SW3123717833567XXX	1.38	0.38	4.67	0.13	5.17	2.42	8.96
SW3123718233594XXX	4.58	0.33	4.71	0.13	5.17	3.13	12.88
SW3123720338370XXX	3.46	0.33	4.08	0.08	4.50	0.88	8.83
SW3123720739349XXX	3.29	0.33	3.88	0.13	4.33	1.29	8.92
SW3123721640960XXX	4.46	0.33	2.50	0.13	2.96	0.33	7.75
SW3123721740980XXX	4.71	0.33	3.88	0.08	4.29	0.96	9.96
SW3123722041720XXX	2.58	0.33	3.71	0.08	4.13	0.42	7.13
SW3123722442250XXX	1.54	0.33	0.75	0.13	1.21	0.42	3.17
SW3123722442310XXX	2.00	0.33	2.13	0.04	2.50	2.00	6.50
SW3123723343720XXX	1.67	0.29	1.71	0.13	2.13	0.08	3.88
SW3123723343830XXX	2.42	0.29	2.83	0.08	3.21	1.92	7.54
SW3123723343870XXX	2.50	0.38	1.75	0.13	2.25	2.21	6.96
SW3123723444030XXX	2.33	0.38	1.79	0.13	2.29	4.25	8.88
SW3123723544080XXX	2.33	0.38	1.75	0.13	2.25	2.21	6.79
SW3123723844340XXX	2.21	0.33	2.00	0.13	2.46	2.25	6.92
SW3123723844370XXX	2.21	0.33	2.29	0.08	2.71	2.00	6.92
SW3123723844450XXX	1.25	0.33	2.00	0.13	2.46	2.25	5.96
SW3123724145340XXX	0.67	0.38	0.67	0.13	1.17	4.33	6.17
SW3123725811390XXX	1.29	0.33	1.13	0.17	1.63	1.13	4.04
SW3123726292260XXX	3.21	0.33	2.04	0.04	2.42	1.25	6.88
SW3123726692940XXX	3.33	0.29	2.13	0.13	2.54	0.13	6.00
SW3123726793100XXX	3.42	0.33	3.96	0.17	4.46	0.58	8.46
SW3123726793140XXX	4.50	0.29	1.79	0.08	2.17	0.04	6.71
SW3123726793390XXX	3.63	0.29	1.79	0.08	2.17	0.04	5.83
SW3123726893650XXX	1.42	0.33	1.00	0.08	1.42	0.75	3.58
SW3123726893680XXX	1.58	0.33	3.13	0.04	3.50	0.67	5.75
SW3123726993920XXX	1.25	0.29	2.83	0.13	3.25	0.08	4.58
SW3123727094050XXX	2.29	0.29	2.04	0.17	2.50	0.58	5.38
SW3123727394390XXX	1.50	0.33	2.92	0.17	3.42	0.00	4.92
SW312372900D686XXX	3.46	0.29	2.04	0.17	2.50	0.04	6.00
SW312373010D846XXX	1.58	0.33	3.08	0.04	3.46	3.92	8.96

TCN	APOE PHT	Transit to RMS	Intransit PHT	Transit to APOD	Intransit Overseas	APOD PHT	AMC PT
SW31237301D857XXX	3.42	0.38	2.79	0.13	3.29	2.96	9.67
SW31237303D892XXX	0.54	0.33	2.13	0.04	2.50	3.92	6.96
SW31237308D978XXX	3.25	0.33	2.29	0.13	2.75	0.88	6.88
SW31237310D000XXX	3.25	0.33	2.29	0.13	2.75	0.88	6.88
SW31237310D018XXX	3.54	0.29	3.13	0.17	3.58	0.67	7.79
SW31237311D031XXX	0.67	0.33	2.75	0.17	3.25	0.79	4.71
SW31237316D103XXX	2.08	0.33	10.13	0.17	10.63	2.54	15.25
SW31237319D170XXX	1.25	0.42	7.88	0.13	8.42	1.83	11.50
SW31237323D252XXX	3.58	0.33	1.79	0.17	2.29	1.88	7.75
TCNs listed below	**this line are outliers for the Tuzla APOD**						
SW312371352904XXX	2.17	0.33	1.75	0.00	2.08	16.17	20.42
SW312371953723XXX	1.33	0.33	1.17	0.00	1.50	1.96	4.79
SW312372033860XXX	4.38	1.21	9.13	0.00	10.33	1.29	16.00
SW312372063925XXX	3.21	0.33	3.75	1.13	5.21	0.25	8.67
SW312372093972XXX	1.38	0.33	1.21	1.08	2.63	0.88	4.88
SW312372551102XXX	1.33	0.33	1.08	0.88	2.29	0.88	4.50
SW312372561124XXX	1.33	0.29	2.13	0.88	3.29	0.88	5.50
SW312372669285XXX	2.54	0.33	1.67	0.21	2.21	0.00	4.75
SW312372699382XXX	1.21	0.46	3.00	0.13	3.58	1.00	5.79
SW312372699401XXX	1.17	0.33	4.17	0.88	5.38	0.00	6.54
SW312372739450XXX	1.38	0.33	4.75	0.25	5.33	0.13	6.83
SW312372749452XXX	2.29	0.29	1.79	0.29	2.38	0.08	4.75
SW312372889665XXX	2.83	0.38	0.71	0.75	1.83	2.46	7.13
SW312372899678XXX	1.67	0.38	1.42	0.46	2.25	2.04	5.96
SW31237297D775XXX	2.13	0.33	2.63	0.83	3.79	0.00	5.92
SW31237297D788XXX	3.42	0.38	1.08	0.79	2.25	0.00	5.67
SW31237298D811XXX	0.96	0.42	1.67	0.92	3.00	1.79	5.75
SW31237300D827XXX	1.63	0.29	0.75	2.00	3.04	0.00	4.67
SW31237300D831XXX	1.42	0.33	1.00	0.71	2.04	0.00	3.46
SW31237301D838XXX	1.63	0.29	1.04	1.71	3.04	0.00	4.67
SW31237301D858XXX	3.33	0.38	2.50	0.38	3.25	3.00	9.58
SW31237302D866XXX	1.13	0.33	1.00	0.71	2.04	0.00	3.17
SW31237303D876XXX	0.67	0.33	2.75	0.33	3.42	3.00	7.08
SW31237304D906XXX	1.42	0.33	9.92	0.42	10.67	0.67	12.75
SW31237304D912XXX	1.42	0.33	0.83	0.29	1.46	2.04	4.92
SW31237304D921XXX	0.63	0.33	5.63	0.42	6.38	1.63	8.63

TCN	APOE PHT	Transit to RMS	Intransit PHT	Transit to APOD	Intransit Overseas	APOD PHT	AMC PT
SW31237307D965XXX	5.13	0.33	1.96	0.38	2.67	0.96	8.75
SW31237309D994XXX	3.25	0.33	2.83	0.33	3.50	0.96	7.71
SW31237309D997XXX	3.25	0.33	2.83	0.33	3.50	0.96	7.71
SW31237310D002XXX	6.25	0.54	1.08	0.21	1.83	0.67	8.75
SW31237310D019XXX	5.29	0.54	2.17	0.13	2.83	0.71	8.83
SW31237311D022XXX	5.13	0.54	2.17	0.13	2.83	0.71	8.67
SW31237311D026XXX	5.42	0.46	1.71	0.38	2.54	0.88	8.83
SW31237311D038XXX	3.38	0.54	2.17	0.13	2.83	0.71	6.92
SW31237312D041XXX	1.46	0.46	3.00	0.17	3.63	4.88	9.96
SW31237312D054XXX	0.58	0.38	1.79	0.42	2.58	0.67	3.83
SW31237314D081XXX	0.54	0.46	2.67	0.46	3.58	4.88	9.00
SW31237314D082XXX	0.50	0.46	2.67	0.46	3.58	4.88	8.96
SW31237317D127XXX	1.33	0.38	9.96	0.29	10.63	2.54	14.50
SW31237319D181XXX	2.54	0.38	4.96	0.29	5.63	2.54	10.71
SW31237321D190XXX	2.54	0.38	4.96	0.29	5.63	2.54	10.71
SW31237325D288XXX	2.50	0.33	2.83	1.00	4.17	0.00	6.67

