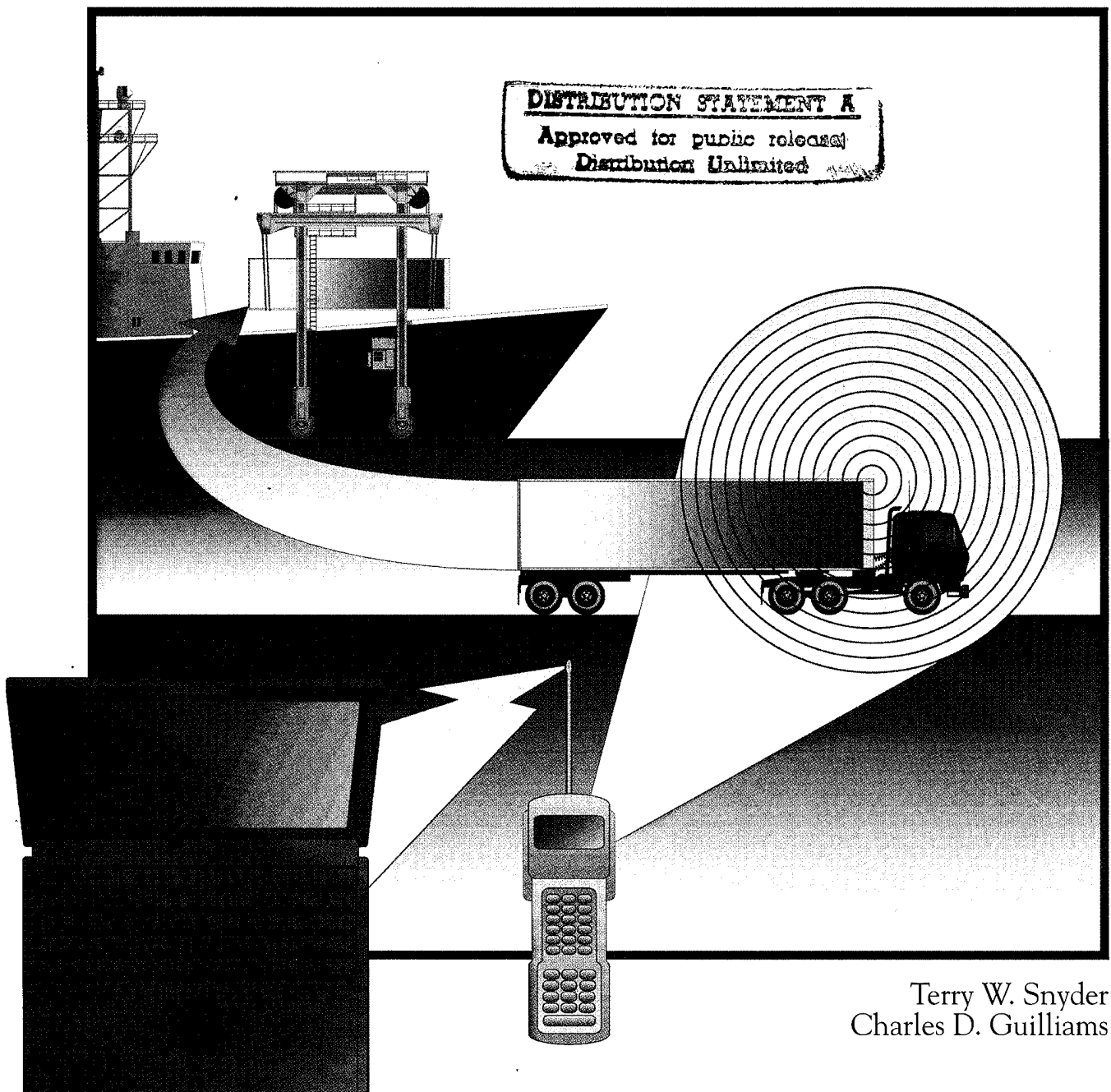# Integration of Automatic Identification Technology into MTMC Operations

MT501MR1

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LMI

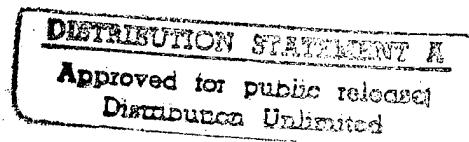# Integration of Automatic Identification Technology into MTMC Operations

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August 1995

Terry W. Snyder
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Integration of Automatic Identification Technology into
Military Traffic Management Command Operations

Executive Summary

BACKGROUND

Post-conflict studies of every contingency from Vietnam to Haiti have routinely identified the need for better visibility over the movement and location of military equipment and supplies. One of the major obstacles to obtaining visibility over military shipments is the difficulty of capturing accurate and timely documentation data. Several Department of Defense (DoD) Components are striving to overcome that obstacle by examining the use of various automatic identification technology (AIT) devices. Since widespread use of AIT has the potential to dramatically affect the business processes it uses, the Military Traffic Management Command (MTMC) seeks answers to the following questions:

◆ What business processes does it need to modify or redesign to accommodate AIT?

◆ What automated systems will be affected by those process modifications or redesigns?

◆ Where should MTMC focus its initial AIT efforts?

This report answers these and other questions related to the potential impact of AIT on MTMC's business processes.

WHAT IS AIT?

AIT includes a variety of methods for marking or "tagging" unit equipment, containers, or individual items. The value of AIT to Defense transportation is its ability to provide accurate information on the location and content of shipments of spare parts, consumable items, subsistence, ammunition, unit equipment, and personal property at various nodes throughout the Defense Transportation System. Shipments can be tagged with bar codes, magnetic stripes, smart cards, optical laser cards, or magnetic storage media with built-in transmitters and receivers. The information on each tag can range, for example, from just a commercial container number to details on every item within a container. The tags can be interrogated using either contact, radio frequency (RF), or laser devices,

with the information obtained from those interrogations often fed electronically into automated information systems for updating movement status records.

What Business Processes Will AIT Affect?

Overview

Although some private-sector carriers, such as American President Lines and many U.S. railroads, are well on their way to integrating AIT into their business processes, DoD's efforts are in their infancy, except for the use of bar codes. The Defense Logistics Agency (DLA) and Military Services have used bar codes to help manage their supply depot operations for many years; DoD's unit deployment procedures have also used bar codes with varying success for more than 10 years. In addition, DLA is fielding a laser card AIT system for shipments originating at its depots, while the Army has purchased more than 10,000 RF-type AIT devices, examined various tagging scenarios, and conducted demonstration tests in Haiti and Somalia. Several logistics offices and task forces have also formulated a number of draft concepts for using AIT to achieve better asset visibility, whether in storage or in transit.

These and other AIT concepts could potentially affect most of MTMC's business processes. However, many of the concepts are subject to dramatic change as DoD Components gain more experience with AIT applications. We, therefore, conclude that MTMC would be premature to modify its business processes to specifically accommodate the concepts prior to DoD establishing AIT standards. We further conclude that two of MTMC's business processes, personal property and break-bulk shipments, do not warrant any investment in prospective AIT applications at this time, while three others, sustainment, ammunition, and unit movements, appear to offer substantial long-term benefits from AIT.

Personal property shipments have little effect on DoD's war-fighting capability. In addition, DoD Components do not have a need for visibility over such shipments beyond that already available from commercial carriers. We believe these reasons justify MTMC assigning its personal property business processes a low AIT implementation priority. Although break-bulk shipments have substantial military value, the number of such shipments are declining and implementing AIT would require a substantial investment with few direct benefits. As a consequence, we propose MTMC also assign a low AIT priority to its break-bulk business processes.

The three business processes that offer MTMC substantial long-term AIT benefits — container shipments of sustainment materiel, containerized ammunition shipments, and unit movements — are also associated with the movement of materiel having high military value. Our ideas on how MTMC could begin to modify its business processes in these three areas to capitalize upon AIT are outlined below.

Container Shipments of Sustainment Materiel

In FY94, MTMC booked almost 108,000 commercial containers. DLA and the Army Air Force Exchange Service (AAFES) depots and consolidation points stuffed almost 54 percent of those containers. DLA and AAFES vendors stuffed another 37 percent, with the balance, 8 to 9 percent, at military ocean ports. Although DoD has not adopted a single concept of operation for using AIT to monitor the movement of commercial containers destined for overseas locations, we do not see MTMC gaining any business process advantage from either reading tags on commercial containers for content information at ocean terminals or having carriers read them. Our reasons are summarized below:

◆ The primary reason for MTMC to query any AIT tag at an ocean terminal would be to obtain information for preparing manifests and keeping shippers informed about the status of their shipments. However, if a shipper can upload shipment information onto an AIT tag, it can also follow standard procedures for electronically transmitting that same information to MTMC for input into the Worldwide Port System (WPS). If accurate information is available electronically, MTMC does not need to read AIT tags to prepare manifests. It would continue to prepare manifests based upon the electronically received shipment information as well as the carrier-provided receipt and lift data.

◆ With most containers transiting commercial terminals, carriers routinely monitor the locations of their containers and update their operational data bases accordingly. They also report various shipment status information to MTMC, such as receipt date at port of embarkation, lift date, date of discharge at port of debarkation, and departure date from port of debarkation. Information on shipment content has little value to commercial carriers.

Although we do not see a need for MTMC to change its business processes in support of container shipments of sustainment materiel moving through commercial ocean terminals, two related processes would require changes. MTMC would need the capability to upload container-content data to AIT tags at any port where it stuffs containers. It would also need the capability to read and upload content data to AIT tags at all bare-beach ports where theater commanders have designated MTMC responsible for retrograde shipments.

When assessing the impact of AIT on MTMC's operations, one finding tended to undermine the viability of every conceivable concept of operation — DoD's long-standing problem with shipment documentation data. Approximately 40 percent of all DoD shipments moving in commercial containers are either missing documentation or the documentation is inaccurate. Since visibility over the movement and location of military equipment and supplies cannot be a reality without accurate documentation data, we conclude that MTMC can best contribute to DoD's AIT efforts for those shipments by redesigning DoD's surface clearance procedures.

The surface clearance procedures contained in "Military Standard Transportation and Movement Procedures (MILSTAMP)" (DoD 4500.32R) describe the Export Traffic Release (ETR) process for booking container space on a particular vessel and a process for ensuring water ports receive accurate MILSTAMP documentation data from shipping activities on all overseas shipments. DoD still requires these two conditions be met before MTMC can issue an ETR. However, enforcement of accurate and complete documentation has eroded to where DoD (i.e., MTMC as the Ocean Cargo Clearance Authority) no longer ensures that documentation is accurate and complete before a shipment leaves the shipper's location.

Although many containers are booked before the cargo going into them is identified, we see no reason to prohibit shippers from booking containers in advance. However, allowing shippers to move containers to ports of embarkation without providing the information necessary to prepare manifests forces MTMC to correct the information manually; it also populates numerous transportation systems with inaccurate or incomplete data, which degrades DoD's ability to have adequate visibility over the movement of sustainment materiel moving in commercial containers. To correct this situation, we propose MTMC, in close coordination with DLA, initiate an in-depth review of the surface clearance process. One approach that should be considered is separating the process of requesting and confirming container bookings from clearing containers for movement to ports of embarkation. MTMC could accomplish this additional clearance step by either modifying the area command container booking operations or assigning container clearance authority to the port that prepares the manifest. The area command booking activity or the port would then issue an ETR only when a shipment is ready to be moved.

