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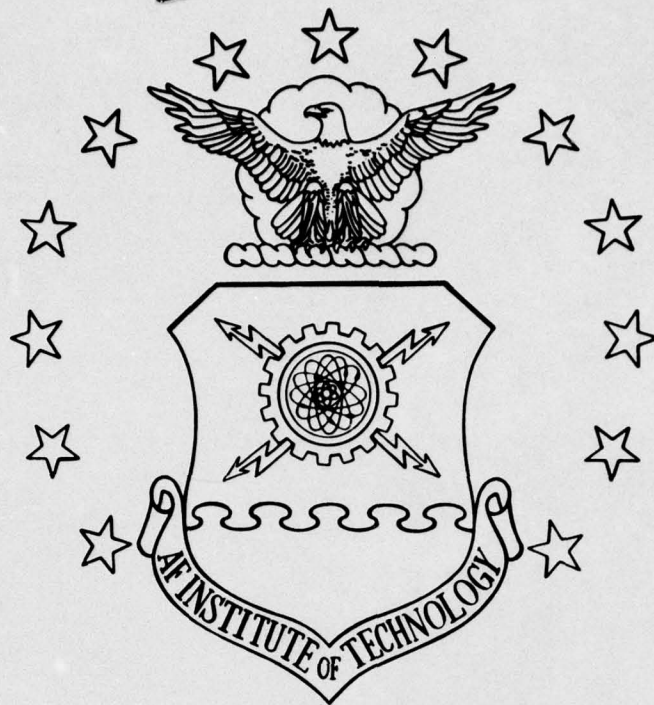


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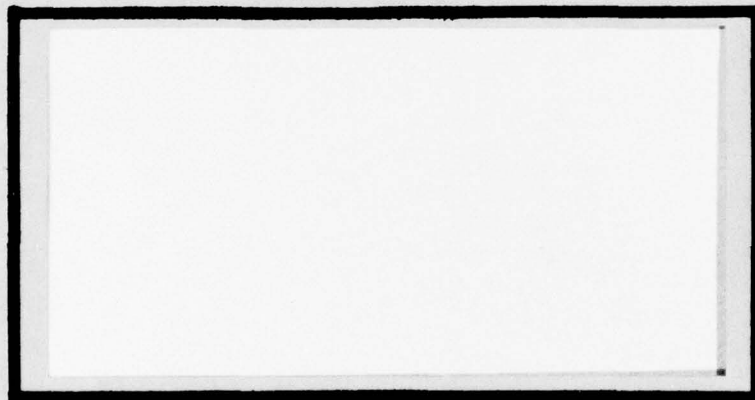
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AN EXAMINATION OF MATERIEL MANAGEMENT
INFORMATION FLOWS ASSOCIATED WITH A
Multi-Service JOINT STOCKAGE LOGISTICS SYSTEM
THESIS

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Douglas L. Brazil
Captain USAF



(see 1473)

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AN EXAMINATION OF MATERIEL MANAGEMENT
INFORMATION FLOWS ASSOCIATED WITH A
MULTI-SERVICE JOINT STOCKAGE LOGISTICS SYSTEM

THESIS

Presented to the Faculty of the School of Engineering
of the Air Force Institute of Technology
Air University
in Partial Fulfilment of the
Requirements for the Degree of
Master of Science

by
Douglas L. Brazil, B.S.
Captain USAF
Graduate Operations Research
December 1976

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Preface

To thank everyone who aided in this effort would require more space than is provided here. Special thanks must be given to Captain Don Ruth, USN, and those people associated with the DODMDS study group; to Captain Bob Tripp, USAF, my advisor; and to my wife, Mia, for her quiet encouragement during this thesis period.

The DoD logistics system is a complex and vastly complicated system that has been divided, for historical reasons, among the various service branches. This division is now causing problems in the building of a unified military logistics system. This effort attempts to look at a very minute part of that system and offers a possible method for cutting overall transportation costs throughout DoD.

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Abstract

The logistics system for the Department of Defense (DoD) could be the system that is of utmost importance to the running of DoD and usually is the system that is least understood. Many studies have been conducted to improve the logistics system for the military services. This study investigates the possibility of a system called "joint stockage," that would allow an Item Manager (IM) from one service to store and issue his assets from the depot facilities of any other service--provided this change creates an overall cost or response savings for the DoD. In the investigation of this joint stockage system, although other problems are highlighted, the primary emphasis is on the IM's information flows required for daily asset control and visibility. The study was restricted to the Army and Air Force logistics systems, although most of the ideas are expandable to the other services. The study concludes that such a system is feasible using today's hardware and software, with minor modifications, and would provide the DoD with a limited joint stockage operation with a small investment cost and the potential for large savings in transportation costs.

AN EXAMINATION OF MATERIEL MANAGEMENT
INFORMATION FLOWS ASSOCIATED WITH A
MULTI-SERVICE JOINT STOCKAGE LOGISTICS SYSTEM

I. Introduction

Background

After the completion of the Korean conflict, the Military Services and Congress initiated a number of in-depth studies and audits of the military logistics system. These studies indicated that there were serious and extensive deficiencies in the Services' ability to manage an effective materiel supply system within the Department of Defense (DoD). The reports showed that there were duplications among the services in the management of common supply items. In particular, the services initiated costly acquisition procedures when, unknown to the wholesale managers, stocks of the desired item existed within the retail supply system; repair facilities stopped functioning due to a lack of repair parts when these assets were available, but under the control of a different organization; and a service would purchase a particular item, when, at the same time, that particular item was being destroyed as excess by another service. The discovery of these deficiencies caused Congress in the late 1950's to direct the DoD to design a logistics system and implement the necessary policy changes that would improve efficiency, eliminate duplication, and

increase responsiveness to the operational forces (Ref 1:I1-I2).

The demands of the Vietnam conflict on the restructured logistics system once again highlighted many deficiencies in the system. Although changes had been made, the system failed to provide sufficient logistics communications between operational commanders and logistics personnel. The cause of these deficiencies was, in many cases, the lack of common automatic data processing systems within the DoD; the result was poor logistics support. The Office of the Secretary of Defense (OSD) was directed to provide agencies with specific policy guidance and specific minimum design parameters in order to create a logistics system that would accomodate both integrated management and the interservice/agency communication necessary to improve efficiency and reduce costs (Ref 1:I2).

The Office of the Secretary of Defense, Installations and Logistics (OSD,I&L) established the DoD Logistics System Policy Committee (LSPC) in January, 1970, for the purpose of developing a DoD Logistics System Plan (LOGPLAN). To this end the LSPC created the LSPC Task Group 1-70 to study the existing problems and recommend policy guidance as a foundation for the LOGPLAN for the 1975-1980+ timeframe (Ref 1:I3-I4). "The LOGPLAN is a DoD-wide, long-range improvement plan for the logistics systems development, complimenting the Five Year Defense Plan (FYDP). As the master plan for DoD logistics systems, the LOGPLAN is a documented collection of logistics concepts, objectives, and subordinate plans to ... assure the highest practical level

of systems compatibility, interface, and integration consistent with DoD requirements and mission needs of the separate DoD components" (Ref 2:1-4). Since the LSPC Task Group 1-70, many studies have been completed and recommendations made for the improvement of the DoD logistics System.

Current Situation

The United States Code (10 U.S.C. 2202 and 2701) sets the policies to be followed by the Secretary of Defense in establishing control of, and accounting for, DoD inventory. The Secretary of Defense has assigned the responsibility for inventory management to his Assistant Secretary of Defense, Installations and Logistics (ASD,I&L) who has established broad policies and procedures to be followed by the military services and the Defense Supply Agency (DSA) (Ref 3:8).

Improvements to the DoD logistics system are being made continuously. Several efforts are currently being conducted to insure the continuous upgrading of both logistics hardware and logistics procedures throughout the DoD. One study of particular importance is the DoD Materiel Distribution System (DODMDS) study, chartered by joint Army Materiel Command/Navy Materiel Command /Air Force Logistics and Systems Commands agreement on 25 March 1975. Under this charter, the study group is to "examine and recommend alternatives to optimally integrate, consolidate, and/or standardize Service or Agency distribution functions and facilities within the fifty states where it is clearly beneficial in terms of response and cost" (Ref 4:1).

The primary search of the DODMDS study is for the optimal physical placement of assets and facilities to minimize cost and response. There is no mention in the DODMDS Charter of the need to study the impacts of this optimal solution on the existing logistics information systems. This thesis was initiated in concert with the DODMDS study to investigate possible impacts of the solution on the services' logistics information systems. It is logical to question whether or not a new, centralized information system will be required under the DODMDS solution.