Appendix B: Army Population #2 Data

TCN	APOE Rcpt	APOE Lift	Intransit Rcpt	Intransit Lift	APOD Rcpt	APOD Lift	APOE PHT	Transit to RMS	Intransit PHT	Transit to APOD	Intransit Overseas	APOD PHT	AMC PT
APOD = Taszar (TZR)													
SW31238113D027XXX	1200 8114	0405 8115	1122 8115	0613 8116	0810 8116	0800 8116	0.67	0.29	0.79	0.08	1.17	0.00	1.83
SW31238113D028XXX	1200 8114	0405 8115	1122 8115	0613 8116	0810 8116	0800 8116	0.67	0.29	0.79	0.08	1.17	0.00	1.83
SW31238113D033XXX	1300 8115	0237 8117	1020 8117	0700 8119	0908 8119	0900 8119	1.54	0.33	1.88	0.08	2.29	0.00	3.83
SW31238117D112XXX	1700 8118	0400 8122	1152 8122	0620 8124	0820 8124	0900 8124	3.46	0.33	1.75	0.08	2.17	0.04	5.67
SW31238120D167XXX	1100 8121	0359 8124	1128 8124	0551 8125	0740 8125	1400 8125	2.71	0.29	0.79	0.04	1.13	0.29	4.13
SW31238120D178XXX	1800 8121	0359 8124	1128 8124	0719 8128	0920 8128	1500 8128	2.42	0.29	3.83	0.08	4.21	0.25	6.88
SW31238124D228XXX	1700 8125	0438 8127	1250 8127	0617 8132	0802 8132	0900 8132	1.46	0.38	4.71	0.08	5.17	0.04	6.67
SW31238125D252XXX	1300 8126	0436 8130	1222 8130	0617 8132	0802 8132	0900 8132	3.63	0.33	1.75	0.08	2.17	0.04	5.83
SW31238127D305XXX	1400 8128	0357 8130	1147 8130	1235 8132	1430 8132	0700 8133	1.58	0.29	2.04	0.08	2.42	0.71	4.71
SW31238127D314XXX	1600 8129	2213 8131	0605 8132	0617 8133	0810 8133	0800 8133	2.25	0.33	1.00	0.08	1.42	0.00	3.67
SW31238128D327XXX	1200 8131	0256 8133	1100 8133	0719 8135	0900 8135	1100 8135	1.63	0.33	1.83	0.08	2.25	0.08	3.96
SW31238131D346XXX	1700 8132	0424 8137	1224 8137	0558 8139	0743 8139	0500 8140	4.46	0.33	1.75	0.04	2.13	0.92	7.50
SW31238131D351XXX	1200 8132	2339 8133	0741 8134	0719 8135	0900 8135	1100 8135	1.46	0.33	1.00	0.08	1.42	0.08	2.96
SW31238133D390XXX	1800 8134	0858 8141	1645 8141	0614 8142	0755 8142	1200 8142	6.63	0.29	0.58	0.08	0.96	0.17	7.75
SW31238133D392XXX	1200 8135	0424 8137	1224 8137	0627 8138	0802 8138	0800 8138	1.67	0.33	0.75	0.08	1.17	0.00	2.83
SW31238133D398XXX	1200 8135	0424 8137	1224 8137	0627 8138	0802 8138	0800 8138	1.67	0.33	0.75	0.08	1.17	0.00	2.83
SW31238134D417XXX	1200 8135	0411 8140	1126 8140	0603 8141	0748 8141	0900 8141	4.67	0.29	0.79	0.04	1.13	0.08	5.88
SW31238134D418XXX	1200 8135	0424 8137	1224 8137	0558 8139	0743 8139	0500 8140	1.67	0.33	1.75	0.04	2.13	0.92	4.71
SW31238134D426XXX	1700 8136	0108 8142	0847 8142	0651 8144	0835 8144	0600 8145	5.33	0.29	1.96	0.04	2.29	0.92	8.54
SW31238135D451XXX	1300 8136	0411 8140	1126 8140	0555 8143	0800 8143	0800 8143	3.63	0.29	2.79	0.08	3.17	0.00	6.79
SW31238135D458XXX	1500 8136	0437 8139	1211 8139	0611 8140	0800 8140	1200 8140	2.54	0.33	0.75	0.08	1.17	0.17	3.88
SW31238138D488XXX	1200 8139	0108 8142	0847 8142	0651 8144	0835 8144	0600 8145	2.54	0.29	1.96	0.04	2.29	0.92	5.75
SW31238138D489XXX	1200 8139	0858 8141	1645 8141	0555 8143	0800 8143	0800 8143	1.88	0.29	1.58	0.08	1.96	0.00	3.83
SW31238140D549XXX	1300 8142	0213 8147	1002 8147	0615 8150	0800 8150	0912 8150	4.54	0.33	2.83	0.08	3.25	0.04	7.83
SW31238140D556XXX	1600 8142	0352 8147	1151 8147	0601 8148	0814 8148	1100 8148	4.50	0.33	0.75	0.08	1.17	0.13	5.79
SW31238141D558XXX	1800 8142	0300 8146	1037 8146	0601 8148	0814 8148	1100 8148	3.38	0.29	1.83	0.08	2.21	0.13	5.71
SW31238146D635XXX	1200 8148	0409 8149	1222 8149	0615 8150	0800 8150	0912 8150	0.67	0.33	0.75	0.08	1.17	0.04	1.88
SW31238147D663XXX	1212 8149	0437 8152	1242 8152	0600 8153	0745 8153	0912 8153	2.67	0.33	0.75	0.04	1.13	0.08	3.88
SW31238152D737XXX	1112 8154	0605 8158	1322 8158	0756 8161	0941 8161	1012 8161	3.79	0.29	2.79	0.04	3.13	0.04	6.96
SW31238154D775XXX	1712 8155	0426 8159	1140 8159	0756 8161	0941 8161	1012 8161	3.46	0.29	1.88	0.04	2.21	0.04	5.71
SW31238155D800XXX	2012 8156	0423 8162	1212 8162	0721 8165	0923 8165	1012 8165	5.33	0.33	2.79	0.08	3.21	0.04	8.58
SW31238160D870XXX	1212 8162	0312 8168	1057 8168	1033 8172	1218 8172	1312 8172	5.63	0.33	3.96	0.08	4.38	0.04	10.04
SW31238161D886XXX	1912 8162	0923 8166	1626 8166	0609 8167	0806 8167	1212 8167	3.58	0.29	0.58	0.08	0.96	0.17	4.71
SW31238163D911XXX	1612 8166	0312 8168	1057 8168	1033 8172	1218 8172	1312 8172	1.46	0.33	3.96	0.08	4.38	0.04	5.88
SW31238163D914XXX	1612 8166	0312 8168	1057 8168	0612 8173	0757 8173	0812 8173	1.46	0.33	4.79	0.08	5.21	0.00	6.67