Containerized Ammunition Shipments

DoD moves ammunition to overseas destinations through common-user ammunition ports in specially designed Containerized Ammunition Distribution System (CADS) vans from DoD and commercial shipping activities. Since it manages much of this process, these shipments present MTMC with an excellent opportunity to gain valuable experience with AIT and upgrade one of its major business processes at the same time. Our concept on how MTMC could incorporate AIT into its ammunition operations is detailed below.

DoD would attach permanent RF tags to all CADS vans. Shipping activities would upload all required transportation and requisition data onto the tags; they would also transmit the transportation data electronically to the MTMC port of embarkation. When shipments arrive at the water ports, the ports would read the tags to capture movement status data and update their inventory and location files. Upon eventual receipt of the shipment, consignees would also read the tags to update their accountability files.

To implement this concept, MTMC would need to procure AIT read/write hardware and systems integration software and hardware. It would also need to

modify WPS. Although a detailed site survey of all major ammunition ports would be required to determine the full resource impact of this operating concept, we estimate that an activity the size and configuration of the 1303rd Major Port Command, Sunny Point, North Carolina, would require approximately $2 million for AIT read/write hardware and systems integration, software, and hardware. Further implementation at other sites should be less expensive, because MTMC will have already invested in software development.

Although MTMC controls much of DoD's ammunition shipment process, it would also need to seek changes in the shippers' business processes, particularly their documentation and system integration procedures. For these reasons, we believe MTMC should undertake this effort as a business process redesign, not a demonstration project. When completed, MTMC's container ammunition shipment process could become the model, and perhaps test bed, for DoD to expand the application of AIT into the commercial container environment.

The benefits from these process changes are numerous — more accurate transportation and requisition data available to ports and consignees, less reliance on paper documentation, better control of ammunition stocks at ports, and more efficient loading of ships and checking of security seals. The concept we propose is also consistent with those underlying the Defense Transportation Tracking System, which MTMC uses to monitor the movement of ammunition shipments throughout the Continental United States.

Unit Movements

The movement of unit equipment is the only MTMC water port business process that uses some form of AIT — bar codes. Although unit equipment is seldom lost, the current shipment process is highly labor intensive because much of the equipment is either improperly marked or unmarked. The use of more robust AIT tags could lead to better visibility over the status and location of unit equipment. It could also give MTMC an opportunity to further improve its water port unit movement business processes. Our ideas on how MTMC could obtain such benefits are outlined below.

Before MTMC upgrades its unit equipment business process to capitalize upon AIT, the Army and Marine Corps would need to place data-rich AIT devices on all unit equipment. In addition, the Army, Marine Corps, and Air Force would need to agree on a single Transportation Coordinator's Automated Information Management System (TC AIMS), with common inputs, outputs, hardware, and software. When the Army and Marine Corps begin to tag their unit equipment, MTMC would need to acquire the capability to read the tags at all unit move outload ports. It would also need to procure tag readers for all major outload ports as well as deployable packages to accompany WPS to overseas sites. An estimate of the cost for a deployable package of one fixed reader, four hand-held readers, associated interface software, lap-top computer, and International Maritime Satellite Organization (INMARSAT) terminal is approximately $50,000. We estimate that MTMC would require one to four deployable

packages depending upon the on/off load site configuration and workload requirements. In addition, MTMC would need to reengineer its business practices for unit movement operations to accommodate the use of AIT. Finally, it would need to develop an interface program with WPS to accommodate both download and upload of transaction data to and from AIT devices to ensure that data correction and updates are the same on the AIT device as in the WPS data base.

Some of the potential benefits from MTMC using AIT in its port operations to support unit movements include

- less time to develop accurate equipment type, responsible unit, number of pieces, and equipment weight and cube data;

- more effective control of unit equipment in marshaling areas;

- better unit integrity of equipment during loading process; and

- less time to change vessel stowage plans during loading process.

WHAT AUTOMATED SYSTEMS WILL BE AFFECTED?

Clearly, WPS will be the system most affected by MTMC pursuing business process improvements through AIT. That system will need to be modified to accommodate AIT transaction data from both containerized ammunition and unit equipment shipments. It will also need to be modified to exploit a number of additional advantages from AIT associated with the movement of containerized ammunition shipments, such as automated inventory levels, container pick and location load lists, and security seal checks.

The other major system affected by MTMC's AIT efforts will be TC AIMS. That system may need some modification to accommodate the use of AIT into the business process supporting the movement of unit equipment. Based upon the Marine Corps' experience with modifying software to accommodate data obtained from omnidirectional RF tags, we estimate that the required software changes to TC AIMS will be less than $2 million.

WHERE SHOULD MTMC FOCUS ITS INITIAL AIT EFFORTS?

Two of the three AIT-related opportunities that we identified — redesigning DoD's surface clearance process and upgrading the business processes supporting containerized ammunition shipments — offer MTMC substantial advantages immediately. As a consequence, we believe they should be the focus of MTMC's initial AIT efforts. The third, unit movements, should be treated as a longer term opportunity because its implementation depends on the occurrence of several

major, non-MTMC actions, such as the procurement of AIT devices for all Army and Marine Corps equipment and the development of a common TC AIMS.

While redesigning the surface clearance process is not directly associated with AIT applications, it has the potential to improve the quality of documentation data supporting the movement of containerized sustainment materiel. Moreover, the effectiveness of any AIT concept will be significantly impacted by the quality of source documentation. Those data are key to DoD having visibility over the movement and location of military equipment and supplies moving in commercial containers. The use of AIT to upgrade MTMC's ammunition business processes could also serve as a test bed for DoD to expand the application of AIT into its commercial container operations.

SUMMARY

The use of AIT to enhance DoD visibility over military shipments is highly promising and could eventually affect most of MTMC's business processes. In the near term, however, we propose MTMC limit its AIT efforts to two areas that would help DoD's overall in-transit visibility program — the surface clearance process and port operations supporting the movement of containerized ammunition. The combination of improved advance source data and integration of AIT into the ammunition shipping process would provide MTMC with the best opportunity to exploit AIT and test the data-rich tag or Portable Data File 417 (PDF-417) label concept before implementation throughout DoD's commercial container shipping environment. We further propose MTMC monitor the activities of the Army and Marine Corps in procuring AIT devices for unit equipment because if they are successful, MTMC would have an opportunity to improve another major business process.

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CHAPTER 1

Introduction

STATEMENT OF PROBLEM

Several Department of Defense (DoD) Components are acquiring automatic identification technology (AIT) hardware and software and incorporating it into their supply and transportation operations. Those efforts are forcing the Military Traffic Management Command (MTMC), DoD's manager of common-user water ports, to examine the effects that AIT could have on its port business practices. MTMC needs to understand how various AIT concepts may affect its water port operations and identify opportunities for capitalizing upon those concepts.

PURPOSE OF REPORT

This report examines MTMC's current water port operations and assesses how it could use AIT to improve those operations. It also seeks answers to the following questions:

◆ What business processes does MTMC need to modify or redesign to accommodate AIT?

◆ What automated systems will be affected by those process modifications or redesigns?

◆ Where should MTMC focus its initial AIT efforts?

BACKGROUND

A consistent finding from post-conflict studies of every contingency from Vietnam to Haiti is the need for better visibility of DoD equipment, supplies, and personnel. Although it has made many attempts to provide that visibility, DoD has been largely unsuccessful in developing effective systems for capturing and making available for decision-making accurate, timely, and comprehensive logistics information from all Military Services. AIT has the potential to help correct that shortcoming.

AIT includes a variety of methods for marking or "tagging" unit equipment, containers, or individual items. The value of AIT to DoD is its ability to provide accurate information on the location and content of shipments of spare parts, consumable items, subsistence, ammunition, unit equipment, and personal

property at various nodes throughout the Defense Transportation System. Shipments can be tagged with bar codes, magnetic stripes, smart cards, optical laser cards, or magnetic storage media with built-in transmitters and receivers. The information on each tag can range, for example, from Transportation Control and Movement Document (TCMD) data to supply detail on every item within a container. The tags can be interrogated using either contact, radio frequency (RF), or laser devices, with the information obtained from those interrogations often fed electronically into automated information systems for updating movement status records.

Various private-sector companies have found that use of AIT to capture logistics information, particularly when coupled with redesigned business processes, has helped to improve their visibility over the status and location of critical assets. Striving to build upon that success, several DoD Components are examining the use of AIT devices to improve their procedures for capturing logistics information. For example, in conjunction with the United States Transportation Command (USTRANSCOM), the Transportation Component Commands, and the Defense Logistics Agency (DLA), the Total Asset Visibility (TAV) Joint Task Force (JTF) has produced several draft concepts for applying AIT devices to improve visibility over materiel assets, while the Army has developed an Operational Requirements Document that details its need for AIT. The Army has also acquired several thousand RF-type AIT devices. Most of the current studies and concepts are focusing on AIT applications to improve in-transit visibility within the Defense Transportation System.

ASSUMPTIONS

In formulating answers to the three questions associated with the impact of AIT on MTMC's operations, we made several assumptions. Those assumptions are listed below:

◆ DoD will adopt multiple forms of AIT for application to various logistics processes.

◆ DLA will refine and implement a laser card AIT approach for containers; it will also use bar codes to identify the contents of containers stuffed in its depots.

◆ DLA will not, in the foreseeable future, impose the same AIT standards on the 30 to 40 percent of sustainment containers shipped directly from vendors as is required for shipments from its supply depots.

◆ Commercial seavan carriers will not, in the near term, adopt a standard AIT technology and data format.

◆ Vendors, shippers, ocean carriers, and third-party logistics contractors will support DoD's use of AIT devices on a cost-reimbursable basis.

◆ Army will continue to focus on in-theater visibility and procure additional data-rich, omnidirectional RF tags.

ORGANIZATION OF REPORT

In this report, we review the potential use of AIT in MTMC's port operations, particularly those supporting ammunition shipments, unit movements, containerized sustainment cargo, break-bulk shipments, and personal property shipments. Our analysis focuses on the processes used in those operations, not on specific applications of AIT. That focus is reflected in the organization of this report.

Chapter 2 presents an overview of MTMC's port operations. Chapter 3 summarizes our analysis of MTMC's port operations and identifies opportunities for improvement through the use of AIT. Chapter 4 identifies several actions that need to occur before MTMC can capitalize on those opportunities and proposes a schedule for accomplishing them. A series of appendices provide supporting details.

CHAPTER 2

Current Practices

During the past 25 years, DoD has steadily increased its reliance on the commercial sector for transportation services. This increase has resulted in the loss of direct physical control over many transportation processes, which affects how MTMC could use AIT to enhance its water port operations. Since those operations vary widely depending on the types of shipments being processed, this chapter describes MTMC's water port operations by focusing on the physical and documentation flows of five different types of shipments — ammunition, unit movements, sustainment materiel moving in commercial containers, break bulk, and personal property.