Current management of nonconsumable, or recoverable, assets is divided among all using services. Each service that uses a particular nonconsumable asset has its own Item Manager and maintains its own materiel management system, separate from the other service users. Each service is responsible for providing its own maintenance capability for repair of its managed items; however, in many cases, a single service--usually the service with the largest or most capable maintenance facility--will perform the required maintenance for the other services using the item through Depot Maintenance Interservice Support Agreements (DMISA's). These agreements are specific written agreements between two services for depot-level maintenance support and includes responsibilities of each service plus funding arrangements for the various depot services performed.

A second effort that is of importance to this thesis is the implementation of a joint service regulation,

AFLCR 400-21/AMCR 700-99, Elimination of Duplication in the Management and Logistics Support of Multi-used Nonconsumable Items. The complete implementation of this regulation throughout DoD will eliminate the duplication of item management for this particular group of assets. The implementation is in two phases: under Phase I, a lead service, or Primary Inventory Control Authority (PICA), will be assigned the primary responsibility for cataloging, procurement, disposal, and depot-level maintenance for particular nonconsumable National Stock Numbered (NSN) items; under Phase II, additional responsibilities will be assigned to the lead services, so that, after complete implementation, each affected NSN nonconsumable, multi-used item will have only one wholesale manager (Ref 5:i,1-1). This implementation is directed in the LOGPLAN in General Objective Number One, "Item Management Duplication" (Ref 2:4-1). Phase I has been implemented, and all NSN items in the category, with a few exceptions, have been assigned to a PICA; Phase II is in the initial conference stages and has an implementation date of May 1978.

Research Objective

The primary concern of all Item Managers (IM's), regardless of the category of their assets, is that there is always an adequate supply of these assets to be requisitioned by the users in the field. In order to insure this supply, an IM must continuously know the stock level and location of each NSN item that he is responsible for.

He must be aware of the "normal" usage rate for his assets and must insure that the required lead times for ordering more of the assets are used in all his calculations. In addition to "normal" usage, the IM must maintain the required War Reserve supply of his assets. If the IM manages nonconsumable items, he must insure that the maintenance capability to repair his assets is functioning and producing to a prescribed standard to guarantee an adequate supply of new items to the user.

All these requirements placed on the IM must be satisfied in part by flows of information that verify the required stock levels or verify actual or future shortages of a particular asset. These information flows are the primary concern in this examination of the IM and his task of asset control and visibility. In its most basic terms, the task of asset control and visibility can be reduced to simple acts of transaction reporting. If one can assume that a hypothetical IM knows the number and position of a given item, and that every time this item is issued the IM receives a report of that issue, so that his inventory count can be altered accordingly, then the IM will always have an accurate count and location of each item. In precisely this manner the IM can program his requirements for stock levels and future purchases or maintenance of his assigned assets. This highly oversimplified description of the requirements of the IM, of course, neglects many of the problems that exist between the Army Materiel Command (AMC)

and the Air Force Logistics Command (AFLC) and will be highlighted in a later chapter.

In light of the problems that exist today, in a logistics system where managed assets are usually stored in the facilities of the IM's service, one must wonder about a logistics system in which an IM would have the freedom to store his managed assets in the storage facilities of another service and have the confidence that those assets would be maintained as though they belonged to his service. For example, if an Air Force IM, located at San Antonio Air Logistics Center (ALC), Texas, had a contractor on the East Coast and a primary user of that item on the East Coast, under the current system he would have no option but to ship those assets to San Antonio ALC from the contractor and then issue them on demand back to the user. If the IM had the freedom to store those assets in another service's existing depot storage facilities, he could choose to store them in the Army depot at Tobyhanna, Pennsylvania, for example, and save the transportation costs on the difference in mileage between Tobyhanna and San Antonio. If this IM had the confidence that Tobyhanna Army Depot would store and issue this asset with the same accuracy and care as the San Antonio ALC, he would probably store the asset there, and thereby create a savings in both dollars and response time to the user.

This concept, to be called "joint stockage," will be investigated for use between the AMC and AFLC on a routine

basis utilizing as many of the policies and procedures, and as much of the hardware and software that exists in today's logistics system as possible. In the area of joint stockage, it was thought that a major problem to be examined and corrected would be in the information flows necessary for proper inventory management throughout the DoD logistics system. It was supposed that since each military service had its separate logistics system, with different procedures, software and hardware, that without extensive software changes or complex computer interface systems, electronic data processing communication between and among all services and agencies would be impossible. It was thought that because each service had requirements for information and reports that followed different timetables, the services would have to decide on one format and one timetable in order to function under the joint stockage concept. Because of the misconception that the services did not communicate with each other in automatic data processing (ADP) language on a routine basis, initially it was thought that the primary concern of this research should be to investigate and discover a means for this communication at the Item Manager level, so that joint stockage could be realistically examined. Investigation into this problem showed that there is daily ADP communication between the services, and that this communication is completely automatic. Any time an item is managed by a single service under a true integrated materiel management concept, the requisitioning by all the using services

is accomplished automatically across service lines, and issues are made without regard to the service affiliation of the requisitioner. Once again, of primary concern are the information flows necessary for an Item Manager in the daily execution of his required asset control and visibility under the concept of joint stockage. Many of the obvious internal and facility problems will have to be given a cursory look because of the extreme complexity of the subject and the limited resources available for thesis work. These problems are being addressed in several other thesis works and by the DODMDS study. This thesis has tried to isolate those problems that deal with the flows of information required to run a logistics system from the item management and DoD point of view.

Assumptions

In order to examine the benefits and drawbacks of a logistics system operating under the joint stockage concept, some underlying continuity must be maintained. Several stabilizing assumptions must be made to insure this continuity for the purpose of study. In line with the assumptions made by the DODMDS study, this study will assume that overall constraints on funds and personnel to run an effective logistics system will continue to tighten in the 1975-1980 timeframe, and that these constraints will require the DoD to continuously manage its logistics distribution system in a more cost effective manner. It must also be assumed that some form of service consolidation will be a reality during

this time period in light of the numerous consolidation efforts currently in progress. The final, and perhaps most important, assumption is that the single manager philosophy will continue to be regarded as the primary means of eliminating unnecessary duplication of management effort for those assets used by more than a single service.

Methodology

Initially the primary method of research was literature search and conversations with those knowledgeable in the logistics field in order to gain enough basic information to begin the actual research. Once the logistics language was learned, specific questions were formulated and a questionnaire was developed to aid in interviewing Item Managers and depot personnel (see Appendix C for sample questionnaires). The final methodology was much the same throughout--continuing literature search and personal interviews with knowledgeable people in AFLC Headquarters, the AMC, the Defense Automatic Addressing System Office, and the Automatic Digital Network office. From this literature search and these interviews came the majority of the substance for this thesis. Because the situation where an IM from one service actively uses the storage facilities of another service is very limited, this situation was impossible to gather actual data on, and impressions had to be relied on from the literature and personal interviews.

Overview

In the next chapter the Item Manager and his primary tasks are discussed. Chapter III addresses two of the major problems encountered by the IM in today's logistics system when operating across service lines. Chapters IV and V discuss the potential benefits and the potential additional problems that could be created under a joint stockage concept. Chapter VI discusses several possible solutions to the information system problems that will be created by joint stockage, and the conclusions of this thesis are contained in Chapter VII.

II. The Item Manager

Consumable Item Management

The item management function is the same for an Air Force IM as it is for an Army IM. The distinctions that exist between item managers are not their service affiliation, but the Federal Supply Classification (FSC) Classes of the assets they control. The IM is truly an Integrated Materiel Manager (IMM) if his assets fall into the group titled Consumable Items of Supply. These are "all NSN items of supply except explosive ordinance, major end items of equipment (IMC Criterion 1) and reparables (IMC Criterion 2)" (Ref 6:1-3); they are items that are usually expended or used up beyond recovery during normal usage. Appendix A contains IMC Criteria 1 and 2. The Integrated Materiel Manager exercises total DoD or Federal Government-wide management control for an FSC Group or Class, commodity or item. He normally is responsible for computing requirements, funding, budgeting, storing, issuing, cataloging, standardization, and disposal instructions. He is the single person or activity that supplies those assets to all users, regardless of their service or agency.