TCN	APOE Rcpt	APOE Lift	Intransit Rcpt	Intransit Lift	APOD Rcpt	APOD Lift	APOE PHT	Transit to RMS	Intransit PHT	Transit to APOD	Intransit Overseas	APOD PHT	AMC PT
SW31238168D960XXX	2012 8169	0209 8171	0910 8171	0612 8173	0757 8173	0812 8173	1.25	0.29	1.88	0.08	2.25	0.00	3.50
SW31238168D964XXX	1512 8169	0209 8171	0910 8171	1033 8172	1218 8172	1312 8172	1.46	0.29	1.04	0.08	1.42	0.04	2.92
SW31238168D967XXX	1512 8169	0209 8171	0910 8171	0612 8173	0757 8173	0812 8173	1.46	0.29	1.88	0.08	2.25	0.00	3.71
SW31238168D974XXX	1512 8169	0209 8171	0910 8171	0612 8173	0757 8173	0812 8173	1.46	0.29	1.88	0.08	2.25	0.00	3.71
SW31238169D003XXX	1312 8170	0213 8174	0923 8174	0614 8175	0829 8175	0812 8175	3.54	0.29	0.88	0.08	1.25	0.00	4.79
SW31238169D009XXX	1212 8171	0256 8176	1031 8176	0620 8177	0820 8177	0912 8177	4.63	0.29	0.83	0.08	1.21	0.04	5.88
SW31238169D014XXX	1212 8171	0447 8174	1241 8174	0621 8176	0817 8176	0912 8176	2.67	0.33	1.75	0.08	2.17	0.04	4.88
SW31238169D999XXX	1612 8170	0213 8174	0923 8174	0614 8175	0829 8175	0812 8175	3.42	0.29	0.88	0.08	1.25	0.00	4.67
SW31238170D018XXX	1412 8171	0201 8173	0911 8173	0621 8176	0817 8176	0912 8176	1.50	0.29	2.88	0.08	3.25	0.04	4.79
TCNs listed below this line are outliers for the Taszar APOD													
SW31238143D618XXX	1600 8147	0313 8149	1116 8149	0615 8155	0813 8155	0712 8155	1.46	0.33	5.79	0.08	6.21	-0.04	7.63
SW31238149D709XXX	1812 8152	0013 8154	0749 8154	0615 8155	0813 8155	0712 8155	1.25	0.29	0.96	0.08	1.33	-0.04	2.54
APOD = Tuzla (TZL)													
SW31238108D946XXX	1200 8111	0303 8112	1020 8112	0440 8116	0712 8116	1000 8118	0.63	0.29	3.75	0.13	4.17	2.13	6.92
SW31238111D989XXX	1700 8112	0127 8114	0830 8114	0440 8116	0712 8116	1000 8118	1.33	0.29	1.83	0.13	2.25	2.13	5.71
SW31238112D003XXX	1700 8114	0316 8116	1103 8116	0439 8117	0656 8117	1000 8118	1.42	0.33	0.71	0.13	1.17	1.13	3.71
SW31238113D025XXX	1200 8114	0405 8115	1122 8115	0548 8117	0804 8117	1000 8118	0.67	0.29	1.75	0.13	2.17	1.08	3.92
SW31238113D026XXX	1200 8114	0405 8115	1122 8115	0434 8121	0659 8121	0700 8122	0.67	0.29	5.71	0.13	6.13	1.00	7.79
SW31238113D051XXX	1500 8114	0316 8116	1103 8116	1304 8121	1520 8121	1200 8122	1.50	0.33	5.08	0.08	5.50	0.88	7.88
SW31238114D060XXX	1400 8115	0237 8117	1020 8117	0622 8120	0900 8120	0600 8122	1.50	0.33	2.83	0.13	3.29	1.88	6.67
SW31238114D065XXX	1400 8115	0237 8117	1020 8117	0441 8124	0700 8124	1400 8124	1.50	0.33	6.75	0.13	7.21	0.29	9.00
SW31238114D081XXX	1200 8117	0206 8118	0933 8118	0622 8120	0900 8120	0600 8122	0.58	0.29	1.88	0.13	2.29	1.88	4.75
SW31238114D082XXX	1200 8117	0206 8118	0933 8118	0434 8121	0659 8121	0700 8122	0.58	0.29	2.79	0.13	3.21	1.00	4.79
SW31238115D094XXX	1500 8117	0206 8118	0933 8118	0622 8120	0900 8120	0600 8122	0.46	0.29	1.88	0.13	2.29	1.88	4.63
SW31238115D097XXX	1500 8117	0206 8118	0933 8118	1304 8121	1520 8121	1200 8122	0.46	0.29	3.17	0.08	3.54	0.88	4.88
SW31238115D103XXX	1300 8118	0309 8121	1054 8121	1130 8124	1358 8124	0700 8126	2.58	0.33	3.00	0.13	3.46	1.71	7.75
SW31238117D116XXX	1700 8118	0400 8122	1152 8122	0443 8125	0702 8125	0700 8126	3.46	0.33	2.67	0.13	3.13	1.00	7.58
SW31238118D123XXX	1100 8119	0400 8122	1152 8122	1328 8123	1605 8123	0700 8126	2.71	0.33	1.04	0.13	1.50	2.63	6.83
SW31238118D125XXX	1800 8119	0359 8124	1128 8124	1121 8127	1335 8127	1200 8128	4.42	0.29	3.00	0.08	3.38	0.96	8.75
SW31238119D145XXX	1200 8120	0359 8124	1128 8124	0443 8127	0708 8127	1200 8128	3.67	0.29	2.71	0.13	3.13	1.21	8.00
SW31238119D146XXX	1200 8120	0359 8124	1128 8124	0540 8128	0802 8128	0700 8132	3.67	0.29	3.75	0.13	4.17	3.96	11.79
SW31238120D166XXX	1100 8121	0359 8124	1128 8124	0540 8128	0802 8128	0700 8132	2.71	0.29	3.75	0.13	4.17	3.96	10.83
SW31238120D169XXX	2000 8121	0519 8125	1240 8125	0540 8128	0802 8128	0700 8132	3.38	0.29	2.71	0.13	3.13	3.96	10.46
SW31238120D176XXX	1500 8121	0359 8124	1128 8124	1124 8126	1335 8126	1200 8128	2.54	0.29	2.00	0.08	2.38	1.96	6.88
SW31238120D188XXX	1500 8121	0359 8124	1128 8124	1156 8128	1420 8128	1200 8130	2.54	0.29	4.04	0.08	4.42	1.92	8.88
SW31238121D194XXX	1200 8122	0519 8125	1240 8125	0435 8128	0700 8128	0700 8133	2.71	0.29	2.67	0.13	3.08	5.00	10.79
SW31238121D213XXX	1300 8124	0355 8131	1151 8131	0420 8133	0640 8133	1300 8137	6.63	0.33	1.67	0.08	2.08	4.29	13.00

TCN	APOE Rcpt	APOE Lift	Intransit Rcpt	Intransit Lift	APOD Rcpt	APOD Lift	APOE PHT	Transit to RMS	Intransit PHT	Transit to APOD	Intransit Overseas	APOD PHT	AMC PT
SW31238122D215XXX	1300 8124	0415 8126	1206 8126	0540 8129	0800 8129	1000 8130	1.63	0.33	2.71	0.13	3.17	1.08	5.88
SW31238122D216XXX	1300 8124	0438 8127	1250 8127	1156 8128	1420 8128	1200 8130	2.63	0.38	0.96	0.08	1.42	1.92	5.96
SW31238122D217XXX	1200 8125	0438 8127	1250 8127	0418 8131	0641 8131	1300 8131	1.67	0.38	3.63	0.08	4.08	0.29	6.04
SW31238122D218XXX	1200 8124	0415 8126	1206 8126	0540 8129	0800 8129	1000 8130	1.67	0.33	2.71	0.13	3.17	1.08	5.92
SW31238122D221XXX	1200 8125	0357 8130	1147 8130	0420 8133	0640 8133	1300 8137	4.67	0.29	2.71	0.08	3.08	4.29	12.04
SW31238124D224XXX	1200 8125	0540 8131	1334 8131	0549 8133	0800 8133	1300 8137	5.71	0.33	1.67	0.13	2.13	4.21	12.04
SW31238124D225XXX	1200 8125	0438 8127	1250 8127	0440 8129	0700 8129	1100 8130	1.67	0.38	1.63	0.13	2.13	1.17	4.96
SW31238125D247XXX	1600 8126	0316 8128	1103 8128	0418 8131	0641 8131	1300 8131	1.46	0.33	2.71	0.08	3.13	0.29	4.88
SW31238126D270XXX	1700 8127	0357 8130	1147 8130	1159 8133	1416 8133	1300 8137	2.46	0.29	3.04	0.08	3.42	3.96	9.83
SW31238126D281XXX	1400 8128	2213 8131	0605 8132	0420 8133	0640 8133	1300 8137	3.33	0.33	0.92	0.08	1.33	4.29	8.96
SW31238132D361XXX	1600 8133	2047 8135	0453 8136	0521 8137	0735 8137	0800 8138	2.17	0.38	1.00	0.08	1.46	1.04	4.67
SW31238134D412XXX	1200 8135	0411 8140	1126 8140	0555 8142	0800 8142	1100 8142	4.67	0.29	1.79	0.08	2.17	0.13	6.96
SW31238134D432XXX	1500 8136	0108 8142	0847 8142	1121 8145	1335 8145	1000 8147	5.42	0.29	3.13	0.08	3.50	1.88	10.79
SW31238135D470XXX	1200 8138	0155 8140	0957 8140	0445 8143	0700 8143	0900 8144	1.58	0.33	2.75	0.13	3.21	1.08	5.88
SW31238136D477XXX	1400 8138	2345 8141	0747 8142	0421 8150	0659 8150	1612 8150	3.38	0.33	7.88	0.13	8.33	0.38	12.08
SW31238136D484XXX	1200 8139	0858 8141	1645 8141	1211 8144	1415 8144	1100 8147	1.88	0.29	2.83	0.08	3.21	2.88	7.96
SW31238138D490XXX	1200 8139	0858 8141	1645 8141	0445 8143	0700 8143	0900 8144	1.88	0.29	1.50	0.13	1.92	1.08	4.88
SW31238138D501XXX	1800 8140	0420 8143	1207 8143	1157 8146	1410 8146	1000 8147	2.42	0.33	3.00	0.08	3.42	0.83	6.67
SW31238138D505XXX	1800 8140	2345 8141	0747 8142	0455 8144	0655 8144	1000 8144	1.21	0.33	1.92	0.08	2.33	0.13	3.67
SW31238139D512XXX	1800 8140	0420 8143	1207 8143	1211 8144	1415 8144	1100 8147	2.42	0.33	1.00	0.08	1.42	2.88	6.71
SW31238139D513XXX	1800 8140	0428 8142	1220 8142	0437 8145	0700 8145	1000 8147	1.42	0.33	2.67	0.13	3.13	2.13	6.67
SW31238142D588XXX	1300 8143	0300 8146	1037 8146	0421 8150	0659 8150	1612 8150	2.58	0.29	3.75	0.13	4.17	0.38	7.13
SW31238142D593XXX	1300 8143	0300 8146	1037 8146	0449 8147	0718 8147	0900 8147	2.58	0.29	0.75	0.13	1.17	0.08	3.83
SW31238142D598XXX	1100 8146	0352 8147	1151 8147	0428 8149	0628 8149	1412 8149	0.71	0.33	1.67	0.08	2.08	0.33	3.13
SW31238144D627XXX	1100 8147	0428 8150	1236 8150	1351 8152	1600 8152	1012 8153	2.71	0.33	2.08	0.08	2.50	0.75	5.96
SW31238146D634XXX	1200 8148	0735 8149	1515 8149	0403 8151	0626 8151	1212 8151	0.79	0.33	1.54	0.08	1.96	0.25	3.00
SW31238146D638XXX	1800 8147	0409 8149	1222 8149	1141 8150	1353 8150	0812 8152	1.42	0.33	0.96	0.13	1.42	1.75	4.58
SW31238148D685XXX	1712 8150	0539 8152	1315 8152	1131 8154	1343 8154	1312 8155	1.50	0.33	1.92	0.08	2.33	1.00	4.83
SW31238149D698XXX	1512 8150	0437 8152	1242 8152	0442 8153	0642 8153	1312 8154	1.54	0.33	0.67	0.08	1.08	1.29	3.92
SW31238150D710XXX	1812 8152	0013 8154	0749 8154	1204 8157	1409 8157	1512 8158	1.25	0.29	3.21	0.08	3.58	1.04	5.88
SW31238150D711XXX	1812 8152	0407 8154	1146 8154	1156 8155	1413 8155	1012 8157	1.42	0.29	1.04	0.08	1.42	1.83	4.67
SW31238150D713XXX	1812 8152	0013 8154	0749 8154	0442 8155	0659 8155	1312 8155	1.25	0.29	0.88	0.13	1.29	0.25	2.79
SW31238152D733XXX	1912 8153	0431 8156	1202 8156	0537 8158	0800 8158	1512 8158	2.38	0.33	1.71	0.13	2.17	0.29	4.83
SW31238152D739XXX	1112 8154	0409 8157	1150 8157	1455 8158	1655 8158	0712 8160	2.71	0.33	1.13	0.08	1.54	1.58	5.83
SW31238153D761XXX	1812 8154	0409 8157	1150 8157	1403 8158	1622 8158	0712 8160	2.42	0.33	1.08	0.08	1.50	1.63	5.54
SW31238154D765XXX	1212 8155	0605 8158	1322 8158	0616 8160	0822 8160	1112 8160	2.75	0.29	1.71	0.08	2.08	0.13	4.96
SW31238154D766XXX	1212 8155	0409 8157	1150 8157	1403 8158	1622 8158	0712 8160	1.67	0.33	1.08	0.08	1.50	1.63	4.79