AMMUNITION SHIPMENTS

Overview

The movement of ammunition has remained primarily a DoD responsibility. Most shipments originate at DoD ammunition plants and depots in the Continental United States (CONUS). Except for large ammunition shipments, which move by rail, they are mostly transported by commercial truck. DoD uses the Defense Transportation Tracking System (DTTS) to monitor the movement of most ammunition shipments moving by truck within CONUS. DTTS surveillance of those shipments provides Government bill of lading (GBL) level of detail and ends when the ammunition is received at a military installation, facility, or port.

Although commercial truck and ocean carriers physically move the ammunition, DoD personnel prepare much of the supporting documentation; they load the ammunition into specially constructed military vans, if it is transported in a container; they receive the ammunition at the installation, facility, or port; and they oversee the loading of ammunition onto ships at military ports. They also oversee much of the offloading at the port of debarkation (POD) and the onward movement to using units. This process is examined in more detail below, using the activities of the 1303rd Major Port Command, Sunny Point, North Carolina, for illustration purposes.

Export Shipments

The 1303rd Major Port Command uses a local data base — Sunny Point Automated Network (SPAN) — to process export ammunition shipments. This data base was developed to make up for the absence of Advance Transportation

Control and Movement Document (ATCMD) data and shortfalls in Terminal Management System (TERMS) and Terminals On-Line System (TOLS). SPAN captures shipment information not included in the normal Military Standard Transportation and Movement Procedures (MILSTAMP) and provides advance shipment information in lieu of a formal prelodge system.

COLLECTING ADVANCE AMMUNITION SHIPMENT DATA

The ammunition materiel commands of the Military Services provide the traffic management division with ammunition shipment plans. The plan alerts Sunny Point that a shipment is imminent and identifies the total amount of ammunition that will be shipped. The Export Traffic Release (ETR) identifies the ship, dates when the ammunition is expected to arrive at the port, and Transportation Control Numbers (TCNs) booked. The port then queries TOLS for any information that is available on those TCNs (the queries typically have a match rate of less than 50 percent). The shipper sends a Report of Shipment to the port of embarkation (POE) for all ammunition shipments that depart the point of origin. At this time, if Sunny Point's traffic management division needs more shipment information, documentation personnel contact the shipper for the missing data. For most shipments, this effort yields the necessary information for the documentation personnel to build the MILSTAMP ATCMD, create a hard copy TCMD to process the shipment through the port, prepare a shipment manifest, and clear the shipment through customs.

PROCESSING EXPORT AMMUNITION SHIPMENTS

Occasionally, a motor carrier arrives at Sunny Point but the port lacks sufficient advance information to process the shipment. The shipment is then moved to a temporary storage pad and left on the trailer. Port personnel research the shipment using the driver's papers and markings on the shipment to track down the shipper and identify the needed documentation. For most rail shipments, however, the port receives the necessary information in advance. Errors or incomplete documentation for those shipments may need to be corrected, but the shipper is usually easy to identify.

Inbound ammunition shipments on trucks pass through a front gate security post, while those on rail cars go through a security post set up at the inbound rail entry gate. At that point, security personnel assign an entrance pass and direct the driver to an inspection point. If a truck arrives after duty hours, security personnel also conduct a safety and seal check and then escort the truck to a temporary holding pad near the security check point. The truck or rail car is eventually directed to either the truck control area or rail operations yard. Content documentation for containerized shipments are assumed to be correct if the shipment arrives with the original seal intact. Unless some obvious problem is discovered, security personnel make no attempt to verify content-level documentation when the container is opened and inspected. This inspection, following removal of the seal, focuses on the blocking and bracing, and the overall safety of the load. All

deficiencies are noted and the documentation is annotated to identify the staging location (storage pad or spur) where the shipment is placed pending vessel loading. Noncontainerized ammunition, with the hard copy TCMDs and shipment labels attached to the shipment units, are sent to rail holding cars or a transshipment shed for container stuffing. For rail cars carrying outsized break-bulk ammunition, the ammunition is left on the rail cars and the cars are sent to a rail holding area. If any rail cars are staged or frustrated before loading, Sunny Point places them in a rail holding area until the documentation is corrected and/or the shipment is loaded aboard a vessel.

The shipment data in SPAN are used to plan vessel loading and prepare TCMDs for the stevedore to check the cargo being loaded aboard each vessel. The type of contractor service and stowage location are marked on each shipment unit's TCMD. A copy is retained for the contractor's files and another copy sent to the documentation section for entry into SPAN. The SPAN data are then loaded into TERMS for manifesting. SPAN does not contain any on-base hold locations. Those locations are kept in a separate data file also locally maintained.

Import Shipments

Both containerized and break-bulk shipments of ammunition move through shipper and port business processes that DoD activities control. The documentation of import shipments originates with a MILSTAMP manifest that a MTMC or 7th Transportation Group activity usually prepares before a ship's arrival.

The receiving port uses the manifest to make inland CONUS transportation arrangements for delivery to the ultimate consignee. The CONUS Freight Management (CFM) system rates and routes all shipments of ammunition out of the port and prepares the Government bill of lading (GBL) for each shipment.[1] Port personnel also request truck or rail carriers to spot empty conveyances (truck chassis, flatbed trailers, or rail cars) on the Sunny Point installation prior to a ship's arrival, so they may begin loading the inbound ammunition immediately onto the conveyances that will move the shipments to the consignees. Local truck company agents usually leave enough empty conveyances on the Sunny Point installation, so having an adequate number of available conveyances for loading is rarely an issue.

The manifest is also used to prepare TCMDs before the ship arrives. TCMDs are provided to the stevedore contractor, who uses them to annotate cargo record corrections, date off-loaded, and payment codes for specific services. Copies of TCMDs should be affixed to all arriving shipment units, but if they are missing, port personnel place them on the shipment units. If a TCMD is already on a shipment unit, its accuracy is verified. Since most retrograde ammunition shipments move by rail to overseas POEs, and rail car and truck capacities, as well as loading rules of foreign nations, are usually different from than those employed in the United States, the documentation often does not

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[1]The CFM system is not capable of importing a MILSTAMP manifest file from MTMC's TERMS or TOLS; Worldwide Port System (WPS); or SPAN system.

indicate how the shipment will depart Sunny Point for delivery to the consignee. As a consequence, the documented shipment characteristics, such as TCN, pieces, dimensions, weight, cube, and net explosive weight, will often differ from those indicated on the TCMD.

Once the correct TCMD is placed on the outbound shipment units, the truck or rail car is loaded. Two copies of every TCMD are annotated with stevedore services pay code information, date loaded, and conveyance identification number. For container shipments outbound by motor carrier, the identification number includes the van owner, van number, and storage pad (temporary parking area) where the loaded van is placed waiting inland carriage. If the shipment unit departs by rail, the TCMD annotates the contractor payment code, date loaded, and rail car owner/number. Although very few noncontainerized ammunition shipments leave the port on trucks (i.e., flatbed loads), they follow the same procedures as container movements except the trailer and tractor identification numbers are annotated on the GBLs and a storage pad is not assigned.

One copy of every import TCMD is given to the stevedore contractor and another to the documentation section of the traffic management division. The remaining copies are attached to the shipment. The documentation section uses its copy to create a GBL, military shipping labels, and hazardous load instructions that accompany the shipment to destination. The carrier (or the carrier's agent) is then requested to pick up the load. All trucks enter the main security gate and report to the truck control point. Every truck is given a safety inspection and then directed to the appropriate storage pad. When a truck is loaded, the driver returns to the truck control point where the full load is inspected, the container seal is checked, and the load contents are verified to ensure the driver picked up the correct container. The driver is then given an exit pass that is surrendered to the security guard at the front gate. The security guard checks the van owner, van number, truck number, and driver's name with the exit pass. When that information is verified, the truck departs the installation.

If the ammunition is moving by rail, the rail carrier is contacted when the shipment is ready for movement. The rail carrier is also given the details of the shipment. Government-owned switching engines and crews move the rail cars along an 18-mile Government-owned access railway to the Leland, North Carolina, interchange that CSX Corporation operates. At that point, the shipment documentation is given to the carrier, which then assumes full responsibility for the shipment.

Summary of Findings and Conclusions

DoD currently owns most of the processes, products, and equipment used to move ammunition shipments. It also has a policy of moving ammunition by containers to the maximum extent practical. Although MTMC has introduced some automation into its ammunition port operations, the inventory and security management of ammunition shipments is still labor intensive. In addition, updating the documentation supporting those shipments requires extensive and tedious paperwork, which is often prepared manually.

These findings suggest that MTMC has sufficient direct control over containerized ammunition shipments to successfully apply AIT devices to improve its business processes.

Unit Movements

Overview

As with ammunition shipments, DoD controls much of the unit movement process. Just like ammunition material managers, unit and deployment managers complain they do not have visibility over the status of unit equipment while in-transit. In addition, MTMC operations personnel are continuously dealing with inaccurate or missing equipment markings and documentation. The marking and documentation processes are labor intensive, not only for the unit but also for the water port activity trying to correct the unit's efforts. Some of the associated problems include incorrect weight and dimension data on unit equipment; equipment placed on top of other equipment (thus creating a consolidated shipment unit, but with new weight and dimensions that exceed those of the individual pieces); and misplaced bar-coded labels (either in the wrong place, on the wrong vehicle, or missing).

Preparing Unit Equipment for Movement

In CONUS, the unit movement data (UMD) serve the same purpose as an ATCMD. It contains most of the information needed to process the ocean cargo manifest. The area command, through MTMC's Automated System for Processing Unit Requirements (ASPUR), and POE normally create the remaining data elements needed to prepare the MILSTAMP advance manifest data. However, MTMC's area commands do not use the same business practices for downloading the data into their TERMS data bases.[2] Eastern Area Command water ports load the advance MILSTAMP TCMD data into their Terminal Support Model (TSM) but do not update the TERMS voyage files of the area command TERMS data base until after vessel loading has been completed.

In the opinion of the Eastern Area Command, the TSM data can be changed more easily by the port operations documentation section without having to work around the cumbersome nightly batch processing of TERMS. (The TERMS data base is updated in nightly batch cycles for preparing manifests, conducting financial accounting tasks, and maintaining historical records.) In contrast, the Western Area Command water ports update the area command TERMS data base each night as was envisioned in the original system design. The Marine Corps, on the other hand, has the capability to produce MILSTAMP ATCMDs, but still needs some refinements to document consolidations and dependency relationships.

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[2] At the time of the study, a WPS regional data base was not installed at either area command.

Although many port operations and cargo documentation personnel have expressed a desire for a permanent TCN, no unit equipment of any Military Service has been assigned a permanent TCN. The Army uses the service designator, unit identification code (UIC), numeric serial number of the transaction, and fills the split shipment field with x's. The other Military Services use the same format except they insert their Joint Operations Planning and Execution System unit line number (ULN) in lieu of the UIC. The Marine Corps, however, tags its equipment with a permanent supply stock number and vehicle registration/serial number. This practice gives the Marine Corps a permanent identification of every asset. All other data, such as ownership, condition code, shipment characteristics, and TCN, are considered temporary data elements and they are better suited for a data base relationship to the permanent registration or serial number.