Consumable items are subdivided into two groups: Commodity Oriented FSC Classes and Weapons Oriented FSC Classes. The Commodity Oriented FSC Classes are those classes approved by the Secretary of Defense for assignment to a Commodity Integrated Materiel Manager (CIMM) "for

management under the concept that 'the management characteristics which distinguish the Commodity Oriented items are such that the relationship of like items to each other rather than the relationship of parts to higher assemblies is generally predominant' " (Ref 7:1-6). A current listing of these classes is given in Appendix D, DoD 4140.26-M, Vol I. The Weapons Systems Oriented FSC Classes are those classes assigned to a Weapons Integrated Materiel Manager (WIMM) and are comprised of "items that require close management and support interdependence of both their technical/engineering and supply functions which are best performed by the Service having management responsibility for the end item" (Ref 6:1-4). The WIMM manages those consumable items which have a fundamental relationship with their parent weapons system or assembly. An example of a weapons oriented consumable item is a \$.94 component part for an aircraft gunnery fire control system, NSN 1270 003305232, that is managed by the AF at Warner Robbins ALC for the AF, Army, Navy, and Marine Corps. Consumable items that fall into the Weapons Oriented FSC Classes are those consumable items listed in Appendix A, DoD 4140.26-M, Vol II, and those consumable items in the Commodity Oriented FSC Classes which meet the IMC Criterion for service management prescribed in DoD 4140.26-M, Vol I (Ref 6:1-4).

Nonconsumable Item Management

Nonconsumable items make up the remainder of the items and are those assets that, because of their cost or

construction, are not consumable items. These Nonconsumable Items are "NSN items of supply which are major end items (principle or secondary), depot reparable components, special management, or inconsistent items" (Ref 5:A2-2). The functions of the nonconsumable IM are the same as the WIMM or CIMM, except that he must concern himself with depot and intermediate maintenance facilities, credit for inoperable carcass returns, disposal approval for non-reparable units, and computations for future procurement based on maintenance rates, condemnation rates, and field usage data. In addition the nonconsumable IM must be consulted prior to any configuration or engineering changes that affect his assets, so that those changes' impacts can be evaluated with respect to projected mission and usage data.

Unlike the WIMM and CIMM, who have world wide control of particular NSN items, nonconsumable IM's exist in every service that currently uses those nonconsumable assets. If a single NSN item is used by the Army, Navy, and AF, there will be a separate IM in each service who has control of that NSN item for his own service; the Army IM will control whatever quantity the Army is authorized, and so forth, for each service. Each IM is responsible for providing all the functions mentioned above, separate from the other services. There are agreements that can be drawn up between two services that will relieve a service of the requirement to have its own procurement, disposal, depot maintenance, and other required functions if their use of the item is small

or not considered important enough to their primary mission. The Wholesale Interservice Supply Support Agreement (WISSA) and the Depot Maintenance Interservice Support Agreement (DMISA) are two such agreements that relieve the IM of the actual function specified in the agreement, but he is not relieved of the responsibility for insuring that the functions are performed.

This nonconsumable materiel management is extremely duplicative in many basic areas where more than one service is a primary user of a specific asset. There are approximately 38,000 NSN nonconsumable items that are currently being used by more than one service that have item managers in each using service. One major effort to bring those multi-used items into line with true IMM policy is the joint committee implementation of AFLCR 400-21/AMCR 700-99 mentioned in Chapter I. As mentioned, the implementation date for this regulation is May, 1978, and, when fully implemented, the materiel management of those 38,000 items should generally follow the lines the WIMM uses in his IMM routine. Services that are only users of an item (SICA) will submit requirements data to the PICA in each designated time period, so the PICA can plan future maintenance and procurement action. Since duplication in the materiel management function occurs primarily when more than one service uses a particular asset, this implementation will take us far in our efforts to reduce unnecessary duplication and cost, while maintaining a flexible and effective

logistics system. No mission effectiveness will be sacrificed during and following the implementation of this regulation throughout DoD (Ref 5:1-1 to 1-4).

A Common System

In the Air Force the IM is located at the ALC that is prime for his assets; in the Army the IM is usually not co-located with his assets. The Air Force operates under its various systems using a variety of computer hardware and software; the Army operates under different systems using a different variety of hardware and software. The titles of these programs or the manufacturer of the various types of hardware, while important to each service, are unimportant to this study effort. The important feature of each system is that it is capable of running the materiel management systems in its own service, and that it can communicate in automatic data processing (ADP) language on a routine basis with the computers of the other's service. This ability was built into each system with the implementation of the sets of procedures known as the Military Standard Systems. Two of the systems that are used daily by the IM's ADP materiel management programs and equipment are DoD 4140.17-M, Military Standard Requisition and Issue Procedures (MILSTRIP), and DoD 4140.22-M, Military Standard Transaction Reporting and Accounting Procedures (MILSTRAP). These two sets of procedures allow an IM from either the Army or AF to communicate in a standard language with the materiel management and depot inventory computers of the other's service.

These two standard systems allow completely automatic requisitioning by a user in the Army of an asset managed by the AF and stored in a storage facility of any service, for example. The frequency of use of this capability depends on the amount of other-service users of a given asset and the category of that asset. In the actual situation presented in Chapter IV, a civilian contractor is performing depot level maintenance on an Army aircraft engine, and on a routine basis, this contractor uses MILSTRIP procedures to requisition approximately 20% of the assets managed by a San Antonio ALC WIMM. In addition to using AF assets on that engine, the contractor also requisitions from the Army, Navy, and DSA using the same set of procedures for each service of agency. Normal Army and Navy users of this WIMM's assets also requisition on a routine basis using the same procedures across service lines. All of these requisitions are processed automatically by the computer system. For the WIMM and CIMM this means of supplying other services with their required assets is a continuous, daily routine, and it is handled completely automatically by both the Army and AF computer systems because of the use of the MILSTRIP/MILSTRAP standard DoD procedures. For the passage of the required information, any combination of requisitioner, manager, depot, and shipper is possible automatically as long as each has the required ADP capability. If any one member does not have the capability, the system still functions, but human intervention is necessary for the non-

ADP user in order to read and decipher the message format.

The primary information the IM requires to maintain his asset control and visibility contains 1) the knowledge of the total quantity of each NSN he is responsible for, 2) the position (storage location for consumable items; the actual location, storage and in-use, for nonconsumable items) of each NSN item he is responsible for, 3) feedback on issues or denials of each NSN for each storage location, 4) an audit trail capability on all issues, receipts, and denials, 5) an internal inventory program that will alert the IM when stocks have reached a "buy" level, and 6) enough usage data to be able to forecast accurately future needs for his assets.

The examination in this section of the basic system as it exists today will use an Air Force IM, keeping in mind that the systems described will apply equally to an Army IM unless noted otherwise (Ref 8 and 9). Assume that the IM begins with full knowledge of his total quantity and position of a particular NSN item. When a user of that item needs one or more, he completes a MILSTRIP requisition form, DD Form 1348m, and sends it via the Automatic Digital Network (AUTODIN) to the appropriate IM using a routing identifier code based on the NSN requisitioned. As the requisition enters the AUTODIN it is automatically routed to the Defense Automatic Addressing System (DAAS), which compares the NSN and the routing identifier to insure the requisition is sent to the proper activity. If the routing identifier is not correct, the DAAS automatically corrects it and sends it

via AUTODIN to the proper activity, the IM or his materiel management computer system (Ref 10:4-1 to 4-3). If the IM has keyed his computer to operate in the automatic mode for that NSN, he will not know about the requisition; the computer will print and send a Materiel Release Order (MRO), also a DD Form 1348m, to the most appropriate available storage site for shipment of the requested NSN item to the requisitioner. In the Army system, each requisitioner, regardless of service, is identified with a geographic region, and the depot in that region will first attempt to fill the requisition. If it cannot fill the requisition, the next closest depot is attempted until the requisition is filled or denied. In the AF system, one depot is prime for each NSN item, and that depot will fill the requisition if it has the assets available. If the prime depot cannot fill the requisition, the computer searches other locations that list that NSN until the requisition is filled or denied. The AF materiel management system has in its logic a geographic locator system similar to the Army system. If no assets exist in the prime depot, the locator begins a search for that NSN item within the AF depot system, beginning in the same geographic area as the requisitioner and moving away until the item is located (Ref 11). If the IM desires to check each requisition on that NSN item, he will receive a listing of that particular requisition and will then make the decision whether or not to honor it. To honor the requisition the IM releases the assets, and the computer

will decrement the paper balance by the appropriate amount for the storage/shipping activity and notify the requisitioner of the shipper's routing identifier and the expected shipping date. All notifications are made via the AUTODIN for all activities having that capability. When the shipment is made to the requisitioner, the shipper notifies the IM that the items have been shipped, which completes the requisition information cycle. The MILSTRIP system uses the same form, DD Form 1348m, appropriately coded, for fifteen separate requisition and issue functions that can be interpreted by all service depot/ICP computer systems. Some of the form functions include follow-up requests on previous orders, supply status reports, and shipment status reports in addition to those mentioned above. This MILSTRIP system allows the IM's materiel management system to be continuously updated with inputs from every service and agency to insure that the IM has accurate and up to date information on which to base his decisions (Ref 12:A-2).