TCN	APOE Rcpt	APOE Lift	Intransit Rcpt	Intransit Lift	APOD Rcpt	APOD Lift	APOE PHT	Transit to RMS	Intransit PHT	Transit to APOD	Intransit Overseas	APOD PHT	AMC PT
SW31238154D769XXX	1412 8155	0605 8158	1322 8158	0443 8159	0705 8159	0712 8160	2.67	0.29	0.63	0.13	1.04	1.00	4.71
SW31238155D792XXX	1812 8156	0605 8158	1322 8158	1245 8159	1510 8159	1112 8160	1.50	0.29	0.96	0.13	1.38	0.83	3.71
SW31238155D797XXX	1612 8156	0405 8160	1127 8160	1126 8161	1345 8161	1312 8162	3.50	0.29	1.00	0.08	1.38	1.00	5.88
SW31238155D806XXX	2012 8156	0426 8159	1140 8159	0616 8160	0822 8160	1112 8160	2.33	0.29	0.79	0.08	1.17	0.13	3.63
SW31238155D807XXX	1912 8156	0426 8159	1140 8159	0616 8160	0822 8160	1112 8160	2.38	0.29	0.79	0.08	1.17	0.13	3.67
SW31238155D808XXX	2112 8156	0422 8160	1106 8160	0441 8162	0658 8162	1312 8162	3.29	0.29	1.71	0.13	2.13	0.25	5.67
SW31238156D809XXX	1812 8156	0923 8166	1626 8166	1207 8167	1424 8167	0912 8169	9.63	0.29	0.83	0.08	1.21	1.79	12.63
SW31238156D811XXX	1812 8156	0405 8160	1127 8160	1126 8161	1345 8161	1312 8162	3.42	0.29	1.00	0.08	1.38	1.00	5.79
SW31238157D837XXX	1712 8159	0405 8160	1127 8160	1126 8161	1345 8161	1312 8162	0.46	0.29	1.00	0.08	1.38	1.00	2.83
SW31238161D872XXX	1312 8162	0923 8166	1626 8166	1207 8167	1424 8167	0912 8169	3.83	0.29	0.83	0.08	1.21	1.79	6.83
SW31238161D874XXX	1312 8162	0923 8166	1626 8166	0446 8168	0725 8168	0912 8169	3.83	0.29	1.50	0.13	1.92	1.08	6.83
SW31238161D876XXX	1312 8162	0923 8166	1626 8166	0450 8167	0700 8167	0812 8168	3.83	0.29	0.54	0.08	0.92	1.04	5.79
SW31238161D877XXX	1312 8162	0923 8166	1626 8166	0450 8167	0700 8167	0812 8168	3.83	0.29	0.54	0.08	0.92	1.04	5.79
SW31238161D881XXX	1312 8162	0347 8163	1133 8163	0449 8165	0649 8165	1712 8166	0.58	0.33	1.71	0.08	2.13	1.46	4.17
SW31238163D913XXX	1612 8166	0312 8168	1057 8168	1123 8172	1320 8172	1312 8173	1.46	0.33	4.00	0.08	4.42	1.00	6.88
SW31238167D941XXX	1212 8168	0209 8171	0910 8171	0443 8173	0643 8173	1312 8173	2.58	0.29	1.79	0.08	2.17	0.29	5.04
SW31238167D945XXX	1512 8169	0209 8171	0910 8171	1123 8172	1320 8172	1312 8173	1.46	0.29	1.08	0.08	1.46	1.00	3.92
SW31238167D949XXX	1212 8169	0209 8171	0910 8171	0446 8174	0646 8174	0912 8175	1.58	0.29	2.79	0.08	3.17	1.13	5.88
SW31238167D953XXX	1212 8169	0209 8171	0910 8171	1210 8173	1415 8173	1312 8176	1.58	0.29	2.13	0.08	2.50	2.96	7.04
SW31238167D954XXX	1312 8169	0209 8171	0910 8171	1508 8174	1723 8174	0912 8175	1.54	0.29	3.25	0.08	3.63	0.67	5.83
SW31238168D957XXX	2012 8169	0209 8171	0910 8171	1123 8172	1320 8172	1312 8173	1.25	0.29	1.08	0.08	1.46	1.00	3.71
SW31238168D977XXX	1612 8170	0213 8174	0923 8174	1206 8175	1420 8175	0912 8176	3.42	0.29	1.13	0.08	1.50	0.79	5.71
SW31238168D984XXX	1612 8170	0648 8172	1352 8172	0443 8173	0643 8173	1312 8173	1.58	0.33	0.58	0.08	1.00	0.29	2.88
SW31238169D988XXX	1312 8170	0209 8171	0910 8171	0505 8176	0709 8176	1312 8176	0.54	0.29	4.83	0.08	5.21	0.25	6.00
SW31238169D989XXX	1312 8170	0209 8171	0910 8171	0446 8174	0646 8174	0912 8175	0.54	0.29	2.79	0.08	3.17	1.13	4.83
SW31238170D016XXX	1212 8171	0213 8174	0923 8174	1315 8176	1520 8176	0912 8177	2.58	0.29	2.17	0.08	2.54	0.75	5.88
SW31238170D017XXX	1412 8171	0447 8174	1241 8174	1206 8175	1420 8175	0912 8176	2.58	0.33	1.00	0.08	1.42	0.79	4.79
SW31238170D033XXX	1812 8171	0447 8174	1241 8174	1206 8175	1420 8175	0912 8176	2.42	0.33	1.00	0.08	1.42	0.79	4.63
SW31238170D036XXX	1812 8171	0701 8173	1420 8173	1508 8174	1723 8174	0912 8175	1.54	0.29	1.04	0.08	1.42	0.67	3.63
SW31238171D038XXX	1812 8171	0213 8174	0923 8174	0505 8176	0709 8176	1312 8176	2.33	0.29	1.83	0.08	2.21	0.25	4.79