The Marine Corps' unit equipment marking operation differs from the Army's in that it first scans the bar codes of deploying vehicles, compares that information against the data base to mark the deploying items, keys in updated weight and dimensional changes as necessary, and then prints the military shipping labels for attachment to the vehicles. While each deployment still requires new labels for equipment, the process of identifying the deploying equipment, relating the permanent equipment identity to a data base record, updating the data base, and creating and affixing military shipping labels to the vehicles are often performed close to the unit's equipment, which reduces the potential for attaching labels to the wrong vehicles or even losing the labels.

For Army deployments, Transportation Coordinator Automated Command and Control Information System (TC-ACCIS) records the selected equipment TCNs and creates a military shipping label, generally for an entire unit. The labels are then manually placed on the equipment. The current TCN contains the UIC, Julian date, and shipment serial number. These data elements are obsolete after each deployment because the date changes and different subsets of unit equipment are used. Since the Army uses the UIC as part of the TCN, any substitution of equipment from other units results in an incorrect TCN. As a result, the Army, like the Marine Corps, must place new bar-coded military shipping labels on each piece of equipment for every deployment.

If the unit is located at an installation that has Transportation Coordinator's Automated Information Management System (TC AIMS), it uses that system to produce bar-code labels for application to the equipment, otherwise it marks TCNs on windshields or body parts, such as doors, fenders, or turrets. However, constantly changing shipping labels and inconsistency in applying the labels to easily accessible places create numerous problems for MTMC as the equipment moves through the POE. Software that formats TCMD data within TC-ACCIS appears to be needed, particularly for retrograde shipments. While the deployment of unit equipment from one theater to another does not seem to present the Marine Corps with a significant problem, it raises several problems for the Army. Most of those problems occur because of the absence of installation transportation offices (ITOs) to assist in operating TC-ACCIS and the absence of a MTMC area command to manipulate and process UMD from a TC-ACCIS

environment through ASPUR. The ITO is the installation's first point of contact for assistance in working with TC-ACCIS. As a result, teams from the program manager's office for TC-ACCIS, including contractor personnel, are usually tasked to use spare TC-ACCIS software and equipment and perform the role of the ITO.

Figure 2-1 provides an overview of the unit movement process. For purposes of this section, the specific data flows and system interfaces that are required to establish the movement requirement and arrange the transportation are described in detail. In summary terms, however, large-scale force deployments are sent to the U.S. Army Forces Command (FORSCOM), which sends an approved Automated Unit Equipment List (AUEL) to Headquarters, MTMC. The headquarters breaks down the data by priority of movement and area command geographic area of responsibility and sends the appropriate data to each area command. In contrast, small-scale deployments consist of direct TC-ACCIS area command data exchanges.
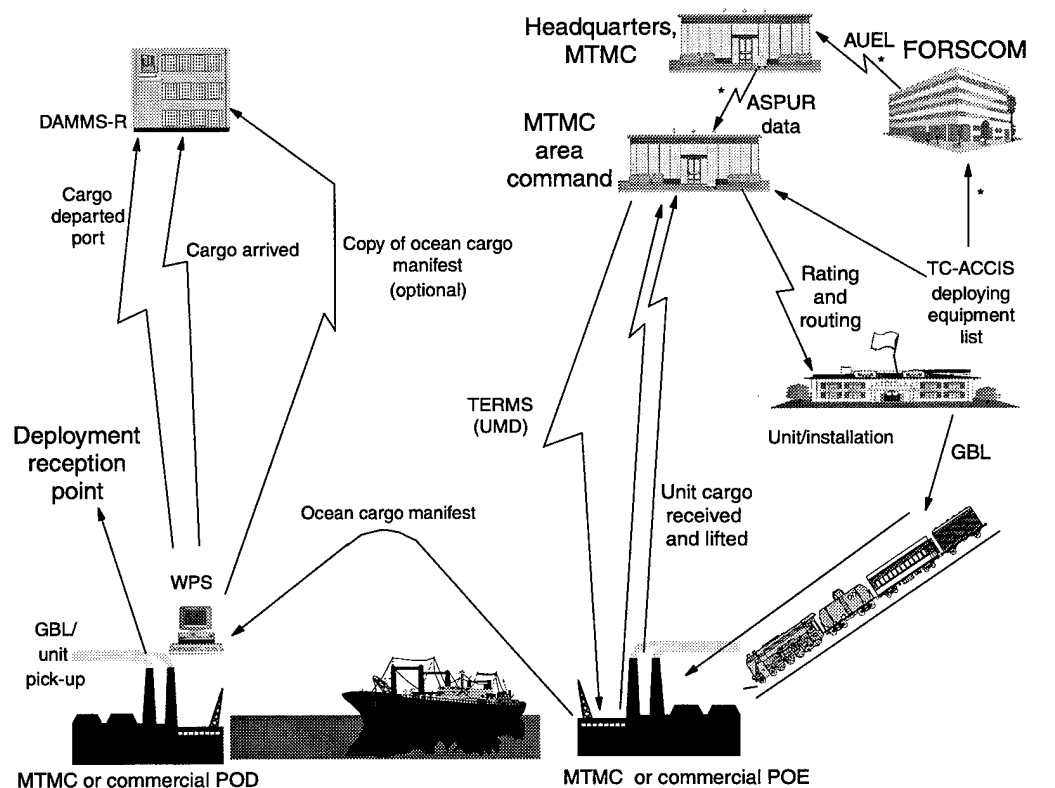
* Large scale (TPFDD) deployments.

Note: DAMMS-R = Department of Army Movement Management System — Redesigned; POD = port of debarkation; TPFDD = Time Phased Force Deployment Document.

Figure 2-1.
Information Flows — Unit Movement Shipment Process

Departing from Home Station

If the unit equipment is to be transported from a CONUS installation by rail or truck, the bar codes on the military shipping labels are scanned after the equipment is loaded on rail cars or it is staged for departure from the installation. The information on the military shipping labels are then uploaded to TC AIMS, which creates a GBL. The carrier or carrier's agent is given a copy of the GBL. When the equipment departs the installation, the unit reports the departure to Military Service headquarters. Departure data is updated and reported to the Military Services throughout the deployment cycle. MTMC does not formally receive information about unit departures from installations.

Arriving at POE

When the equipment arrives at a port, it is directed to an inbound shipment processing area. The locations of those areas are not standard within MTMC's ports, but they are normally close to the loading piers. If the port does not use bar-code scanners, it uses the TCMD to visually check the TCN against the military shipping labels on the vehicles. The port-arrival date is recorded manually on the TCMD, and then the TCMD is sent to a documentation section for data entry. The port's data base is updated with that information in a nightly batch cycle. However, manually matching numbers on the TCMD to numbers on vehicles can be time-consuming, especially if a large unit is moving. If the port uses bar-code scanners, hand-held terminals are initialized with common data, such as the arrival event code, system date, and contractor payment code, then the shipment unit TCNs are scanned.

Although MTMC's operations vary among the different ports, the normal port processing events that are entered into TERMS (and soon into WPS) include

◆ port arrival date and event;

◆ contractor payment codes that indicate the method used to off-load each TCN;

◆ storage (staging) date and location within the terminal area;

◆ date of release from storage for loading; and

◆ stow location and contractor payment codes that indicate how the cargo was placed on the ship, such as driven, normal lift, or heavy lift.

Tracking Shipments in Port Area

Although TERMS (and WPS) have the capability to record staging locations, they are seldom updated with that information. Keeping track of unit equipment within the port area depends on several factors — contractor, amount of

equipment involved, and port workload and layout. If the amount of unit equipment being moved is relatively small, the contractor can keep track of the equipment without automation. When the amount is large, such as during Desert Storm, the process of entering location data manually for every piece of equipment is time-consuming, and, therefore, not often documented in the automated system's records.

Stow Planning

Stow planning activities include developing stow plans, identifying stow locations on manifest records, and sending stow plans to PODs. Prior to vessel loading, the stow plan is developed using the data on file in TERMS (WPS in the future). The TOLS data base is used as input to a program that extracts various information, such as POD, UIC, type vehicle, weight, and dimensions. This information is then used as input to either an automated or manual stow planning process. Stow planning traditionally creates a controversy — whether to maintain unit integrity or use the ship's lift capacity to the maximum. A recent agreement between MTMC and FORSCOM stipulates that unit cargo will normally be loaded in a manner consistent with maintaining unit integrity by UIC. In practice, however, the overriding factor that ship stow planners use is optimum load, rather than equipment ownership. Stow planning is accomplished manually or with the aid of an automated tool. The tool that is emerging as MTMC's standard is the Integrated Computerized Deployment System (ICODES), which is a fourth-generation ship load planning system that is under development.

Loading the Vessel

All shipment dimension and weight characteristics in the data base must be validated against the actual cargo to ensure that they are accurate because those data are critical to effective stow planning and vessel loading. Sometimes MTMC documentation teams perform the validation at the shipping installation; other times during shipment in-processing; and still other times while the equipment is staged, after in-processing but before the day of loading. The latter is common during large-scale deployments. Once the equipment characteristics are validated, various shipping configuration adjustments may be required to reduce the equipment to its lowest cubic foot profile, which could lead to further corrections to the shipment characteristics (dimensions, cube, and weight) data in the data base. These new equipment data are then used to prepare or adjust the vessel's stow plan. When it is time to load the vessel, the port's documentation section prepares hard-copy TCMDs and carries them to a cargo operations office, which oversees the contract stevedore's loading and documentation operations.

The contractor lines up the unit equipment in the order called for in the stow plan, drives or lifts the equipment aboard the ship, and documents the transaction. That documentation consists of TCNs, lift-event codes, load dates, stow locations, and contractor payment codes. Some contractors also annotate

the hatch gang that loaded the equipment. However, MTMC does not require the use of standard procedures for capturing load information and the associated documentation. Some ports use bar-code scanners during the loading operation, capturing TCNs with the scanner and keying in the other four data elements. The actual procedures used depends on the ship, the business practices of the contractor providing the services, and the labor unions. Regardless of the procedures used, a transaction is eventually keyed or downloaded into a TERMS or WPS terminal, using written notes, paper TCMDs, and printouts from hand-held portable electronic bar-code terminals. In major ports, where bar-code scanners are often used to support vessel loading, specially trained government personnel are frequently used, with a contractor duplicating the entries on paper TCMDs.

The stow plan, which may be available to stage the cargo, dictates the sequence of loading, thus the pick-and-pull sequence. When unit equipment arrives at the port, contract operators try to stage all "like" equipment in the same area. (The recent policy change that calls for staging and loading by UIC may not be followed in the stow planning process.) This staging is accomplished because the stow plan loads are sequenced by type of equipment, not TCNs. Once driven or lifted onto the vessel, a specific piece of equipment may not be placed in the exact spot shown on the stow plan. The process of documenting the specific stow location aboard the vessel ship is seldom easy, given the motivation and training of the contract labor performing the work. Further complications arise because vessel holds are not clearly marked; many are also nonstandard or in hard-to-access locations.