Many IM's currently have some of their assets stored in other services' depot storage. These assets were not specifically placed into those facilities, but were left there following a change of ownership of the assets. To save transportation costs back to the new owner's depot, the assets are left in the previous owner's depot, and this depot now becomes an attrition site for the new owner. If the new owner is an Air Force IM and the owner of the storage depot is the Army, the Air Force IM will use the Army depot

as though it were an AF site when he desires to fill a requisition using those assets. When he sends the MRO to the Army site for shipment to a user, the MRO will appear identical to an MRO sent to an AF site, with the exception of the routing identifier. The AUTODIN will route the MRO to the designated site regardless of service boundaries, and since the MRO is in accordance with MILSTRIP, the Army site can interpret the message and comply with the release and shipping instructions and will notify the AF IM of shipment. This attrition of assets is continued until the attrition site reaches a zero balance on the particular NSN item. When the zero balance is reached the AF IM drops that location from his available shipping sites, and the Army depot drops that NSN item from its list of assets held. Under the present system, the level of stock is never replenished at attrition sites. Under some form of joint stockage arrangement, specific depot locations could be identified as more economical than present depot locations, in terms of overall DoD transportation costs and response time, and joint stockage sites could be "created" by direct shipments of assets into these sites. The information system is currently capable of handling the joint stockage information flow requirements if the concept is limited in numbers and is set up under the current attrition site rules of storage and issue; however, there are problems other than information flows. These will be addressed specifically in Chapters III and V.

III. Common Problems

From the discussion in the previous chapter, one could conclude that AF and Army Item Managers operate with the same set of rules based on the same set of DoD Directives, Instructions, and Manuals, and, therefore, should have no difficulty in operating across service boundaries using standard procedures and forms. In reality, however, serious problems exist when operating across service boundaries.

The vast majority of the problems that exist today when operating between the two services is caused by the constant state of flux of the DoD logistics system in combination with the failure of people to adjust to that flux.

Losses of Assets

The most frequent and most serious problem, from the standpoint of the IM, is the loss of assets in the storage facilities of another service. Assets are lost, primarily on paper, in several ways in both owned and non-owned storage facilities, but these losses appear most frequently when operating across service boundaries (Ref 8 and 9).

There is a constant flow of changes within the logistics system that aid in causing losses in inventory. When a change of ownership takes place at the wholesale level between the AF and Army, or any service/agency, on a particular NSN item, that item is not physically transferred to the gaining service. If the AF manages item XX and is storing item XX in an AF facility prior to a change of

ownership/management to the Army, when the change takes place, the AF will keep the item in storage and merely transfer the accountable records to the Army. The AF tells the Army it now has a given number of item XX in storage at the AF facility; the Army IM has to assume the given number is correct. When the Army IM receives a requisition for item XX, he sends an MRO to the AF facility for the item. If the given number of item XX was initially correct when the accountable records were changed, the MRO is honored, and the proper quantity of item XX is sent as requested. If, however, the given number of item XX was not correct initially, and fewer than the quantity requested on the MRO are actually in the specified location, the Army IM receives a Materiel Release Denial (MRD) for the missing items, and must accept a loss of inventory because the AF initially reported more of the item XX than it actually had. This loss could have been caused by the storage personnel not looking in all the possible locations for the item. If the warehouseman went to the first location, and it was empty, he could have issued the MRD to the Army by mistake. The item is in the facility, but as far as the Army IM is concerned, the MRD tells him he has lost inventory.

Another common way to lose inventory in another service's facilities is through a NSN change throughout DoD. If the Army is the owner/manager of assets that are stored in an AF facility when the change is made, and the Army requisitions the item under the new NSN before the AF computer is updated

with the new NSN, the AF computer will issue the Army IM an MRD, because it has no record of that NSN in its files. The converse is true also if the AF is faster at making the change than the Army and the Army IM requisitions under the old NSN; he will get an MRD. Either way, it appears to the Army IM that he has lost all his assets with that particular NSN, when, in reality, they are stored in their proper location.

Gains of Assets

In the above example, if the Army IM were certain that the assets he requisitioned were actually in the storage location, even though an MRD was issued for item XX, he could send the AF facility a DoD Physical Inventory Document, DD Form 1485, with the MILSTRAP document identifier code "DJA," to request a special inventory to search for his item XX (Ref 12:B-10 and 5-17). If the assets were found by this inventory, both his records and the AF records would be updated to reflect the current quantity and location of item XX. If the Army IM had already eliminated item XX from that facility on his records, the new addition would amount to an asset gain.

It is possible that the special inventory would produce no additional assets even though the assets were in the facility. They could be mismarked or merely overlooked during the inventory. Once each year the storage facility is required to conduct a location reconciliation to insure: that each location that is listed as empty, is empty; that

each location that is listed as occupied, is occupied; and that occupied locations contain the NSN item that is listed on the computer as belonging in that location. During these location reconciliations assets are often found that are not managed by the storing service. In these cases, the owners/managers are notified by a MILSTRAP DD Form 1485, coded "DKA," that a certain number of that asset have been found so the added number of assets appear as an asset gain in the owner's accountable records (Ref 12:B-10 and 5-17).

Information Problems

The problems mentioned above of paper asset gains and losses may appear to be physical problems rather than information type problems. The most basic element of the IM's information system is the human, input/output element. The mechanical means are here today to insure that all the required pieces of information are transmitted to the proper people at the proper time as long as the correct information is input into the system. The AUTODIN system has proven itself reliable in transmitting high speed electronic messages world wide without error. The DAAS is used to check and edit the messages and to insure that they are being routed to the proper people; however, if incorrect NSN's are being punched into the standard MILSTRIP/MILSTRAP card forms, or if people responsible for inventories do a poor job and input incorrect results to the information system, the information system appears to be the cause of the errors.

IV. The Benefits of Joint Stockage

Under the current item management system, the IM is limited to where he can position his assets for storage while they are waiting to be requisitioned by the user. In many cases the IM knows specifically that a large portion of his assets will be requisitioned by a single user-- usually a depot-level maintenance facility. In the AF this knowledge is used to place the IM, his assets, and the depot maintenance at the same location, the ALC, whenever possible. In many cases, however, the maintenance depot or other primary users are far removed from the authorized storage sites. The cases where an adequate supply of the assets are available and where there is a large distance between a prime user and the nearest authorized storage site are the cases that would benefit greatly in a joint stockage environment.

Transportation Cost Benefits

The cost of transportation of assets to the user is directly proportional to the distance that must be traveled to deliver the assets. As long as the assets must be stored and issued prior to use, the cost for these operations should be approximately the same order of magnitude whether the assets are in an AF depot far from the user or in an Army depot close to the user. If a shift is made from long distance air transportation to short distance ground transportation, the potential for transportation cost savings is even greater than discussed.

From historical data, the IM can determine if any one of his users constitutes a majority of his transactions or a high percentage of the total volume of an asset, or if a given geographic area accounts for most of his shipments. He can also estimate the yearly proportion of his assets that originate in a particular geographic area. In the case of the WIMM or CIMM, he knows his primary contractors for his assets, and since there is no depot maintenance to be concerned with, generally 100% of his assets will come from the contractors. The IM concerned with nonconsumable, or recoverable, assets must determine what percent of his assets are new from the contractor or "new" from the depot maintenance facility in order to determine the various numbers and points of origin for his assets. From this data an IM can indicate which combinations of users and contractors are responsible for increased transportation costs caused by the requirement that assets be stored in only a predetermined number of specific locations. For those assets that are not used primarily in one or two geographic locations, joint stockage may not be the appropriate solution.