TCN	APOE Rcpt	APOE Lift	Intransit Rcpt	Intransit Lift	APOD Rcpt	APOD Lift	APOE PHT	Transit to RMS	Intransit PHT	Transit to APOD	Intransit Overseas	APOD PHT	AMC PT
APOD = Taszar (TZR)													
FB58958113H001XXX	1600 8119	0725 8121	1433 8121	0620 8124	0820 8124	0900 8124	1.63	0.29	2.67	0.08	3.04	0.04	4.71
FB58958114H001XXX	1912 8167	2022 8168	0420 8169	0611 8171	0802 8171	0812 8171	1.04	0.33	2.08	0.08	2.50	0.00	3.54
FB58958114H002XXX	1600 8117	0206 8118	0933 8118	0612 8120	0805 8120	1100 8120	0.42	0.29	1.88	0.08	2.25	0.13	2.79
FB58958114H004XXX	2000 8114	0316 8116	1103 8116	0612 8120	0805 8120	1100 8120	1.29	0.33	3.79	0.08	4.21	0.13	5.63
FB58958114H006XXX	1500 8117	0206 8118	0933 8118	0612 8120	0805 8120	1100 8120	0.46	0.29	1.88	0.08	2.25	0.13	2.83
FB58958114S600XXX	1500 8117	0206 8118	0933 8118	0612 8120	0805 8120	1100 8120	0.46	0.29	1.88	0.08	2.25	0.13	2.83
FB58958117H005XXX	1600 8119	0725 8121	1433 8121	0620 8124	0820 8124	0900 8124	1.63	0.29	2.67	0.08	3.04	0.04	4.71
FB58958118H002XXX	1500 8119	0725 8121	1433 8121	0620 8124	0820 8124	0900 8124	1.67	0.29	2.67	0.08	3.04	0.04	4.75
FB58958118H003XXX	1500 8120	0309 8121	1054 8121	0620 8124	0820 8124	0900 8124	0.50	0.33	2.79	0.08	3.21	0.04	3.75
FB58958118H004XXX	1900 8124	0256 8128	1036 8128	1306 8133	1458 8133	0800 8135	3.33	0.29	5.13	0.08	5.50	1.71	10.54
FB58958118H005XXX	1500 8120	0309 8121	1054 8121	0620 8124	0820 8124	0900 8124	0.50	0.33	2.79	0.08	3.21	0.04	3.75
FB58958118H006XXX	1500 8120	0309 8121	1054 8121	0620 8124	0820 8124	0900 8124	0.50	0.33	2.79	0.08	3.21	0.04	3.75
FB58958118S601XXX	1500 8119	0725 8121	1433 8121	0620 8124	0820 8124	0900 8124	1.67	0.29	2.67	0.08	3.04	0.04	4.75
FB58958119S600XXX	1500 8120	0309 8121	1054 8121	0620 8124	0820 8124	0900 8124	0.50	0.33	2.79	0.08	3.21	0.04	3.75
FB58958120S602XXX	1600 8121	0400 8122	1152 8122	0620 8124	0820 8124	0900 8124	0.50	0.33	1.75	0.08	2.17	0.04	2.71
FB58958121H001XXX	1500 8124	0519 8125	1240 8125	0624 8127	0819 8127	1000 8127	0.58	0.29	1.75	0.08	2.13	0.08	2.79
FB58958124H001XXX	1500 8126	0438 8127	1250 8127	0624 8129	0809 8129	0900 8129	0.54	0.38	1.71	0.08	2.17	0.04	2.75
FB58958124H002XXX	1500 8126	0438 8127	1250 8127	0624 8129	0809 8129	0900 8129	0.54	0.38	1.71	0.08	2.17	0.04	2.75
FB58958124R001XXX	1900 8126	0306 8131	1041 8131	1235 8132	1430 8132	0700 8133	4.33	0.29	1.08	0.08	1.46	0.71	6.50
FB58958124S604XXX	1700 8125	0415 8126	1206 8126	0624 8129	0809 8129	0900 8129	0.46	0.33	2.75	0.08	3.17	0.04	3.67
FB58958126H003AXA	1712 8168	0622 8169	1343 8169	0611 8171	0802 8171	0812 8171	0.54	0.29	1.71	0.08	2.08	0.00	2.63
FB58958126H003AXB	1712 8168	0622 8169	1343 8169	0611 8171	0802 8171	0812 8171	0.54	0.29	1.71	0.08	2.08	0.00	2.63
FB5895812700 11XXX	1500 8138	0414 8139	1250 8139	0603 8141	0748 8141	1200 8142	0.54	0.38	1.71	0.04	2.13	1.21	3.88
FB5895812800 11XXX	1700 8133	2003 8134	0407 8135	0611 8137	0820 8137	1000 8137	1.13	0.33	2.08	0.08	2.50	0.08	3.71
FB58958128S604XXX	1700 8132	2339 8133	0741 8134	0617 8136	0802 8136	1000 8136	1.25	0.33	1.96	0.08	2.38	0.08	3.71
FB58958129H002XXX	1700 8131	0352 8132	1145 8132	1306 8133	1458 8133	0800 8135	0.46	0.29	1.08	0.08	1.46	1.71	3.63
FB58958129H003XXX	1700 8131	0352 8132	1145 8132	1306 8133	1458 8133	0800 8135	0.46	0.29	1.08	0.08	1.46	1.71	3.63
FB58958129H010XXX	1600 8132	2339 8133	0741 8134	0617 8136	0802 8136	1000 8136	1.29	0.33	1.96	0.08	2.38	0.08	3.75
FB58958129H011XXX	1600 8133	2003 8134	0407 8135	0611 8137	0820 8137	1000 8137	1.17	0.33	2.08	0.08	2.50	0.08	3.75
FB58958131H001XXX	1600 8132	2339 8133	0741 8134	0617 8136	0802 8136	1000 8136	1.29	0.33	1.96	0.08	2.38	0.08	3.75
FB5895813200 23XXX	1600 8134	2047 8135	0453 8136	0611 8137	0820 8137	1000 8137	1.17	0.38	1.04	0.08	1.50	0.08	2.75
FB5895813200 24XXX	1600 8146	0352 8147	1150 8147	0615 8150	0800 8150	0912 8150	0.50	0.33	2.75	0.08	3.17	0.04	3.71
FB5895813200 25XXX	1600 8135	0415 8136	1224 8136	0611 8140	0800 8140	1200 8140	0.50	0.33	3.75	0.08	4.17	0.17	4.83
FB58958132H002XXX	1700 8133	2003 8134	0407 8135	0611 8137	0820 8137	1000 8137	1.13	0.33	2.08	0.08	2.50	0.08	3.71
FB58958132H003XXX	1600 8134	2047 8135	0453 8136	0611 8137	0820 8137	1000 8137	1.17	0.38	1.04	0.08	1.50	0.08	2.75