Preparing Manifests

When the vessel is loaded, each port uses TERMS or WPS to produce an initial manifest for the vessel operator and transmit the full MILSTAMP manifest to the POD and TERMS central data base. Cargo detail records in the TERMS data base are linked by voyage number. The manifest is created for each POE-POD combination soon after the vessel sails. Subsequent manifest corrections may be required after the MTMC port operations staff makes various quality control checks. The communications path is predefined in the system for each POD (and other DoD activities). Once the POE prepares the manifest, its responsibilities for the shipment end except for responding to manifest changes and cargo out-turn report differences.

Off-Loading the Vessel

For most shipments, the POD receives several manifests because each port with an WPS capability sends manifests directly to the POD. A single voyage usually makes several ports of call within a particular trade route. During import cargo processing, the manifest is used as an advance planning document to notify units of inbound equipment and/or arrange for onward movement if the unit does not pick up its equipment at the port. Before the unit equipment arrives, the POD uses its advance documentation to satisfy host nation customs

clearance requirements. When the ship arrives at the POD, WPS processes a vessel arrival event. As the unit cargo is offloaded, WPS also records a cargo discharge event. Although bar-code scanners are intended to capture the TCN at the point of offload, this data capture does not always occur. For most unit equipment moves, the unit picks up its equipment at the port staging area. That event terminates MTMC's responsibilities for unit equipment.

Summary of Findings and Conclusions

Inaccurate or missing advance documentation is a common problem, which results in DoD's unit movement documentation process being labor intensive. The data supporting Army shipments of unit equipment are often incorrect, which contributes to excessive manual efforts to capture the required information. Because of their business processes supporting the outload of unit equipment, ports need the ability to correct AIT data, regardless of the associated technology. The use of AIT at water ports to enhance the receipt and manifesting processes is currently quite limited.

These findings suggest that the use of AIT, beyond the use of bar codes, to enhance the receipt and outload of unit equipment has considerable promise.

SUSTAINMENT MATERIEL MOVING IN COMMERCIAL CONTAINERS

Overview

As a result of DoD's success in out-sourcing noncombatant functions, military ports no longer physically process the majority of DoD container shipments. Most containers are moved by intermodal carriers through third-party carrier agent facilities. Nonetheless, MTMC operates an automated common brokerage house for making container reservations aboard specific vessels (container booking); collects shipment documentation for transmitting ocean cargo manifests to PODs for customs clearance and notice of pending cargo arrival; and maintains a data base of manifests for verifying carrier billings and conducting traffic analyses.

In addition to its use of commercial containers, the nature of the shipper community has also changed. As shown in Figure 2-2, more than 90 percent of today's containers are stuffed at their source. They are loaded by the shipper, moved to a commercial carrier's facility, and delivered to the customer by the carrier or the carrier's foreign country agent. Direct vendor shipments are generating much of the growth in source-stuffed containers. Those shipments travel from a vendor's facility to a commercial shipping company, never transiting a DoD facility or being seen by DoD personnel until they are delivered to the consignees. This method of resupply improves delivery time performance and reduces handling cost. Since many direct vendor shippers are not required to

prepare any MILSTAMP or Military Standard Requisition and Issue Procedures (MILSTRIP) documentation, contract offices and activities that sponsor those types of shipments sporadically submit the documentation to MTMC using purchase orders and contract item specifications. Both DLA and the Army and Air Force Exchange System (AAFES) make extensive use of direct vendor deliveries.
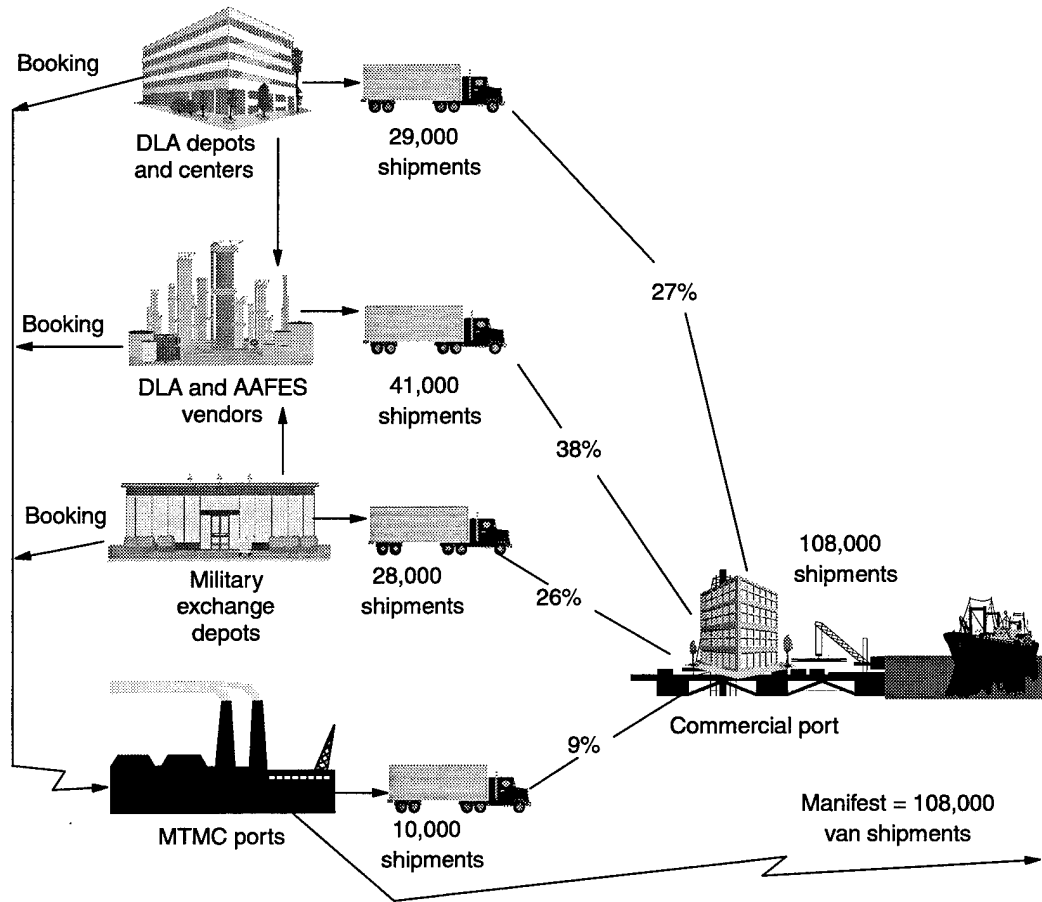
Figure 2-2.
Commercial Seavan Shipments

Only four or five major United States-registered steamship lines are supporting DoD's shipments of containerized cargo. In addition, DoD cargo represents less than 7 percent of the annual revenue of those lines. Several ocean carriers, as well as the rail industry, are now using "license tag" AIT devices to assist in controlling their assets. These devices typically contain permanent data, but in a "write once, read many" format. The larger ocean carriers are generally willing to accept, store, and transmit container-content information if the shipper provides the information and pays for the additional service. Some carriers have even established subsidiary third-party logistics companies to provide those types of services on a fee-for-service basis. Most carriers providing such services use a data base, with the shipper and consignee exchanging content-level detail

and the associated container number. Each party then tracks the movement status by container identification number.

Summary of Findings and Conclusions

Although most sustainment cargo moving in commercial containers bypass military ports, MTMC is still responsible for preparing manifests for those types of shipments. The ocean carrier industry currently tracks its containers, but not the contents of those containers. However, several carriers are providing added services to their customers by relating container numbers to content information, with AIT devices often used to track the location of containers.

Since DoD does not control the process, any application of AIT devices to enhance the visibility of sustainment materiel moving in commercial containers must involve vendors and commercial carriers. The challenges associated with involving thousands of vendors and carriers in efforts to improve water port operations through the application of AIT devices more than offset the potential benefits.[3] In addition, MTMC's inexperience with using robust AIT devices to improve its water port business processes suggests that a more narrowly focused application would provide a better foundation for the future.

BREAK-BULK SHIPMENTS

DoD has two different types of break-bulk shipments moving through MTMC ports. One entails cargo that is suitable for consolidation in a container. The other consists of shipment units that are destined for low volume, hard-to-lift area; are outsize or overweight and cannot be put into a container, such as barrels, bales of wire, resupply wheeled and track vehicles; and dangerous or hazardous materials.

Most break-bulk shipments of less than a full truckload are moved under standing route orders and typically arrive at a port with no advance documentation. In contrast, truckload and rail shipments generally move under MTMC's rating and routing process, and tend to provide some advance documentation. Most carriers notify the port of a shipment's arrival the day before it actually arrives (i.e., the shipment is prelodged). If the ATCMD data are available and the shipment was prelodged, the cargo is "in-checked" at the warehouse or open storage area, where it awaits vessel loading. (The port uses some of the documentation data, such as commodity, destination, and size and weight characteristics, to determine where to direct the truck or rail car for shipment in-check.) If

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[3] Although it is widely argued that use of robust AIT devices would greatly enhance DoD's processes supporting sustainment materiel moving in containers, we conclude that such an application would add little value. If a shipper can update accurate shipment data onto a tag, the shipper could also transmit that same information to a port and a tracking system, such as GTN, more easily and at lower cost. Appendix A expands upon our position that sustainment materiel moving in containers does not warrant MTMC modifying its supporting business processes to incorporate AIT.

the shipment is either not prelodged or missing the necessary documentation, port personnel frustrate the shipment until they obtain the documentation.

If the shipment can fit in a container and it is suitable for movement in a container, the port's cargo operations section in-checks the shipment at the container freight station (CFS), provided that normal container service to the destination can satisfy the required delivery date. At the CFS, paper copies of TCMDs are attached to each piece of cargo, then the cargo is stored in container route areas based on consignee groupings, and loaded in commercial containers when enough cargo has been accumulated for a specific traffic route. After stuffing the container and manually updating the paper TCMDs, the carrier is called to pick up the container and dray it to the port facility. The TCMDs are then transferred by courier to a central location where they are entered into TERMS or WPS.

If the cargo cannot be moved in a container, it is in-checked at a storage area to await break-bulk ocean transportation service. Paper copies of TCMDs are also placed on the cargo. Contract stevedores use the TCMDs to retrieve the cargo from the staging location by visually reading the shipment labels. Normally these shipments are loaded at Government-owned piers or booked with a commercial carrier, which requires additional transport to the carrier's break-bulk pier for loading aboard a vessel. When break-bulk shipments are loaded at MTMC piers, contract stevedore checkers annotate the TCMDs with the date of the vessel loading event, stowage location, and contractor payment codes. The TCMDs are then sent to the documentation section, which enters the data into TERMS or WPS.

Summary of Findings and Conclusions

Less than 10 percent of all DoD tonnage destined for overseas users are moved as break bulk. This percentage is expected to decrease further as both shippers and commercial carriers continue to emphasize container shipments. Approximately 45 to 50 percent of all break-bulk shipments arrive at military ports without proper shipment labels and advance documentation. Although CFSs stuff considerable break-bulk cargo into containers, most of their processes are manual.