The next concern is to locate the available storage locations, near points of primary usage, that could be used for those assets determined to have excessive transportation costs under the present system. Under joint stockage, these facilities could belong to any service or agency as long as that facility had enough automatic data processing and electronic communication capability to comply with the

mechanical MILSTRIP and MILSTRAP procedures.

An actual example will point out vividly the transportation cost savings in just one group of NSN items. These items are Weapons Oriented Consumable Items managed by Mister Don Yankey, a WIMM at San Antonio ALC, Texas. These particular items are all used in the Pratt & Whitney (P&W) J-60 engines on the T-39 and C-140 aircraft in the AF and CH-54 helicopter in the Army. The WIMM is responsible for providing all using services with their required items when requisitioned, as discussed in Chapter II, and all these items are stored at San Antonio ALC. The primary contractors and suppliers to the WIMM for these items are P&W, East Hartford, Connecticut, Chandler Evans, West Hartford, and Hamilton Standard, Hartford. The Army nonconsumable IM who directs the maintenance on these Army engines has contracted with P&W to do its depot maintenance, and that facility is in Southington, Connecticut. The WIMM at San Antonio receives the consumable items he manages from the three suppliers in economic order quantities (EOQ) at various times during the year. The Army maintenance facility (P&W) must receive its consumable items necessary for the overhaul of the Army engines from the WIMM in San Antonio, and, as required by current procedures, must submit MILSTRIP requisitions for the materiel. In this particular example the assets are being shipped from three points in Connecticut (Figure 1, point 1) to San Antonio ALC (point 2) and back to Connecticut, because that is how the system operates. Mister Yankey

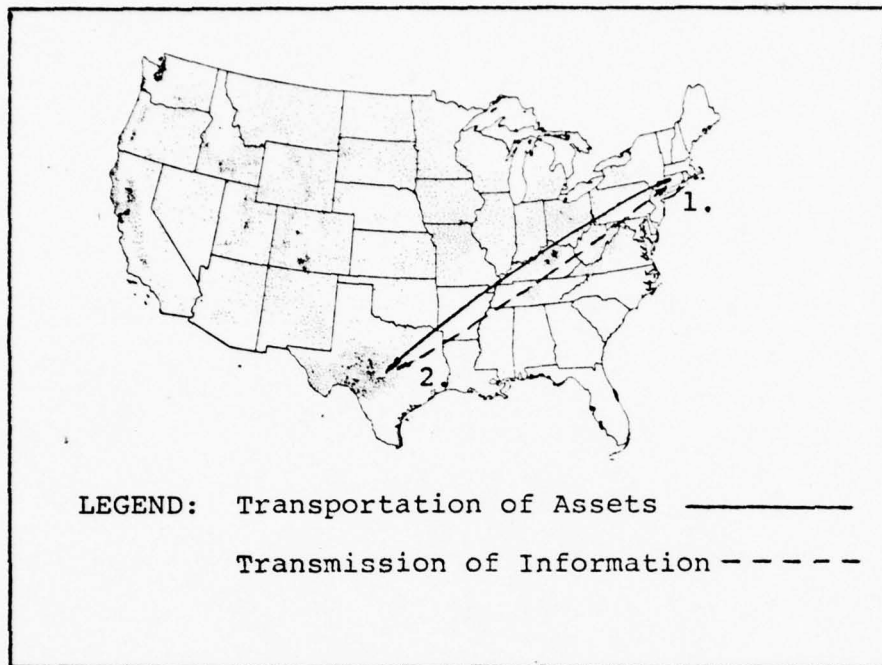


Figure 1. Location Benefits of Joint Stockage Storage Sites.

indicated in an interview that if there were a depot available for his use (New Cumberland Army Depot, Pennsylvania, for example) and if he could feel confident that his assets would not become lost in the other depot, he would position approximately 30% of his assets in that depot for use by the P&W Army depot maintenance and by Andrews AFB, Maryland, his second and third heaviest users, respectively. The savings in distance required to ship those assets would be a factor of sixteen for each supplier when one considers two-way transportation required now and required if New Cumberland were the selected joint stockage depot. For this example, assuming the assets are now stored at New Cumberland,

P&W would requisition its required assets in the normal manner; the requisitions would be forwarded via AUTODIN through the DAAS to the WIMM at San Antonio ALC, who would issue an MRO to New Cumberland Army Depot for the assets. Upon receipt of the MRO, New Cumberland would issue and ship the required items to P&W and, thereby, save the DoD approximately eight times the shipping distance--and the appropriate shipping cost--each time an issue was made from New Cumberland instead of San Antonio. When it came time for the WIMM to reorder those assets, if the required quantity were shipped directly to New Cumberland from the three suppliers, instead of to San Antonio, another tremendous cost savings would be realized.

The potential for dollar savings throughout the DoD could be tremendous if there is only the repositioning of certain selected assets as indicated above. If there is a large percentage of assets that can demonstrate major savings in this manner, it may be beneficial to modify procedures for the handling of attrition site assets, so that a more positive inventory can be maintained at the various joint stockage locations (Ref 8). In addition to the dollar savings possible through decreased transportation distances, there is also a great potential for savings in response time.

Response Time Benefits

In the example above it is obvious that there is a great transportation cost savings when using the joint stockage concept. The distance that the assets must travel

has been reduced by a factor of eight, but also the time for the requester to receive his materiel has been reduced. In ordinary circumstances this time savings is probably not very important, because the Army nonconsumable IM responsible for the engines and P&W both have fairly reliable forecast of their requirements for the assets from San Antonio. If, however, there is an unexpected increase in the failure rate of these engines or, for some reason, there is an undetected shortage of needed items at the maintenance facility that causes a work slowdown, the response time savings in the joint stockage situation could be expressed as a dollar savings by costing the time delay over the entire facility. Using the same mode of transportation to deliver the assets from both storage sites clearly gives the advantage in response to the joint stockage site. If the mode of transportation was upgraded to make the response times approximately equal, the transportation costs will increase by an added increment.

The dollar savings due directly to improved response time will, on the average, be small. These savings do become significant, however, when this improved response time is seen as an efficiency improvement and an added time buffer in the periods when decreased response times become critical to the mission, such as during contingency operations.

V. Problems Associated With Joint Stockage

Two specific problems encountered when operating across service lines in our current DoD logistics system were discussed in Chapter III. These problems, which arise frequently when only two or three percent of an IM's assets are stored in another service's depot, could create tremendous problems if that small percentage were raised under joint stockage, and those specific problems had not been remedied. These problems are in existence today, but there are many other problems that would need solutions prior to an effective and routine joint stockage system.

Candidates for Joint Stockage

Before one can begin to experiment with the joint stockage concept, he must locate those assets that are known, through the discussion in Chapter IV, to have excess transportation distances associated with their normal usage. Each IM can provide a list of individual NSN items and users that constitute at least a given percent of the IM's transactions or a given dollar amount of transportation cost, and that from experience, he knows are excessive costs. As in the example in Chapter IV, the IM knew that assets were being transported from Connecticut to Texas to Connecticut and would include those assets on a list of assets that constituted 30% of his shipments and excess transportation costs. In this manner it would be possible to compile a tentative list of joint stockage candidates.

This method would be adequate for those obvious joint stockage candidates, but for those assets that do not fall into such clear categories, one could create a transportation model for use by all IM's to help determine the least expensive combination of supplier, shipper, and user for the various assets the IM manages. This model would only be an aid in determining the least cost storage sites, because other elements of the problem must be addressed such as response time, type of storage space available at a particular point in time, the capability or manning of a particular site, and the resulting overall mission enhancement as the result.

Central Storage Locator

The Logistics System Policy Committee recommended in the Task Group 6-73 Report, published in February 1976, that a DoD Registry of Users System be established for use at the ICP to "indicate the receiving, shipping, packing, and data automation capability of reporting activities on an inter-service basis" and "ascertain world-wide available storage information in support of positioning assets on an inter-service basis" (Ref 1:IV-1,2). This recommendation supports the need for a central storage locator that would be required for the logical selection of joint stockage sites.

Since the joint stockage operation as envisioned here would be a relatively stable operation, a locator system need not be as elaborate as that recommended by the LSPC. The joint stockage locator would be required to be kept up

to date for use at any time; however, it would not need to be an on-line system for instant response. Prior to the adoption of a joint stockage site, historical data would be studied on item use, by location, and there would be adequate advance notice prior to use of the locator, negating the on-line requirement. On items that are newly introduced into the system, estimates will have been made on major users and their locations prior to a need to use the locator. It could, therefore, be stored on tape at a convenient location with unused computer capacity available and updated periodically with current available-storage updates from the various facilities.