TCN	APOE Rcpt	APOE Lift	Intransit Rcpt	Intransit Lift	APOD Rcpt	APOD Lift	APOE PHT	Transit to RMS	Intransit PHT	Transit to APOD	Intransit Overseas	APOD PHT	AMC PT
FB58958132H004XXX	1600 8134	2047 8135	0453 8136	0611 8137	0820 8137	1000 8137	1.17	0.38	1.04	0.08	1.50	0.08	2.75
FB58958132H005XXX	1600 8133	2003 8134	0407 8135	0611 8137	0820 8137	1000 8137	1.17	0.33	2.08	0.08	2.50	0.08	3.75
FB58958132H006XXX	1500 8135	0415 8136	1224 8136	0611 8140	0800 8140	1200 8140	0.54	0.33	3.75	0.08	4.17	0.17	4.88
FB58958132H007XXX	1700 8133	2003 8134	0407 8135	0611 8137	0820 8137	1000 8137	1.13	0.33	2.08	0.08	2.50	0.08	3.71
FB58958138H001XXX	1500 8139	0411 8140	1126 8140	0651 8144	0835 8144	0600 8145	0.54	0.29	3.83	0.04	4.17	0.92	5.63
FB58958138H002XXX	1500 8139	0411 8140	1126 8140	0651 8144	0835 8144	0600 8145	0.54	0.29	3.83	0.04	4.17	0.92	5.63
FB58958138H003XXX	1600 8140	0405 8141	1158 8141	0651 8144	0835 8144	0600 8145	0.50	0.33	2.79	0.04	3.17	0.92	4.58
FB58958138S604XXX	1500 8139	0411 8140	1126 8140	0651 8144	0835 8144	0600 8145	0.54	0.29	3.83	0.04	4.17	0.92	5.63
FB58958140H001XXX	1500 8142	0414 8143	1127 8143	1127 8146	1312 8146	0600 8147	0.54	0.29	3.00	0.08	3.38	0.71	4.63
FB58958141S606XXX	1500 8146	0352 8147	1150 8147	0615 8150	0800 8150	0912 8150	0.54	0.33	2.75	0.08	3.17	0.04	3.75
FB58958142H001XXX	1600 8146	0352 8147	1150 8147	0615 8150	0800 8150	0912 8150	0.50	0.33	2.75	0.08	3.17	0.04	3.71
FB58958142H002XXX	1500 8146	0352 8147	1150 8147	0615 8150	0800 8150	0912 8150	0.54	0.33	2.75	0.08	3.17	0.04	3.75
FB58958142H003XXX	1600 8147	0437 8152	1242 8152	0622 8154	0818 8154	0912 8154	4.50	0.33	1.75	0.08	2.17	0.04	6.71
FB58958142S606XXX	1500 8146	0352 8147	1150 8147	0615 8150	0800 8150	0912 8150	0.54	0.33	2.75	0.08	3.17	0.04	3.75
FB58958149H002XXX	1512 8152	0408 8153	1159 8153	0545 8156	0733 8156	0812 8156	0.54	0.33	2.71	0.08	3.13	0.04	3.71
FB58958153S601XXX	1512 8155	0348 8156	1132 8156	0621 8158	0810 8158	0712 8159	0.50	0.33	1.79	0.08	2.21	0.96	3.67
FB58958155S602XXX	1612 8156	0409 8157	1150 8157	0621 8158	0810 8158	0712 8159	0.50	0.33	0.75	0.08	1.17	0.96	2.63
FB58958159H000XXX	1512 8166	0652 8167	1433 8167	0622 8169	0815 8169	0912 8169	0.67	0.29	1.67	0.08	2.04	0.04	2.75
FB58958159H001XXX	1512 8161	0423 8162	1212 8162	0610 8163	0815 8163	0912 8163	0.54	0.33	0.75	0.08	1.17	0.04	1.75
FB58958159S600XXX	1712 8160	0916 8165	1627 8165	0609 8167	0806 8167	1212 8167	4.67	0.29	1.58	0.08	1.96	0.17	6.79
FB58958162H001XXX	1512 8166	0652 8167	1433 8167	0622 8169	0815 8169	0912 8169	0.67	0.29	1.67	0.08	2.04	0.04	2.75
APOD = Tuzla (TZL)													
FB583080830034XXX	1700 8120	0309 8121	1054 8121	1046 8123	1305 8123	0700 8126	0.42	0.33	1.96	0.13	2.42	2.75	5.58
FB583080880002XXX	1400 8133	2003 8134	0407 8135	0521 8137	0735 8137	0800 8138	1.25	0.33	2.04	0.08	2.46	1.04	4.75
FB583080890019XXX	1600 8124	0519 8125	1240 8125	0435 8128	0700 8128	0700 8133	0.54	0.29	2.67	0.13	3.08	5.00	8.63
FB58308118K001XXX	1400 8119	0725 8121	1433 8121	1046 8123	1305 8123	0700 8126	1.71	0.29	1.83	0.13	2.25	2.75	6.71
FB58308119K001XXX	1500 8121	0400 8122	1152 8122	1130 8124	1358 8124	0700 8126	0.54	0.33	1.96	0.13	2.42	1.71	4.67
FB58308119X100XAA	1800 8132	2047 8135	0453 8136	0521 8137	0735 8137	0800 8138	3.08	0.38	1.00	0.08	1.46	1.04	5.58
FB58308119X100XAB	1800 8132	2047 8135	0453 8136	0521 8137	0735 8137	0800 8138	3.08	0.38	1.00	0.08	1.46	1.04	5.58
FB58308119X100XBA	1900 8138	0858 8141	1645 8141	1200 8142	1346 8142	0900 8144	2.58	0.29	0.83	0.04	1.17	1.83	5.58
FB58308119X100XZX	1400 8134	0359 8137	1212 8137	1140 8139	1400 8139	1100 8140	2.58	0.33	1.96	0.13	2.42	0.88	5.88
FB58308120K002XXX	1600 8124	0519 8125	1240 8125	0435 8128	0700 8128	0700 8133	0.54	0.29	2.67	0.13	3.08	5.00	8.63
FB58308121K001XXX	1600 8124	0438 8127	1250 8127	1156 8128	1420 8128	1200 8130	2.50	0.38	0.96	0.08	1.42	1.92	5.83
FB583081240040XXX	1600 8140	0405 8141	1158 8141	1200 8142	1346 8142	0900 8144	0.50	0.33	1.00	0.04	1.38	1.83	3.71
FB58308124K002XXX	1600 8125	0415 8126	1206 8126	1156 8128	1420 8128	1200 8130	0.50	0.33	2.00	0.08	2.42	1.92	4.83
FB58308126K001XXX	1400 8128	0436 8130	1222 8130	1159 8131	1411 8131	0700 8133	1.58	0.33	1.00	0.08	1.42	1.71	4.71

TCN	APOE Rcpt	APOE Lift	Intransit Rcpt	Intransit Lift	APOD Rcpt	APOD Lift	APOE PHT	Transit to RMS	Intransit PHT	Transit to APOD	Intransit Overseas	APOD PHT	AMC PT
FB58308126K003XXX	1600 8128	0436 8130	1222 8130	1159 8131	1411 8131	0700 8133	1.50	0.33	1.00	0.08	1.42	1.71	4.63
FB58308126K004XXX	1500 8128	0436 8130	1222 8130	1159 8131	1411 8131	0700 8133	1.54	0.33	1.00	0.08	1.42	1.71	4.67
FB58308126K005XXX	1500 8128	0436 8130	1222 8130	1159 8131	1411 8131	0700 8133	1.54	0.33	1.00	0.08	1.42	1.71	4.67
FB58308130K001AXX	1600 8134	2047 8135	0453 8136	1142 8137	1350 8137	1600 8138	1.17	0.38	1.25	0.13	1.75	1.08	4.00
FB58308130K002XXX	1600 8133	2003 8134	0407 8135	0521 8137	0735 8137	0800 8138	1.17	0.33	2.04	0.08	2.46	1.04	4.67
FB58308130K004XXX	1600 8133	2003 8134	0407 8135	0521 8137	0735 8137	0800 8138	1.17	0.33	2.04	0.08	2.46	1.04	4.67
FB5830813100 32XXX	1600 8134	2047 8135	0453 8136	1142 8137	1350 8137	1600 8138	1.17	0.38	1.25	0.13	1.75	1.08	4.00
FB5830813100 33AXX	1500 8134	2047 8135	0453 8136	1142 8137	1350 8137	1600 8138	1.21	0.38	1.25	0.13	1.75	1.08	4.04
FB5830813200 35XXX	1500 8139	0411 8140	1126 8140	1200 8142	1346 8142	0900 8144	0.54	0.29	2.04	0.04	2.38	1.83	4.75
FB58308132K001XXX	1600 8133	2003 8134	0407 8135	0521 8137	0735 8137	0800 8138	1.17	0.33	2.04	0.08	2.46	1.04	4.67
FB58308133K003XXX	1500 8135	0415 8136	1224 8136	1142 8137	1350 8137	1600 8138	0.54	0.33	0.96	0.13	1.42	1.08	3.04
FB58308140K002XXX	1500 8141	0725 8142	1436 8142	0437 8145	0700 8145	1000 8147	0.67	0.29	2.58	0.13	3.00	2.13	5.79
FB58308140K004XXX	1600 8146	0357 8148	1209 8148	1152 8149	1419 8149	0912 8151	1.50	0.33	1.00	0.08	1.42	1.79	4.71
FB58308140K005XXX	1500 8142	0414 8143	1127 8143	0437 8145	0700 8145	1000 8147	0.54	0.29	1.71	0.13	2.13	2.13	4.79
FB58308140K006XXX	1612 8169	0302 8170	1055 8170	0446 8174	0646 8174	0912 8175	0.46	0.33	3.71	0.08	4.13	1.13	5.71
FB5830814200 35XXX	1500 8146	0352 8147	1150 8147	1103 8148	1324 8148	1012 8149	0.54	0.33	0.96	0.08	1.38	0.88	2.79
FB58308147K001XXX	1612 8149	0428 8150	1236 8150	1351 8152	1600 8152	1012 8153	0.50	0.33	2.08	0.08	2.50	0.75	3.75
FB58308153S602XXX	1512 8155	0348 8156	1132 8156	0537 8158	0800 8158	1512 8158	0.50	0.33	1.75	0.13	2.21	0.29	3.00
FB5830815900 18XXX	1512 8166	0652 8167	1433 8167	1202 8169	1407 8169	1412 8170	0.67	0.29	1.92	0.08	2.29	1.00	3.96
FB58308159K001XXX	1712 8168	0622 8169	1343 8169	1209 8170	1421 8170	0812 8172	0.54	0.29	0.96	0.08	1.33	1.75	3.63

Appendix D: Application of UMMIPS Time Standards Results

UMMIPS Time Standards (extracted from Table 2)

Segment	UMMIPS Time Standard (in days)
G. APOE Port Hold Time	2
H. Transit Time Between APOE and APOD	1.5
I. APOD Port Hold Time	1
AMC Possession Time	4.5

APOE Port Hold Time

		# of TCNs Meeting Standards	Total # of TCNs	% of TCNs Meeting Standards
Taszar	Army #1	36	68	52.9%
	Army #2	19	44	43.2%
	Air Force	52	56	92.9%
Tuzla	Army #1	26	66	39.4%
	Army #2	44	91	48.4%
	Air Force	29	34	85.3%

Transit Time From APOE to APOD

		# of TCNs Meeting Standards	Total # of TCNs	% of TCNs Meeting Standards
Taszar	Army #1	11	68	16.2%
	Army #2	18	44	40.9%
	Air Force	8	56	14.3%
Tuzla	Army #1	15	66	22.7%
	Army #2	31	91	34.1%
	Air Force	13	34	38.2%

APOD Port Hold Time

		# of TCNs Meeting Standards	Total # of TCNs	% of TCNs Meeting Standards
Taszar	Army #1	56	68	82.4%
	Army #2	44	44	100.0%
	Air Force	52	56	92.9%
Tuzla	Army #1	32	66	48.5%
	Army #2	43	91	47.3%
	Air Force	5	34	14.7%

AMC Possession Time

		# of TCNs Meeting Standards	Total # of TCNs	% of TCNs Meeting Standards
Taszar	Army #1	16	68	23.5%
	Army #2	17	44	38.6%
	Air Force	40	56	71.4%
Tuzla	Army #1	11	66	16.7%
	Army #2	17	91	18.7%
	Air Force	10	34	29.4%

Appendix E: Key Definitions

Aerial Port - An airfield selected for the air movement and transshipment of personnel and material. It serves as an authorized entry or departure point for the country in which it is located.