Since break-bulk shipments constitute only a small percentage of DoD's shipments and are decreasing, they will yield a low return on investment for applying AIT devices to improve the associated shipment processes.

PERSONAL PROPERTY

Personal property shipments consist of privately owned vehicles (POVs) and household goods. This section addresses both types of shipment.

Privately Owned Vehicle Shipments

POV shipments are usually handled separately from other DoD cargo. Most POV shipments are processed through a Government-owned-contractor-operated facility with at least one DoD representative assigned full time to the processing center. The processing center may accept the vehicle for import transshipment, for export shipment, or for truck or rail car carriage to another port.

If the POV is an import transshipment, it is removed from the container, inspected, loaded on a car carrier, and shipped to its destination. If the owner is picking up the vehicle at the port, the owner shows the processing center a copy of his or her permanent change of station (PCS) orders and vehicle registration. The processing center retains a copy of the PCS orders. The owner and processing center contractor jointly inspect the POV, annotating on Defense Department (DD) Form 788 (inspection report) any damages found. If the original inspection report, which was completed when the vehicle was turned over for shipment, is available, the condition of the vehicle before and after the shipment is compared. If the vehicle was damaged during shipment, the owner receives copies of both inspection reports and instructions on how to file a damage claim. If the original inspection report is not available, the owner receives just the final inspection report, along with instructions on how to file a claim. (Owners receive copies of the initial inspection reports when they drop off POVs for shipment and copies of the final inspection reports when they pick them up.) The owner signs for the vehicle and if compliance with specific United States customs is needed, the owner is provided a customs form that describes what must be done, when, and what may happen if the owner fails to submit proof of compliance. A copy of the signed customs form is also sent to the customs office. From that point, the owner handles all customs clearance issues.

Export POV shipments begin when a processing clerk prepares the shipment processing documentation and reviews the owner's PCS orders and the vehicle's registration or title. The clerk and owner then jointly inspect the vehicle, recording the results on an inspection report. The processing center may require the owner to complete additional forms, such as acknowledging that the port may drive the vehicle a specified number of miles to process the vehicle. A copy of the PCS orders, inspection report, and cardboard placard with a shipping label pasted on it are then placed in the vehicle, usually on the dashboard or seat. Although some POV processing centers may use bar-coded shipping labels, no processing center scans the label during either the import or export process. The vehicle's key is tagged with a copy of the shipping label and the POV moved to a temporary staging area. If the vehicle can be put in a container, the processing center contractor normally performs the booking. The vehicle may be stuffed in a container at the POV processing center or at a carrier's facility. If is stuffed at the carrier's facility, the vehicle is either driven to the facility or the carrier sends a truck to pick it up. Once at the carrier's facility, the vehicle may be placed in a special container rack or stuffed into a container. If container service is not available to the POD, the vehicle is loaded as break-bulk cargo.

The Military Ocean Terminal at Bayonne, New Jersey, usually ships all POVs destined for Central Europe on Military Sealift Command (MSC) -owned ships, thus the majority of all POVs moving as break-bulk cargo are loaded over Government piers. For those POVs, contractor personnel key the associated information into the standard POV system, which then creates the necessary TERMS or WPS entries. A copy of all orders and inspection reports collected during each work day is sent by courier to MTMC's documentation section, and in some cases, to its booking section. The port also retains copies of those documents. Another set is mailed to the POD, sometimes by the POV processing center and other times by the port documentation section.

The two most troublesome issues associated with POV shipments are the inspection reports and vehicles that show up at a port with little or no documentation. Only two ports (Cape Canaveral, Florida, and Norfolk, Virginia) have automated parts of the inspection report, even though it is completed whenever responsibility for the vehicle changes between the owner, Government, contractors, and carrier. Legal claims offices and owners need at least the initial and final inspection reports to verify damage claims. Government claims offices need all inspection reports to determine where the damages occurred and what party is liable. The PCS orders present another set of problems. Vehicles routinely arrive at PODs without the required documentation, other than a manifest entry. In those situations, the name of the sponsoring Military Service or Defense agency and the owner's social security number must be retrieved from the manifest entry, and the owner tracked down through his or her parent Military Service or agency.

Household Goods

Household goods shipment processes were examined only in a cursory manner because of the small number of shipment units that pass through MTMC ports. Most household goods shipments do not transit MTMC ports. However, in some instances, military ports, such as Oakland, California, provide temporary storage services to military members.

Summary of Findings and Conclusions

The POV and household goods business processes are predominately contract operations. Except for shipments moving on MSC-arranged ocean carriage, carriers control the entire movement process. The visibility that the carriers provide over these types of shipments appears to be sufficient. Although DoD negotiates for the best "per unit" (ton or cube) rate, the methods of conducting business are left to the carriers. As a consequence, the introduction of AIT devices into the movement of household goods and POVs would add little value.

Summary

The results of this review of MTMC's current business practices at its water ports suggest that two types of shipments — ammunition shipments and unit movements — warrant a more detailed examination for possible AIT applications. That examination is provided in the following chapter. Chapter 3 also addresses a problem that routinely surfaced throughout this review and affects all DoD shipments passing through water ports — inaccurate or incomplete documentation. This problem results in MTMC and other organizations expending considerable resources and time to correct or complete shipment documentation.

CHAPTER 3

Employing AIT in Water Port Operations

INTRODUCTION

One of the biggest challenges to effectively inserting AIT into DoD's transportation system is gaining accurate information on containerized sustainment cargo that moves primarily through commercial channels, and management (recovery and reuse) of nondisposable AIT devices. Other types of shipments, including ammunition moving in containers and unit movements, present more favorable, near-term opportunities because DoD activities (particularly MTMC) own much of the supporting business processes. As a consequence, DoD Components are in position to reengineer those processes to exploit the improvements that are possible through expanded use of AIT.

This chapter proposes how MTMC could use AIT to enhance its business processes supporting ammunition moving in containers and unit movements. It also addresses an additional issue that underlies many overseas shipments — inaccurate or incomplete documentation. Although this report focuses on MTMC's use of AIT in its water port operations, MTMC also owns the ETR process, which directly contributes to the documentation problems that hinder additional applications of AIT. Because of this relationship, this chapter also addresses MTMC's ETR process.

AMMUNITION SHIPMENTS

Overview

DoD moves ammunition in both break-bulk and containers shipments. As noted previously in Chapter 2, break-bulk ammunition shipments offer few opportunities for process improvements through AIT applications, much like similar shipments of other commodities. In contrast, the process of shipping ammunition in containers is ideal because MTMC owns much of the associated business processes and DoD has imposed very stringent handling and storage requirements for those types of shipments. MTMC also insists on accurate and timely documentation. The added emphasis on handling, storage, and documentation results in more labor-intensive shipments than other types of commodities. These two characteristics, control of the process and labor-intensive processes, create an environment that is well suited to AIT applications.

Most containerized ammunition shipments destined for overseas units are shipped through MTMC's common-user port of Sunny Point, North Carolina, and through the Navy port of Concord, California. (Navy ammunition shipments also move through Earle, New Jersey; Yorktown, Virginia; Norfolk Naval Base, Virginia; Charleston Naval Base, South Carolina; Blount Island, Florida; Port Hadlock, Washington; and Seal Beach, California.) Since MTMC does not manage the Navy ports, their operations are not considered in the following concept.

In addition to DoD owning the water ports that most ammunition is shipped through, ammunition shippers and consignees are either owned or closely managed by DoD. The number of shippers is fairly small, unlike the thousands of commercial seavan shippers of other sustainment materiel.

Concept of Operation

Export Ammunition Shipments

Under this concept, a permanent "write many, read many" AIT device would be attached to each of the 12,000 DoD-owned Containerized Ammunition Distribution System (CADS) vans. Each device would contain a van identification number that would never change; it would also have a robust data capacity. Every ammunition shipper would be provided with personal computer (PC) -based hardware and expert system software capable of producing TCMDs, including miscellaneous trailer cards. The shippers would also be given the specifications and processing logic of this software so they could integrate the programs into their material management and material release order systems. Using this software, shippers would electronically transmit ATCMD data to the POE and write the TCMD data onto the AIT tag when the container has been loaded and the doors closed, preferably before it leaves the loading dock. The shipper could also write key supply and consignee/consignor data to the tag, if space is available.

Initiating Export Container Ammunition Shipments

The booking process for ammunition shipments would not change from today's practices, which essentially entail a Military Service ammunition command booking the shipment with a MTMC area command. However, MTMC should consider revising its surface clearance procedures to include the delegation of export release authority to ammunition ports for all CADS vans.

Release from Shipping Activity

After receiving the ETR, the shipper would notify the line-haul carrier to pick up the container and take it to the port. The use of electronic seals would enable the shipper to enhance its on-site inventory and security functions. When

the container departs from the security control point within the facility (outbound gate or rail siding), the AIT tag would be automatically read and the shipment data integrated with the shipper's material release order system to automatically produce the report of shipment. Since the POE is a recipient of the report, it would provide a notice (i.e., prelodged shipment information) of a pending inbound shipment. (Ports do not always receive that advance information today.) The same notice could also trigger an electronic data interchange (EDI) -formatted report of shipment departure from the consignee to the Global Transportation Network (GTN).

Ammunition Shipment Tracking

DTTS would track the CADS van from the CONUS shipping facility to the POE. The DTTS Program Office is already examining the technical and economic feasibility of having an AIT tag and electronic seal interface with the truck's transmitter. The objective of that interface would be to transmit a security message automatically to the DTTS operations center in Norfolk, Virginia, if the electronic seal is opened.

Ammunition Shipment Receipt at POE

When the CADS van arrives at the initial entry gate (truck or rail) of the POE, the AIT tag would be interrogated, automatically updating the WPS data base with a port arrival transaction. The truck or rail car would be directed to an inspection area where a safety inspection of the load's blocking and bracing would be performed and new seal numbers keyed into the container records of WPS. During the inspection, electronic seal and AIT tag battery checks would also be performed. If the batteries are weak, the inspection personnel would change them. After the van has been inspected, the seal would be closed and the van directed to the port's storage area or holding pad.

Inventory and Security Checks

Every ammunition staging rail spur or truck pad would have an interrogation capability to determine whether the shipment is arriving or departing the spur or pad. The interrogation could be provided using either a fixed or truck-mounted device. The current process of physically inventorying containers and ensuring container seals are intact would be replaced by electronic queries of AIT tags and electronic seals. The container locations obtained during twice-daily inventories would be automatically compared with the WPS data base to validate the container location field in the data record. Electronic seals could be interrogated throughout the port in a matter of minutes. WPS inventory and seal check audit files would be maintained for recall if a security violation occurred. A security feature, incorporated in RF technology exists whereby a wire or optic loop is used with the RF tag to detect locking and unlocking of containers. As an example, at Sunny Point Military Ocean Terminal, each storage pad

entrance gate would also have an AIT locking device for use by security personnel. The lock or unlock data for containers and storage pad gates can then be transmitted to the ocean terminal security office on a real-time basis.