One logical position for the locator would be in the DAAS, since, according to Mr. Dave Brown, Logistics Systems Division of the DAAS Office in Dayton, Ohio, this facility has some excess computer capacity and since the majority of all requisitions throughout the DoD are normally routed or passed through the DAAS. This normal routing juncture appears to be a very logical place to locate a central storage availability system. Each subscriber activity could periodically send its available-storage information directly to the DAAS for the updating of the Central Storage Locator, which could be used in the transportation model to aid in selecting joint stockage locations when needed.

Economies of Scale

Another potential problem that would have to be considered prior to determining joint stockage candidates

and locations for routine operations is the loss of any current economies of scale in the storage facilities. In some cases this loss could be high if the storage costs in the chosen joint stockage site are far above those in the parent service facility. Because of this phenomenon it is possible that the total costs for a specific group of NSN items would not decrease when a large percent of selected items were moved out, since the remaining items would still require a building, manpower, materiel handling equipment and computer support, and at the same time the storage costs for the moved assets would be increased by placing larger requirements on the joint stockage location facilities. These losses may or may not be large; if the joint stockage location can accept the new items without increasing any of its direct costs significantly, then the extra overall DoD costs--changes in costs--would be very small, and economies of scale would be a small consideration.

In addition to the simple storage cost economies of scale, one must consider the overall quantities of assets throughout DoD when dispersing them. It requires fewer numbers of an item to support DoD if that item can be located in a single location because of the requirement to maintain reserves and the requirement to maintain each pipeline for continuing demands. If there is only one pipeline to keep full, the overall number, and therefore cost, of an asset will be reduced. If many joint stockage sites are envisioned, these pipeline costs could increase the overall burden tremendously and offset any savings in transportation costs

and response times that would otherwise be realized. For consumable items this pipeline cost will not be as great as for nonconsumable items, which are usually of high value. Any increase in the overall quantity of nonconsumable items required could quickly offset a transportation cost saving.

Joint Stockage Procedures

There are currently no procedures that specifically allow an IM from one service to position his assets in the storage facilities of another service. If joint stockage is to become a routine concept for those effected assets, some procedures must be established, so that once an asset is singled out as a good joint stockage candidate, and a joint stockage site has been chosen based on available storage space, manpower considerations, inventory, and transportation distances, those procedures will make the transfer of the assets as smooth as possible. A possible vehicle for this transfer, given the conditions above have been met, would be the MILSTRAP Preposition Materiel Receipt Card, DD Form 1486, appropriately coded, which is used to alert a given storage facility to expect a shipment of a specific number of NSN items and to provide for receipt and storage awaiting dispersal instructions from the management authority. Additional Document Identifier Codes used to distinguish the purpose of a given multi-use form could be created to signal the receiving depot that the assets are to be handled for joint stockage use and to specify the service account into which the assets should be

placed (Ref 13:5-6). Once the IM directs the assets be placed in the joint stockage location, there must be procedures that will handle the exchange of funds between the two services.

Reimbursements for Joint Stockage

Procedures must be established for determining the individual service costs for its joint stockage. If there were no exchange of funds, it would seem likely that each service would attempt to move its assets into the facilities of the other service to cut down its own overhead costs; therefore, there must be some means of bookkeeping for the the joint stockage assets. One method of payment used today where storage and warehousing facilities are used across service lines is spelled out in DoD 4145.19-D concerning Interservice Supply Support Agreements (ISSA). In part this directive states that "the DoD Component operating a storage facility shall normally furnish all personnel, supplies, and equipment required when providing common servicing (no reimbursement) or cross servicing (with reimbursement) for other DoD Components" (Ref 14:4). This directive also states that each means of reimbursement will be clearly stipulated in the written agreement (ISSA) and will normally be only for those services that are rendered that cause an additional workload or equipment/warehouse cost. This system is straight forward; however, if there were many instances of joint stockage or if the situation is not a stable one, some less cumbersome means

must be adopted to compute charges for joint stockage services.

Automatic Joint Stockage Procedures

In both the Army and AF systems there is no completely automatic means of insuring that a desired storage location will be the shipping activity for any specific requisition. In order for the IM to insure shipment from a specific location, he must require that all requisitions with the NSN's of interest be blocked from automatic shipment, so that he may specify a given shipper for a given requisitioner. This manual input of the shipping activity for a specific number of requisitions is not overly time consuming; however, if the requirement were for many NSN items, each with many joint stockage sites, the IM would soon be overloaded with these exception requisitions (Ref 8 and 9).

Service Discrimination

During over twenty personal interviews with individuals knowledgeable in the logistics operations of all the services and DSA, one fear continues to be voiced: that their service will not be treated fairly in a storage facility that they do not control. They are concerned that another service will not receive, store, and issue assets for them as well as would their own service, and that if there is a choice to be made about who is serviced first, the host service will naturally get priority. Under a "supply seargent" depot system, this may be a real fear.

Under the standard systems already set up, however, priorities for issue operations are determined through use of the Uniform Materiel Movement and Issue Priority System (UMMIPS) and the Issue Priority Designator (IPD). According to DoD directives, all directed cross service logistics support operations require that "requisitions will be filled... in accordance with MILSTRAP procedures without regard to the Service affiliation of the requisitioning activity" (Ref 7:4-4). The procedures can still be violated in assigning issue priority, but if violations occur, they should be detected through another set of evaluation procedures, Military Supply and Transportation Evaluation Procedures (MILSTEP). These procedures are used, in part, to evaluate performances against UMMIPS time standards, to evaluate the performance of each segment of the transportation pipeline, and to analyze the utilization of issue and movement priorities (Ref 13:13-0).

Our present system, when requisitioning across service lines, operates in automatic mode, and unless computed priorities are shuffled on the depot floor, there is normally adherence to the issue priorities specified by UMMIPS. If automatic operation can be obtained under joint stockage, there should be no violations caused by parochial attitudes within the depot when dealing across service lines.

Management Computer Overloads

Current attrition site management in the AF is an imprecise operation. Stock kept for other services is

maintained by location only and not by a perpetual inventory system like owned stock is maintained. The AF relies on the owner's materiel management computer to maintain actual item count in the storage facility (Ref 11). The Army is forced to maintain a perpetual inventory on both owned and non-owned stock, because the Army comingles like stock items and must know at all times how many of a given NSN item in a location belongs to Army, Navy, AF, and others (Ref 8).

In order for an Army IM to feel secure about the quantities of those assets located in an AF depot, he would desire that the depot maintain a perpetual inventory for him, so that a balance could be checked periodically without the need for a physical inventory. These items could be put on one of the AF materiel management systems, such as the DO32 or DO34, so that a perpetual inventory could be maintained. These systems are constructed so they handle one asset at a time during processing, and the only change that would actually occur with the adding of more NSN items to the program would be to increase the running time of the program (Ref 15). This perpetual inventory system would aid in maintaining a proper balance of non-owned assets in the AF depot and would help to give the Army manager confidence that his assets were being well maintained. Lack of confidence in another service's handling of non-owned assets is a major cause of the fears that exist today about any joint service logistics operations.

Communication Overloads

If widespread joint stockage operations become a reality, there will be a major increase in the amount of AUTODIN traffic required to run the system. Under the current AF system, with the assets usually stored with the IM, information traffic goes to the IM as described, but since the assets are co-located, no additional external AUTODIN communication would be required to ship the asset. Under a joint stockage system, the IM would receive the requisition, issue the MRO via AUTODIN and receive the response from the shipper via AUTODIN prior to the completion of the information cycle. This would increase the required number of transmissions from two to four for each joint stockage requisition filled. It is recognized that some fraction of the traffic that flows over the AUTODIN is other than logistics (IM related) traffic; however, to use readily available data, total AUTODIN traffic figures were examined to determine the theoretical increase in message traffic that can be borne by the AUTODIN as it exists today. Using average message lengths for each Automatic Switching Center (ASC), the bit per second (baud) capacity of its lines, and a 24-hour day, comparisons were made between the actual message traffic and the maximum possible message traffic to determine what percentage of the ASC users-- the message centers--would be overloaded by a 100% increase in traffic of average size. This measure is not precise, but it gives an approximation of the amount of excess capacity,

on the average, the system possesses. Overall, 90.2% of all users could function with a 100% increase in average message traffic. No compilation of data could be found that would reflect peak period traffic or temporary AUTODIN overloads. The majority of the overloads would occur in 40 of the 151 75-baud (teletype) users. If these 75-baud lines were upgraded to 150-baud lines, the overall percentage that could accept a 100% increase in average traffic would rise to 94.8%. See Appendix B for the table of calculations and data references.