Automatic Identification Technology (AIT) - "Consists of process control hardware, application software, and hybrids that provide industry-standard real-time data acquisition to enhance productivity. It includes bar codes, radio frequency identification, magnetic stripes, smart cards, and optical laser cards. In DoD logistics, these technologies facilitate the capture of supply, maintenance, and transportation information for inventory and movement management, shipment diversion and reconstitution, and personnel or patient identification" (DoD, 1995:B-1).

Defense Automatic Addressing System Center (DAASC) - "designs, develops, and implements logistics solutions that improve customers' requisition processing and logistics management processes world wide. Our mission is to receive, edit, and route logistics transactions for the Military Services and Federal Agencies; to provide value added services for standard MILS transactions and provide information about anything, anywhere, anytime, anyway, to anybody(s) in the DoD and Federal Logistics Community. DAASC is the official repository for selected DoD publications, the DoDAAD, MAPAD, MILRI, and Distribution Code" (DAASC, 1998b).

Defense Transportation System (DTS) - "That portion of a nation's transportation infrastructure that supports DoD transportation needs in peace and war. The DTS consists of those common-user military and commercial assets, services, and systems organic to, contracted by, or controlled by the DoD" (DoD, 1987:A-3).

Department of Defense Activity Address Code (DODAAC) - A six position alphanumeric code identifying specific activities authorized to ship or receive materiel and prepare documentation or billings (DoD, 1987:A-4).

Focused Logistics - "the fusion of information, logistics, and transportation technologies to provide rapid crisis response, to track and shift assets even while enroute, and to deliver tailored logistics packages and sustainment directly at the strategic, operational, and tactical level of operations" (JCS, 1995:24).

Green Sheet Procedures - A process that specifically identifies cargo in the AMC system to gain movement precedence over other priority cargo of the same sponsoring Service, including high-priority (RDD code 999) shipments. It is used to expedite movement of specific shipments that are in the national interest and certified as an operational necessity (DAF, 1996).

Intransit Assets - "Materiel that is between storage locations, either wholesale or retail; materiel shipped from vendors after acceptance by the government but not yet received by the inventory manager; materiel temporarily in use or on loan with contractors or schools; or materiel that cannot be otherwise categorized" (DoD, 1996b:26).

Intransit Visibility (ITV) - "The ability to track the identity, status, and location of DoD unit and non-unit cargo (excluding bulk petroleum, oils, and lubricants) and passengers; medical patients; and personal property from origin to to the consignee or destination designated by the CINCs, Military Services, or Defense agencies, during peace, contingencies, and war" (DoD, 1995:B-1).

Julian Date - A four-digit number representing the year and day of the year. The first digit represents the last digit in the year and the remaining digits represent the day of the year. Example: 1 Jan 98 = 8001.

Lead Transportation Control Number (Lead TCN) - a set of individual TCNs consolidated--physically and systemically--under a single TCN for ease of movement and ITV through the DTS.

OPERATION JOINT ENDEAVOR (OJE) - North Atlantic Treaty Organization (NATO) multinational forces operating in the Bosnia-Herzegovina theater of operations to implement the military aspects of the Bosnia Peace Agreement signed in Dayton, Ohio, on 14 December 1995. 20 December 1995 - 20 December 1996. (NATO, 1997)

OPERATION JOINT GUARD (OJG) - NATO multinational forces operating in the Bosnia-Herzegovina theater of operations as a stabilization force supporting the Dayton Peace Accords. 21 December 1996 - present. (NATO, 1997)

Palletized - A set of items arranged on a pallet and secured so that the entire set may be handled as a single unit.

Required Delivery Date (RDD) - A three-digit alphanumeric code indicating the date a shipment is required by the requisitioning unit. An RDD code of 999 identifies the most acutely needed shipments.

Total Asset Visibility (TAV) - "The capability that permits operational and logistics managers to determine and act on timely and accurate information about the location, quantity, condition, movement, and status of Defense material. It includes assets that are instorage, inprocess, and intransit." (DoD, 1995:B-3)

Transportation Control Number (TCN) - "A unique 17-position alphanumeric data element assigned to control a shipment unit throughout the transportation pipeline" (DoD, 1995:B-3)

Transportation Priority (TP) - A number (1-4) assigned to a shipment indicating its movement priority in the Defense Transportation System. It is assigned based on the Required Delivery Date (RDD) code. TP1 represents the highest priority of shipment.

Appendix F: Glossary of Acronyms

AFDD	Air Force Doctrine Document
AIS	Automated Information System
AIT	Automatic Identification Technology
AMC	Air Mobility Command
AMMP	Air Mobility Master Plan
APOD	Aerial Port of Debarkation
APOE	Aerial Port of Embarkation
ATAV	Army Total Asset Visibility
CAPS II	Consolidated Aerial Port System II [AMC]
CCP	Consolidation/Containerization Point
CONUS	Continental United States
DAAS	Defense Automated Addressing System
DAASC	Defense Automatic Addressing System Center
DLA	Defense Logistics Agency
DoD	Department of Defense
DoDAAC	DoD Activity Address Code
DOV	Dover Air Force Base, Delaware
DS/DS	Desert Shield/Desert Storm
DTS	Defense Transportation System
DUSD(L)	Deputy Undersecretary of Defense (Logistics)
GAO	Government Accounting Office
GATES	Global Air Transportation and Execution System [AMC]
GCCS	Global Command and Control System
GTN	Global Transportation Network [USTRANSCOM]
IT	Information Technology
ITV	Intransit Visibility
JTAV	Joint Total Asset Visibility
LOTS	Logistics On-Line Tracking System [DAASC]
MILSTAMP	Military Standard Transportation and Movement Procedures
MILSTRIP	Military Standard Requisition and Issue Procedures
MTMC	Military Traffic Management Command
OCONUS	Outside the Continental United States
OJE	OPERATION JOINT ENDEAVOR
OSD	Office of the Secretary of Defense
PHT	Port Hold Time
POD	Port of Debarkation

POE	Port of Embarkation
RDD	Required Delivery Date
RF/ITV	Radio Frequency/Intransit Visibility
RFID	Radio Frequency Identification
RMS	Ramstein Air Base, Germany
TACC	Tanker Airlift Control Center
TAV	Total Asset Visibility
TCN	Transportation Control Number
TP	Transportation Priority
TRAIS	Transportation Reporting & Inquiry System
TZL	Eagle Base, Tuzla, Bosnia
TZR	Taszar Airfield, Hungary
UMMIPS	Uniform Material Movement and Issue Priority System
USAREUR	U.S. Army Europe
USEUCOM	U.S. European Command
USTRANSCOM	U.S. Transportation Command
WWW	World Wide Web

Bibliography

Air Mobility Command Computer Systems Squadron (AMC CSS). "GATES takes AMC, USTRANSCOM into 21st Century," n. pag. WWWeb, http://smsmweb.scott.af.mil/projects/gates/news/article2.htm. 30 June 1998.

Ashby, Timothy R. Headquarters Air Mobility Command, Tanker Airlift Control Center-East Cell, Scott AFB IL. Telephone conversation. 28 June 1998.

Begert, William. "The Global Transportation Network," Defense Transportation Journal, 52: 6-10 (September/October 1996).

Closs, David J., Thomas J. Goldsby, and Steven R. Clinton. "Information technology influences on world class logistics capability," International Journal of Physical Distribution & Logistics Management, 27: 4-17 (1997).

Cooke, James Aaron. "A sneak peek at tomorrow's technology," Logistics Management, 35: 51S-53S (December 1996).