Vessel Loading

When the vessel is ready to be loaded, WPS would have accurate information on the location of all containers in the port. The ICODES stow planning system would be used to prepare a "pick list" printed in the cargo operations area. Eventually, an RF transmitter mounted in the cab of yard tractors would identify the containers on a pick list. The containers would be picked in the sequence detailed in the stow plan and pulled to the loading dock. When a container leaves the containment pad or rail holding yard, the AIT tag would be interrogated and a "staging release" transaction would be automatically sent to WPS. When the container reaches the loading dock, a crane would hoist it onto the vessel. Either crane-mounted AIT interrogators or cargo checkers with hand-held devices would read the container number. The container number would then be displayed on the crane operator's (checker's) terminal and the operator (checker) would be prompted to key in the stow location and contract pay codes. The crane or hand-held devices would also be capable of uploading data changes to the AIT tag if necessary.

Vessel Manifesting

The MILSTAMP ocean cargo manifest would be prepared immediately after the vessel is loaded, which would minimize the number of corrections or adjustments to the manifest. The vessel master would be given a copy of the manifest before vessel departure, while electronic copies would be forwarded to the POD and regional WPS data base. The regional WPS data base would send (using EDI standards) a near real-time version of all manifest transactions to GTN.

Arrival and Discharge at POD

When the vessel arrives at the POD, the port would use hand-held and crane-mounted interrogation devices to read the AIT tags and electronic seals. These devices would have similar capabilities and be programmed to format and transmit the container discharge transaction to WPS. The port would also need software that supports downloading MILSTAMP data from the AIT tag to the POD's WPS data base if no previous record exists.

POD Staging and Processing

If the POD is in a mature theater, the container's staging location, inventory levels, and electronic seal status would be recorded and monitored in the same manner as at CONUS ports. (In bare-based ports, hand-held or mobile terminals

could be used in staging areas.) When the container departs the port, the AIT tag and electronic seal would be read at the final security check point; the interrogator reading the AIT tag would transmit a port departure transaction to WPS, which would complete MTMC's tracking and handling responsibilities. At the outbound check point, the AIT tag on the container would be interrogated and the container number used to access the WPS record. The container number would then be keyed into the system. When the consignee receives the container, an interrogator at the ammunition supply point or other storage facility would capture the container's TCN and report its arrival to GTN. Depending on the robustness of the AIT tag and the needs of DoD's supply system, the tag may also contain supply accountability data that could be read and uploaded to a stock record automated system. The consignee and MTMC ports would need the capability to erase (overwrite) the AIT tag and electronic seal when the container is empty. Shippers, port activities, and major consignees would also need the capability to erase all data on the AIT tag, except for the container identification number, when the van is empty.

RETROGRADE AMMUNITION SHIPMENTS

MTMC overseas port activities would process retrograde container ammunition shipments using the same procedures that it uses for export ammunition shipments. However, the port activity would probably be more involved with booking the containers on MSC-controlled ships, rather than requiring shippers to contact an area command booking office. If the container of ammunition was shipped for a contingency and not used, the AIT tags and electronic seals would probably be intact with export TCMD data still recorded on the tag. In those situations, WPS port operations personnel could interrogate the TCN data on the container AIT tag. The data would then be downloaded to a WPS laptop computer and input by electronic file transfer or converted to a diskette file that WPS could read. Since WPS contains processing logic that allows an import manifest record to be reconfigured into an export manifest record, the diskette file would be read into WPS and the ATCMD files would be created in a manner similar to the existing process. The updated or revised TCMD data would then be used to upload the correct TCMD data to the AIT tags without redocumenting each container. The remainder of the process would then be a reverse of the export process described above.

In the case of an improved theater returning ammunition because of either age, recall, or stock-level reductions, the ammunition storage activity would prepare the TCMD and add that information to the AIT tags using the same procedures as their CONUS counterparts. The ATCMD would be transmitted electronically to the port and port processing would be essentially the same as for export container shipments from CONUS.

Summary — Containerized Ammunition Shipments

The movement of containerized ammunition occurs in a controlled environment involving MTMC and a manageable number of mostly DoD shippers and consignees. We believe these shipments present an excellent opportunity for DoD to exploit the advantages of AIT devices and gain needed experience in using data-rich tags to enhance logistics operations before expanding their use to other, more challenging transportation applications.

The proposed operating concept for using AIT to enhance DoD's business process supporting containerized ammunition shipments builds upon existing processes, but it also introduces several detailed operating issues that need to be resolved. However, since MTMC owns most of the associated business processes, it is in position to make the needed changes. Although a detailed site survey of every major ammunition port would be required to determine the resources required to implement the proposed operating concept, we estimate that MTMC's port at Sunny Point, North Carolina, would require approximately $2 million to cover the cost of AIT hardware and systems integration, software, and hardware. The cost of implementing the operating concept at other ports would be less costly because MTMC would not need to develop interfaces between the AIT devices and WPS.

UNIT MOVEMENTS

Introduction

Since the fielding of TC AIMS, DoD's shipping procedures for unit movements have improved greatly, but additional improvements are still possible, particularly in areas of submission of accurate advance documentation, visibility, operational practices, and systems. While MTMC has adequate visibility of unit movements while they are in transit between the POE to POD, its unit movement business practices within water port operations could be improved through the use of a more robust AIT capability than three of nine bar-code technology offers. In addition, the migration to a standard TC AIMS will greatly enhance MTMC's port operations because both the Army and Marine Corps will then use the same unit movement procedures.

Although MTMC currently uses a bar-code scanning process to link equipment to the TCMD, missing or incorrect data on the bar-code labels routinely result in labor-intensive documentation efforts that are now manageable only in minor deployments. In addition, the Army will most likely press to replace the use of bar-code labels with data-rich AIT tags and a robust writer and interrogator capability, primarily to improve visibility over the status and location of unit movements. MTMC's ports, however, do not normally need such extensive data to carryout their unit movement responsibilities unless prior source data are not available. Nonetheless, MTMC has a number of operational areas where it could capitalize upon the Army's AIT plans to improve its water port business

processes. This section presents an overview of a port operating concept for using data-rich AIT tags to enhance the processing of unit movements through MTMC's water ports.

Concept of Operation

ASSUMPTIONS

The concept of operation for using data-rich AIT tags assumes that DoD will develop a new TC AIMS II[1] to replace the individual TC AIMSs of the Military Services. It also assumes that the cost of integrating AIT into TC AIMS II will be included in the cost of developing TC AIMS II, not as a MTMC or Military Service expense for retrofitting AIT into existing systems. The concept further assumes the AIT tags would contain permanent, unique vehicle or equipment identification numbers and full TCMD data that change every time the equipment is shipped. The tags could also contain other data that are not relevant to port operations.

COMMUNICATING UNIT MOVEMENT REQUIREMENT TO MTMC

Since MTMC has a worldwide port responsibility but does not have a deployable capability that mirrors its CONUS infrastructure, the Military Services use different methods for communicating their unit movement requirements for deployments and redeployments. A MTMC area command is the focal point for all deployments from CONUS. When a unit redeploys from an OCONUS location, the theater Commander-in-Chief controls all traffic management and port selection decisions. A MTMC support activity or transportation terminal unit at the theater POE would typically perform those functions, using WPS, TC AIMS II, and any AIT employed to support the redeployment. Although both WPS and TC AIMS II are intended to support deployments and redeployments, TC AIMS II must also be capable in CONUS of consolidating requirements; adding rating and routing information to the deployment data; and transmitting the rating and routing data to an area command. The area command (soon through use of the Integrated Booking System, or IBS) would determine the data that each POE requires and then download the MILSTAMP portion of those data through WPS to the POE. Today, the OCONUS process, however, does not always result in MILSTAMP information being passed through IBS to WPS. Thus, if AIT devices are employed, WPS must have the flexibility to create its data base records directly from AIT tags at the port without input from another automated system. This requirement further suggests that the AIT tag supporting unit movements must have sufficient robustness to store TCMD data. When IBS is installed OCONUS, standard booking procedures for unit and non-unit movements will be used worldwide for peacetime and wartime operations.

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[1] TC AIMS II is the generic title given to DoD's migration system for supporting unit movements.

PREPARING UNIT EQUIPMENT FOR MOVEMENT

Using TC AIMS II for both deployments and redeployments, units would upload MILSTAMP data to an RF tag with sufficient storage capacity to accommodate at least the prime TCMD data for two levels of MILSTAMP consolidations. The tags would also contain a permanent (password protected) identification number for each piece of unit equipment. Automated systems that upload data to the tag would use the permanent identification number to ensure that the correct data base record is included in the MILSTAMP information. This practice should help to eliminate the problem of equipment being mislabeled. The unit would transmit its ATCMD data via TC AIMS II to IBS if it is deploying and directly to the water port (i.e., WPS) if it is redeploying. The remainder of this concept details how MTMC could exploit AIT in its water port business process.

UNIT DEPARTURE FROM CONUS BASE

WPS does not currently contain any information alerting the port that a unit's equipment has departed home station and is en route to the POE. That information is often provided by voice or on-site coordination. With the AIT device on the equipment, the CFM system or TC AIMS II would read the tags as the equipment departs the home station and transmit an EDI freight status inquiry message to GTN. While not required for documentation or port processing by WPS, the water port activity could access the home station departure information from GTN, or MTMC could develop a direct interface for installation departure transactions, if desired.

POE ARRIVAL AND INITIAL RECEPTION

When the unit equipment arrives at the port, either hand-held or fixed interrogation devices in the receiving area would read the tag on every piece of equipment. The information on those tags would then create a port arrival transaction in WPS. If the advance data matches those data, the arrival transaction would be posted to the WPS record. If the data do not match, the TCMD data on the AIT tag would be used to create the WPS record, annotate port arrival, and add the transaction to the data base. If any tag is either missing, inoperative, or unable to be read, the equipment would be weighed and measured, and the MILSTAMP data keyed into WPS. The equipment data would also be uploaded to the AIT tag by interfacing a hand-held AIT reader-writer terminal with WPS. The hand-held terminal would also be used to overwrite the weight, dimension, and cube data on the AIT tag with the updated information.

UNIT EQUIPMENT STAGING

An advance stow plan would be used to produce an automated staging sequence, including the positioning of equipment alongside the pier for vessel

loading. This practice would require modifying WPS to use the ICODES load plan to assign every piece of equipment a notional staging area and marshaling sequence. Through RF communications with the WPS data base, the equipment would be directed to the assigned staging position, its position would then be validated using a hand-held AIT reader and confirmed visually. Following confirmation, a staging transaction would be transmitted to WPS, confirming the equipment was staged in the intended location and the date of staging.

VESSEL LOADING

When the vessel is loaded, a contract stevedore cargo checker or government documentation specialist would use a hand-held AIT device to read the tag for purposes of confirming the actual stow location and entering the stevedore services contract payment codes. Rather than using contract or government personnel to confirm stow locations, MTMC could mount interrogator devices and data repeaters in vessel storage areas and cargo holds at the beginning of the deployment. Those devices and repeaters would be used to read the tag of a piece of equipment and report the stow location. This approach would provide accurate record stow locations and could be readily implemented in vessels that the MSC controls. It would also free the cargo checkers to monitor the data recording operation and enter contract payment codes when required. All stow location data would be immediately transmitted to WPS.