VI. A Possible Joint Stockage Solution

The difficulty that arises under the current system when stocks are prepositioned, either under normal or attrition site procedures, is that that stock is now available for any user to requisition. The materiel management programs of both services will handle these assets in the same manner. If the items are positioned and listed as in a normal storage depot, the automatic mode of operation will cause those assets to be shipped to any requisitioner in addition to the intended joint stockage users. This could be a possible side benefit except that under a system like this, it would be difficult to determine stock requirements large enough to insure the joint stock-age users adequate assets. If the items are positioned and listed under attrition site management, an even worse situation will develop: because of the logic in the materiel management programs, the system will attempt to empty that attrition site of all assets without regard to the geographic areas of the requisitioner. To take these requisitions out of the automatic mode of the system and force the IM to review all requisitions on NSN items that are joint stockage items would cause the system to break down in all but the most trivial examples. The IM would be overcome by the requirement to manually review and release assets for every requisition he received. Some method must be found that would relieve the IM of this

impossible task. Here are three possible solutions to this dilemma.

The first possibility will not eliminate the manual review requirement by the IM; however, it will eliminate the manual review for all requisitions that are not from a joint stockage user for that particular NSN item. In both the Army and AF system there is an edit routine that all requisitions must go through. An additional edit subroutine can be placed in this program to block from automatic shipment all requisitions that contain certain routing identifier code/NSN pairs and mark them for manager review. All other requisitions would follow the normal, automatic issue logic within the system. Those requisitions blocked and marked for manager review would represent only the joint stockage items and users, and the IM could direct shipment from the appropriate joint stockage site. If the number of joint stockage requisitions is small for each IM, this system could provide some joint stockage operations, but it could not operate if the joint stockage traffic were heavy (Ref 9 and 11).

The second possibility has the same drawback as the first, except that no reprogramming of the edit routine would be required. If joint stockage users maintained a listing of those NSN items that were stored in joint stockage locations, those users could utilize the message format for a MILSTRIP requisition that contains exception data, Standard Form 344. This exception data would be to

insure that the requisition was given manager review, so that the IM could direct a shipment point for those assets. This method would create the same workload for the IM as the first solution; however, the users would be required to first check their requirements against a list of joint stockage assets before preparing either the standard DD Form 1348m or the message format for their requisitions (Ref 12:A-1,A-4). This possible solution would create more work for the joint stockage users and eliminate the requirement to reprogram any of the existing software. Again, the limitation on this solution is that as soon as the numbers of message requisitions become greater than the IM can review, the system will develop an ever-growing backlog of unfilled requisitions.

The third possible solution would require some reprogramming of the materiel management systems. Under this solution there would be a need to create additional Purpose Codes that could be used specifically for joint stockage operations. According to AR 725-50, there are six unused Purpose Codes in the Army system, and according to AFM 67-1, Vol III, Part Three, there are fourteen in the AF system. Four of these unused codes are the same in both services: I,O,R and Z. These four common Purpose Codes could be reserved for joint stockage operations and would provide the required logic cues for four joint stockage locations for each NSN item. If four or less joint stockage sites are needed for each NSN item, these unused, common codes

could be used. If, however, there is a need for more than four sites, then additional Purpose Codes would need to be created; this would entail considerable reprogramming of the existing materiel management systems in both the Army and AF (Ref 16). When an NSN item was placed in a joint stockage location, it would be given Code Z, for example. When an authorized joint stockage user of that item submits a requisition, he would specify Purpose Code Z. The logic in the materiel management system will step through all available locations containing that NSN item until it finds one with Code Z and will then issue an MRO to that location having the item with the required code. Since each NSN item is listed separately in the computer memory, Code Z could be used for any number of locations, provided they were for different NSN items. An example will clear up this point. If item A is in joint stockage at New Cumberland Army Depot and item B is in joint stockage at Oklahoma City ALC, both sites could be coded "Z" for their respective items, since the items are unique. When the computer searches for an item A with Code Z, it will not search through item B and, therefore, will not be aware that the "Z" had been used for several locations. As long as the requisitioner and joint stockage storage site use the same code, the shipment will be from the proper location.

In order to insert the additional Purpose Codes in each materiel management system, it has been estimated that it would require approximately nine man-months of effort

for each service's system effected. The nine man-months consist of two computer programmers and one systems analyst for a period of three months. This estimate is very approximate and is only for the reprogramming of each system to accept currently unused Purpose Codes. It does not include other necessary items such as follow-on documentation on the uses of the changed system and new Purpose Codes (Ref 16).

The use of the Purpose Codes to specify joint stockage operations is one way of obtaining automatic operation for joint stockage requisitions; however, it is not the only method. Other solutions could range from adding additional card column entries to be scanned by the edit subroutines to creating an entirely new logistics information system that contains all the necessary logic for joint stockage operations.

VII. Conclusion

The logistics system has made much progress in coping with the extreme problems it has faced through the years. While it is said that the logistics system exists today only to support the combat arms of the military services, it is clear that without this system there could be no effective combat arm. The aircraft and other combat vehicles in today's armed forces are complex and expensive and require specialized skills to procure and maintain them at an effective level. It would be virtually impossible to expect each operational unit to maintain its own supply line and achieve the level of economy that can be achieved by a central system. It is unfortunate that we do not have a more centralized DoD logistics system to eliminate the duplication of storage, maintenance, and procurement effort throughout the DoD; however, much effort has been expended since World War II to eliminate as much inter-service duplication as possible and still maintain a separate service concept. Studies and independent research are continuously being conducted in an effort to further reduce the cost of running such a massive world wide logistics system.

This investigation began to examine the information flows that exist and would be required to operate a logistics system across service lines using as much of today's hardware and software as possible. A concept called

joint stockage was looked at that would allow an IM from one service to store and issue his assets from the depot facilities of another service, but only when there were clear savings to be gained in dollars and response time without degrading the effectiveness of the operation.

To investigate only information requirements involved with such a system was, perhaps, to omit many of the very real problems that would be associated with that system. Many of these problems were addressed in Chapter IV; however, this list is certainly not all inclusive. This investigation centered on the information that would be required by an IM in the performance of one major portion of his primary task--to insure adequate supplies of assets to the users of those assets on a timely basis at the least cost to the managing service and DoD. To that end it was determined that if the IM could begin this investigation with a known quantity of assets at given storage locations, the examination could focus on the information flows necessary across service lines and on the means and format of that information.

With the full implementation of the Military Standard Systems (MILSTRIP, MILSTRAP, et cetera) the vehicle was established for most of the necessary communication among all services and agencies. These systems set up standard formats that can be read by every required user of the system; those users that do not possess ADP equipment receive their standard information in message format. The communications link among the services is complete and is

being upgraded further in the near future to improve the capability even more. It is a daily occurrence for hundreds of Army requisitions to be filled by an AF materiel management computer completely automatically, and the same is true for AF requisitions of Army assets using the Army materiel management system. Each materiel management system is designed to accept a MILSTRIP requisition from any user and fill it as though it were from a user of the same service, without bias. Each requisition is handled in the order received, within each UMMIPS priority, so that no service receives preferred treatment while the system is in automatic operation.

The major information problem that arises under joint stockage operations is that in order for the concept to work effectively, the materiel management system managing the item requested must be able to direct shipment from a stockage location out of the normal service system based on the location and status of the requisitioner. The Army currently uses a geographic locator for normal requisitions and ships from the closest location (Ref 9), while the AF uses its geographic locator only when searching for excesses from which to fill a requisition (Ref 16). Under the Army system the assets are separated into two or more geographic depots, and it appears that joint stockage would not be as large a cost saver for them as it would be for the AF, where the majority of a given asset is currently stored in a single location.

In the early discussion of the usefulness of joint stockage there appeared to be a practical maximum to the number of joint stockage sites for each NSN item, not based on technological considerations, but on the numbers and locations of primary users and suppliers. It should not be necessary to position San Antonio ALC assets in several joint stockage sites on the East Coast, for example, since a single site there would represent most of the savings in transportation costs, and dividing that single site into several could lose any economies of scale that would be gained by a single larger site.