Currie, Karen W. "An Executive's Guide to the Internet," Supply Chain Management Review: 84-91 (Winter 1998).

Defense Automated Addressing System Center (DAASC). "LOTS," n. pag. WWWeb, http://daynt2.daas.dla.mil/daashome/html/lots.htm. 30 June 1998a.

----. Homepage: n. pag. WWWeb, http://daynt2.daas.dla.mil/. 16 July 1998b.

Department of the Air Force (DAF). Air Mobility Master Plan (1998). Scott AFB IL: Headquarters Air Mobility Command, 24 October 1997a. WWWeb, http://www.scott.af.mil/hqamc/pa/about/ammp.htm. 21 April 1998.

----. Logistics. AFDD 40. Washington: HQ USAF, 11 May 1994.

----. Radio Frequency Identification. Wright-Patterson AFB OH: HQ AFMC, 18 April 1997b. WWWeb, http://www.afmc.wpafb.af.mil/HQ-AFMC/LG/LSO/LOA/rfid.htm. 14 January 1998.

----. Transportation - Cargo Movement. AFI 24-201. Washington: DAF, 1 August 1996.

Department of Defense (DoD). Annual Report to the President and the Congress. Washington: DoD, March 1996a. Excerpt from report, n. pag. WWWeb, http://www.dtic.mil/execsec/adr96/index.html. 21 April 1998.

----. Annual Report to the President and the Congress. Washington: DoD, March 1997. Excerpt from report, n. pag. WWWeb, http://www.dtic.mil/execsec/adr97/index.html. 21 April 1998.

----. Defense Intransit Visibility Integration Plan. Washington: GPO, February 1995.

----. Department of Defense Logistics Strategic Plan. Washington: GPO, 1998a. WWWeb, http://www.acq.osd.mil/log/mdm/lsp98pln.htm. 21 April 1998.

----. DoD Materiel Management Regulation. DoD 4140.1-R. Washington: DoD, 20 May 1998b. WWWeb, http://204.255.70.40/supreg/. 29 June 1998.

----. In-Transit Visibility Implementation/Action Plan (Draft). Washington: HQ USEUCOM, 25 November 1996b.

----. Military Standard Transportation and Movement Procedures (MILSTAMP). DoD 4500.32-R, Vol. I. Washington: DoD, 15 March 1987.

Federal Express Corporation (FedEx). 1997 Annual Report. Memphis TN: FedEx, July 1997a.

----. Information Packet. Memphis TN: FedEx, February 1997b.

Franciose, Michelle M. Supply Chain Integration: Analysis Framework and Review of Recent Literature. Master's Thesis. Massachusetts Institute of Technology, June 1995.

Government Accounting Office (GAO). 1997 Consolidated Financial Statements of the United States. Report AIMD-98-127. Washington: GPO, 31 March 1998. WWWeb, http://www.gao.gov/reports.htm. 15 April 1998.

----. Operation Desert Storm, Lack of Accountability Over Materiel During Redeployment. Report NSIAD-92-258. Washington: GPO, September 1992 (B-246015).

Grant, Linda. "Why FedEx is Flying High," Fortune, 136: 155-160 (10 November 1997).

Honor, Edward. "Enabling Technologies - The 52nd Annual NDTA Transportation and Logistics Forum and Exposition," Defense Transportation Journal, 53: 42-52 (December 1997).

Janah, Monua and Clinton Wilder. "Networking--Special Delivery--Think FedEx is only about delivering packages? Think again," Information Week, 654: n. pag. (27 October 1997). WWWeb, http://www.techweb.com/se/directlink.cgi?IWK19971027S0043. 1 February 1998.

Joint Chiefs of Staff (JCS). Joint Vision 2010. Washington: JCS, 1995.

Lappin, Todd. "The Airline of the Internet," Wired, 4: n. pag. (December 1996). WWWeb, http://www.wired.com/wired/4.12/features/ffedex.html. 1 February 1998.

Malone, Julia. "Cargo MIA, report finds," Dayton Daily News: 1A. 28 March 1998.

McClave, James T. and George Benson. Statistics for Business and Economics. New Jersey: Prentice-Hall Inc., 1994.

Miller, James M. Intransit Visibility: Capturing All the Source Data. Graduate Research Paper, AFIT/GMO/LAP/96J-5. School of Logistics and Acquisition Management, Air Force Institute of Technology (AFIT), Wright-Patterson AFB OH, May 1996 (AD-A309719).

Murphy, Jean V. "Brutal competition, consolidation seen for transport's technology-intense future," Traffic World, 10: 28-39 (4 December 1995).

National Defense Transportation Association (NDTA). "Intransit Visibility: Harmonizing the Process," Report of the July 20-22, 1994, ITV Workshop. Cambridge MA: September 1994.

North Atlantic Treaty Organization (NATO). "The NATO-led Stabilisation Force (SFOR) in Bosnia and Herzegovina," n. pag. (April 1997). WWWeb, http://www.nato.int/docu/facts/sfor.htm. 23 July 1998.

"Scaling the heights of technology," Logistics, 37: 58-64 (February 1998).

Shalikashvili, John M. "Joint Vision 2010: Force of the Future," Defense 96, 4: 6-21 (1996).

United States Transportation Command (USTRANSCOM). "Global Transportation Network Overview," n. pag. WWWeb, http://www.gtn.transcom.mil/webplus/overview.html. 30 June 1998.

Wilder, Clinton. "Delivery Goes Digital--The growth of the Web compels the transport industry to make basic changes," Information Week, 649:n. pag. (22 September 1997). WWWeb, http://www.techweb.com/se/directlink.cgi?IWK19970922S0063. 1 February 1998.

Wolford, Dean A. Improved Visibility Within the Air Force ITV System. Graduate Research Paper AFIT/GMO/LAL/96N-15. School of Logistics and Acquisition Management, Air Force Institute of Technology (AFIT), Wright-Patterson AFB OH, November 1996 (AD-A320449).

Wooley, Scott. "Replacing inventory with information," Forbes, 159: 54-58 (24 March 1997).

Vita

Capt Leigh E. Method was born on [redacted]. She graduated from Northville High School in 1986 and entered undergraduate studies at Michigan State University in East Lansing, Michigan. She graduated with a Bachelor of Arts degree in Personnel Administration in June 1990. She received her commission through the Air Force Reserve Officer Training Corps on 9 June 1990 as a Distinguished Graduate and recipient of a Regular Air Force Commission.

Her first assignment was at Langley AFB as the Combat Readiness & Resources Officer and, for a short time, the Vehicle Operations Officer for the 1st Transportation Squadron, 1st Fighter Wing. She attended the Transportation Officer Course at Sheppard AFB and graduated in March 1992. Her second assignment was at Yokota AB as an Air Terminal Operations Duty Officer and later as the Air Freight Officer for the 630th Air Mobility Support Squadron (previously the 316th Aerial Port Squadron). While at Yokota AB, she completed Squadron Officer School by correspondence. Her next move was into a logistics crossflow assignment at Travis AFB as the Assistant Maintenance Supervisor for the 60th Aircraft Generation Squadron (C-5 aircraft). While assigned to Travis AFB, she attended the Aircraft Maintenance Officer School at Sheppard AFB and graduated in January 1996. She attended Squadron Officer School at Maxwell AFB and was a Distinguished Graduate upon completion in June 1996. In May 1997, she entered the School of Logistics and Acquisition Management, Air Force Institute of Technology.

Permanent Address: [redacted]

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WPAFB OH 45433-7765

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This research is an analysis of the effect that the added in-transit visibility (ITV) associated with applying Radio Frequency Identification (RFID) technology to Army resupply cargo makes on total cycle time (from entry into to exit from the system) within the Air Mobility Command (AMC) portion of the Defense Transportation System. Although information technology applications are known to contribute to ITV, there has been no attempt to quantify it despite a perception held by at least part of the DoD community that ITV initiatives will reduce logistics response time by improving cycle time. This study was aimed at quantifying RFID technology's contribution to cycle time by comparing a set of RFID-tagged shipments to a set of non-RFID-tagged shipments moving into the Bosnia-Herzegovina theater of operations. Although there are agencies looking at worldwide implementation of this system, the system under study is currently the only one of its kind. The major finding of this research is that RFID-tagged shipments actually took longer to move through the AMC system. Port Hold Time at the point of embarkation was 2 to 2.5 times longer for RFID-tagged shipments and had a total possession time 19 percent longer than non-RFID-tagged shipments.

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3. **Please estimate** what this research would have cost in terms of manpower and dollars if it had been accomplished under contract or if it had been done in-house.

Man Years_____ $_____

4. Whether or not you were able to establish an equivalent value for this research (in Question 3), what is your estimate of its significance?

a. Highly Significant b. Significant c. Slightly Significant d. Of No Significance

5. Comments (Please feel free to use a separate sheet for more detailed answers and include it with this form):

_____ _____
Name and Grade Organization

_____ _____
Position or Title Address