The final result of this research is the general impression that such a joint stockage system is desirable in situations where excessive transportation distances cause major transportation costs or delayed delivery times to the users. The major difficulties that would confront such an implementation do not lie in the means of transporting the information across service lines as was earlier suspected, but lie within each service's computer materiel management logic. The logic basically was not meant to work from non-owned facilities, and it appears that in order to implement a DoD-wide joint stockage system on a large scale, it would require large individual reprogramming efforts for each service to incorporate the concept into each system.

With this concept the management systems and the owner/manager of the assets work together to accomplish their required tasks. As long as each service system can manage

its own assets--and it currently can-- and as long as the means is available to communicate in ADP language with the other services using the Military Standard Systems, there is no immediate need to standardize hardware and software throughout DoD. There are procedures currently in use that will hold specific assets for specific uses; the Purpose Codes can restrict distribution of an asset to a specific use, and, therefore, a specific user. If additional Purpose Codes are to be designated for joint stockage operations, then some reprogramming will be necessary. If the change is simply to add logic to accomodate currently unused Purpose Codes, then the task is a minor one and easily defined. If the task is to change existing, in-use Purpose Codes, in order to have greater than four joint stockage sites per NSN item, then changes in the existing internal logic will be required to replace the current code logic everywhere in the system, and the reprogramming becomes a massive undertaking.

This investigation of required information flows leaves much work undone prior to the installation of a working joint stockage system; however, it does highlight some major problem areas and points out a possible solution to the automatic information process necessary for such a working system. This concept could provide the DoD with a low cost means of integrating service/agency functions without the requirement to standardize hardware and software throughout DoD--a seemingly impossible and immensely expensive task.

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Appendix A

Item Management Coding (IMC) Criteria

IMC Criterion 1: Major end items of equipment.

"Items of such importance to the operating readiness of operating units that they are subject to continuing centralized individual item management and asset control throughout all command and support echelons."

"It is the intent of this criterion to assure that the Military Services retain under their management those end items, generally of high unit cost, which should and do receive premium and comprehensive supply management attention both in the supply system and in all command echelons within the Military Service."

IMC Criterion 2: Repairables.

"Centrally managed recoverable items designated as repairable for the reasons that repair of unservicable quantities of the items is considered by the inventory manager in satisfying requirements prior to, or in conjunction with determining procurement quantities."

It is the intent of this criterion to retain under Military Service management recoverable items on which consideration of the repair pipeline BELOW the depot level by the managing Inventory Control Point (ICP) is essential to assure efficient management of the item" (Ref 7:2-2 and 2-3).

Appendix B

AUTODIN User Overload Computations

Maximum number of Average Messages* in a month (Approx)				
Line Capacity:	9600 baud	4800	2400	1200
<u>ASC</u>				
Norton **	680,000 0/12	340,000 0/4	170,000 0/7	85,000 1/19
McClellan **	995,000 0/0	497,000 0/15	250,000 0/5	125,000 0/17
Tinker **	685,200 0/0	340,000 0/10	171,000 0/12	85,600 0/19
Hancock **	718,213 0/0	360,000 1/12	180,000 0/10	90,000 0/13
Gentile **	682,000 0/0	341,000 3/19	170,000 0/9	85,000 0/11
Ft. Detrick **	840,000 0/0	420,000 0/19	210,000 0/11	105,000 3/18
Andrews **	877,000 0/0	440,000 0/13	220,000 1/7	110,000 0/19
Albany **	850,000 0/0	425,000 0/9	212,000 0/7	106,000 1/23
Totals by line capacity:	0/12	4/101	1/68	5/139
Percentages by line capacity:	0%	4%	1.5%	3.6%

* Average message lengths by Automatic Switching Centers (ASC) was converted to bits/second to compare actual average number of messages passed with the line capacity maximum (based on a 24 hour day, 31 day month and average message length--center down times were used in the computations).

** Number of stations that cannot accept a 100% increase in their present traffic/ total number of stations.

Appendix B (Continued)

Maximum number of Average Messages* in a month (Approx)					
Line Capacities:		600 baud	300	150	75
	<u>ASC</u>				
Norton	**	42,500 0/5	21,250 1/13	10,600 1/6	5,300 2/13
McClellan	**	62,200 0/9	31,000 0/15	15,500 1/4	7,800 6/22
Tinker	**	42,800 0/13	21,400 0/23	10,700 0/9	5,300 5/28
Hancock	**	45,000 0/14	22,500 0/0	11,000 4/8	5,600 4/20
Gentile	**	42,600 0/5	21,300 0/16	10,600 0/4	5,300 0/15
Ft. Detrick	**	52,000 1/6	26,000 3/8	13,000 0/0	6,500 3/15
Andrews	**	55,000 0/1	27,500 4/10	13,700 2/8	6,800 14/28
Albany	**	53,000 0/14	26,500 0/11	13,200 0/5	6,600 6/20
Totals by line capacity:		1/67	8/96	8/44	40/151
Percentages by line capacity:		1.5%	8.3%	18%	26%

Appendix B (Continued)

Maximum number of Average Messages* in a month (Approx)				
Line Capacities: 45 baud / Totals and % by ASC**				
<u>ASC</u>				
Norton	-			
**	0/0	5/79	6.3%	
McClellan	4,680			
**	1/6	8/93	8.6%	
Tinker	2,600			
**	0/0	5/114	4.4%	
Hancock	2,800			
**	0/0	9/77	12%	
Gentile	2,664			
**	0/0	3/79	3.8%	
Ft. Detrick	3,300			
**	0/6	10/83	12%	
Andrews	3,400			
**	0/1	21/87	24%	
Albany	3,300			
**	0/0	7/89	7.8%	
Totals by line capacity:	1/13	68/691	Overall	
Percentages by line capacity:	7.7%	9.8%	Overall	

NOTE: This table was compiled from the Communication Operating Performance Summary (COMOPS) from the eight Automatic Switching Centers in the AUTODIN system and represents all authorized users of the AUTODIN communications network. Average message lengths and actual message traffic were taken from the COMOPS for August, 1976.

Appendix C

IM Questionnaire

Name:

Title:

Types of Assets Controlled:

1. What directives govern your daily materiel management operation? Are they DoD based? Be specific.
2. What specific problems do you have in maintaining proper asset control and visibility? Are they primarily procedural problems or people-type problems?
3. Do the same problems occur when your assets are stored in another service's facilities?
4. Are there more problems when interservice support is involved? What % of these interservice problems must be hand worked?
5. If you could store your assets in another service's facilities, would it improve your response time? Efficiency? Decrease costs? Decrease your asset control and visibility? Be specific.
6. What % of your assets are stored in another service's facilities? What would happen if as much as 50% were stored in another service's facilities?
7. What % of your assets are or will be shipped to another service in a year?
8. If these could be stored in that services facilities, would it save on response time or transportation costs? What are the drawbacks?
9. What % of your assets go to the depot maintenance facility here (or wherever it is located)? To other service's maintenance facilities?

Depot Questionnaire

Name:

Title:

Types of Assets most familiar with:

1. How much workload is due to the other service managed items that you only store for them? Can you tell the difference between owned and non-owned assets?
2. How much of your work load is in support of other

Appendix C (Continued)

3. Does this cause special problems--inventory schedules, inspection requirements (reporting of inspections), et cetera?
4. How are other service's assets handled in the storage facility? Are there special procedures if the facility is only an attrition site for the assets?
5. Is attrition site status the only way other service's assets remain in your facility?
6. How much of an increase in non-owned assets could you accept without causing an information or communication overload?

VITA

Douglas Lee Brazil was born on 11 April 1944 in Las Vegas, Nevada. He graduated from Nelson C. Brown High School, Nouasseur AB, Morocco in 1962 and attended the United States Air Force Academy from which he received the degree of Bachelor of Mathematics in June 1967. He was commissioned upon graduation and went immediately to pilot training, receiving his wings in September 1968. He served as a C-130 pilot and flight examiner in the 36 Tactical Airlift Squadron and 16th Special Operations Squadron until entering the School of Engineering, Air Force Institute of Technology, in May 1975.

Permanent address: 9221 Stagecoach

Houston, Texas 77041

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the depot facilities of any other service--provided this change created an overall cost or response time savings for the DoD. In the investigation of this joint stockage system, although other problems are highlighted, the primary emphasis is on the IM's information flows required for daily asset control and visibility. The study was restricted to the Army and Air Force logistics systems, although most of the ideas are expandable to the other services. The study concludes that such a system is feasible using today's hardware and software, with minor modifications, and would provide the DoD with a limited joint stockage operation with a small investment cost and the potential for large savings in transportation costs.

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