VESSEL MANIFESTING

At the direction of the cargo operations section, the MILSTAMP ocean cargo manifest would be created immediately after the vessel is loaded. Corrections or adjustments to the manifest should seldom be required because the data were captured when the vessel was loaded. The vessel master would be given a hard copy or computer disk copy of the manifest before the vessel departs; copies of the manifest would also be sent to the POD and regional WPS data base. Although not currently a requirement of GTN, the WPS could also transmit the manifest to GTN if required by USTRANSCOM.

VESSEL OFF-LOADING

While offloading the vessel, stevedore cargo checkers would interrogate the AIT device mounted on every piece of equipment, capture the TCN, enter the contract payment code, and transmit a cargo discharge transaction to WPS. The final MTMC water port interrogation of the tag would occur at the outbound security control point using either a hand-held or fixed interrogator.

The redeployment of unit equipment would follow the same procedures as a deployment, except the data for arranging inland transportation would be transmitted to a theater traffic management activity or movements control center instead of a MTMC area command. The ATCMD data would be transmitted directly into WPS by electronic file transfer, diskette, or from the AIT tag on the equipment. In austere port operations, the inland transportation request data would not be used because most units would drive their equipment to the port. In those situations, the equipment would probably arrive without advance data and WPS would then upload TCMD data directly from the AIT tags. It is the responsibility of the deploying unit to populate the AIT device with TCMD data. As an alternative to uploading from the AIT tag (such as when a port lacks the capability to update the tags), WPS has planned for developing the capability to save a deployed unit's manifest data, manipulate the appropriate data fields, and reenter the data as an export shipment file.

Summary — Unit Movements

The proposed operating concept for using AIT devices to support movements of unit equipment depends on the Army permanently marking all unit equipment with RF tags, replacing the existing bar codes. By doing so, MTMC would increase the accuracy of equipment data, enhance its ability to correct equipment data in port areas, improve its control of equipment in marshaling areas, and reduce the time it spends processing equipment through ports and preparing manifests. MTMC would also capitalize upon a major Army investment in RF tags.

Implementing the proposed operating concept would require MTMC to make several changes to its business processes, particularly the use of paper TCMDs. It would also require modification of WPS to incorporate interfaces with RF terminals and the provision of additional training for port personnel and personnel who are designated to deploy portable WPS. This concept, however, cannot be implemented without an operational TC AIMS II.

SURFACE CLEARANCE PROCESS

Since visibility over the status and location of military equipment and supplies cannot become a reality without accurate and timely documentation from shippers, we believe MTMC can make a substantial contribution to DoD's intransit visibility efforts by upgrading its ETR process.

DoD's surface clearance procedures, as detailed in DoD 4500.32R, "Military Standard Transportation and Movement Procedures (MILSTAMP)," and the Defense Traffic Management Regulation (DTMR), address the booking of container space on a particular vessel and the port's receipt of accurate and complete

MILSTAMP documentation on all overseas shipments. Both of these conditions must be met before MTMC can issue an ETR. However, the enforcement of accurate and complete documentation has gradually been relaxed to the point where DoD, specifically MTMC in its role as DoD's Ocean Cargo Clearance Authority (OCCA), no longer ensures that all shipments are properly documented before they depart the shipper's location.

One method that could be effective in correcting this shortcoming would be for MTMC, in coordination with DoD shippers, to separate the process of requesting and confirming container bookings from the process of clearing containers for movement to the POE. Although most containers are booked before the actual cargo that will be loaded into them has been identified, we see no reason to change this practice. Shippers need the ability to book containers in advance. However, shippers should not be permitted to move a container to a POE until they have provided the required documentation and received confirmation that it is sufficiently accurate and complete for the port to prepare a manifest.

One approach for improving the container clearing process would be for the port that will prepare the manifest for the container to also have responsibility for clearing it for movement to the port. This change would place clearance responsibility at the point where the manifest process occurs. When the shipping activity and port agree the container is ready to be cleared, the port would issue an ETR to the shipper. Giving OCCA to water port commanders would improve the quality of documentation because their personnel would be responsible for correcting all problems. Under current procedures, if a container arrives at a port with either inaccurate or incomplete documentation, the area command, which now serves as the OCCA, is not involved in resolving the problem, only the shipper and the port manifesting the cargo.

Since WPS is designed to support decentralized preparation of manifests, changing the IBS booking and export clearance process appears to be feasible. However, MTMC would need to assess the practicality of this proposal more closely.

If the port received and validated shipment data before issuing an ETR to the shipper, it would also be able to produce and transmit the ship's manifest on the departure date without significant difficulty. This process should dramatically reduce the amount of time required to prepare accurate and complete shipment documentation, as well as the time to correct manifests and their supplements. Vessel masters would also be given a copy of an accurate manifest shortly after vessel loading is complete.

Summary — Surface Clearance

A very high percentage of DoD shipments (reportedly as high as 40 percent) arrive at MTMC ports with no documentation, or the document is either missing data or the data are incorrect. Port personnel spend considerable time resolving those documentation problems before producing a manifest. The existing

process that is designed to prevent these types of problems is no longer effective. The proposed approach — giving container clearance authority to MTMC ports — would eliminate many of the data problems because they would have an incentive to prohibit shippers from moving containers unless they are properly documented. Accurate and timely documentation data would also serve as a foundation for an effective in-transit visibility capability.

The following chapter presents a series of implementation actions if MTMC elects to move forward with implementing either of the proposed operating concepts or adopting the suggested approach for improving shipment documentation data.

CHAPTER 4

Follow-On Actions

INTRODUCTION

This chapter presents MTMC with a plan for implementing AIT in its water port operations supporting shipments of ammunition moving in containers and unit equipment. It also details the steps that MTMC needs to take to upgrade DoD's surface clearance procedures.

CONTAINERIZED AMMUNITION SHIPMENTS

We recommend that MTMC begin by refining the proposed concept of operations for using AIT devices in its processes supporting containerized ammunition shipments. The refined concept of operations will then serve as a basis for estimating the resources required to implement the concept. The resource estimates must consider the specific requirements of individual ammunition ports in CONUS. In the interest of garnering support throughout DoD, MTMC should brief its concept of operations to senior leadership in USTRANSCOM and the Military Service's logistics offices, as well as to the Deputy Under Secretary of Defense (Logistics). MTMC should then convene a working group, with representation from major ammunition supply and shipment customers, to develop a detailed concept of operations and a business process improvement plan, project management plan, and milestone schedule. The working group should also develop an acquisition and funding strategy, perform any necessary procurement actions, and commence with implementation. A list of the major milestones is provided in Figure 4-1.

UNIT MOVEMENTS

Since MTMC does not control the segment of the unit movement business process that occurs at the unit's installation, the Military Services must agree to support its concept of integrating a robust AIT capability into the unit movement process. The Military Services must also acquire the AIT devices along with the hardware and software system required to upload and download data onto the AIT devices at origin and destination. Presently, only the Army intends to use robust AIT devices to support unit movements.

Task	Lead activity	Schedule					
		1995		1996			
		Jul	Oct	Jan	Apr	Jul	Oct
Refine concept	MTOP-CD	▬					
Develop resource estimates	MTOP-CD	▬					
Brief concept to DoD logistics leadership	MTOP-CD		▬				
Brief concept to ammunition shippers	MTOP-CD			▬			
Develop business process improvement plan	MTMC-EA/WA			▬			
Develop project management plan	MTMC-EA/WA			▬			
Develop milestone schedule	MTMC-EA/WA			▬			
Develop acquisition strategy/plan	MTOP-CD				▬		
Develop funding strategy	MTOP-CD				▬		
Accomplish procurement actions, as necessary	MTMC-EA/WA				▬▬		
Commence project development	MTMC-EA					▬▬	

Note: MTOP-CD = Assistant Deputy Chief of Staff for Operations for Future Concepts; MTMC-EA = MTMC Eastern Area.; MTMC-WA = MTMC Western Area.

Figure 4-1.
Containerized Ammunition Milestones

If MTMC desires to capitalize upon the Army's investment in AIT for unit equipment, it should brief the proposed concept of operations to the Army's Director of Transportation, Energy and Troop Support; USTRANSCOM; and the Assistant Deputy Under Secretary of Defense for Transportation Policy. If the Military Services elect to pursue a single concept, MTMC should designate a project officer to lead its efforts. The project officer's initial action should be to refine the unit movement concept of operations and then review the refined concept with the Program Manager, TC AIMS II. The next step should be to brief the refined concept of operations to Army and Marine Corps representatives and others within the joint deployment community. The objective of those briefings is to gain support for the unit movement concept of operations and solicit support for developing a joint concept of operations, business process improvement plan, project management plan, acquisition strategy and plan, funding strategy, and milestone schedule. Figure 4-2 provides a schedule for accomplishing these and other actions associated with using robust AIT devices to enhance the movement of unit equipment.

Task	Lead activity	Schedule					
		1995		1996			
		Jul	Oct	Jan	Apr	Jul	Oct
Appoint project office	MTOP-CD	▬					
Refine concept of operations	MTOP-CD	▬▬					
Coordinate concept within MTMC	MTOP-CD		▬				
Develop milestone schedule	MTOP-CD		▪				
Brief operating concept	MTOP-CD		▬				
Solicit support from Military Services	MTOP-CD		▬				
Coordinate effort with Program Manager, TC AIMS II	MTOP-CD		▬				
Develop business process improvement plan	MTMC-EA/WA		▬				
Develop project management plan	MTMC-EA/WA			▬			
Develop acquisition stragegy/plan	MTOP-CD				▬		
Develop funding strategy	MTOP-CD				▬		

Figure 4-2.
Unit Movement Milestones

SURFACE CLEARANCE PROCESS REVIEW

Upgrading DoD's surface clearance procedures should occur even if MTMC decides not to use AIT in its water port operations, primarily because accurate and timely shipment documentation data are key to DoD's Total Asset Visibility (TAV) program. As noted in Chapter 3, the proposed approach for upgrading those procedures is to separate the booking activity from traffic release. Figure 4-3 lists the steps that MTMC needs to take to reengineer the ETR process; it also provides a schedule for accomplishing each step. One of the key steps is designating a project team — comprised of headquarters, area command, and port representatives — to propose specific procedural changes that will result in accurate and timely documentation data being available to ports before shipments arrive.

SUMMARY

Although each of the proposed improvements has the potential to substantially enhance Defense transportation, we believe MTMC should give priority to upgrading DoD's surface clearance procedures because of their importance to TAV. Nonetheless, the introduction of robust AIT capability into the water port processes supporting containerized ammunition shipments and unit movements

also offers major benefits in receiving and managing the flow of ammunition and unit equipment through MTMC ports. Those benefits cannot be obtained without aggressive programs.

Task	Lead activity	Schedule					
		1995		1996			
		Jul	Oct	Jan	Apr	Jul	Oct
Appoint project team	MTOP-CD	▬					
Appoint a project officer	MTMC-EA/WA	▬					
Develop a business process improvement plan	MTMC-EA/WA			▬▬			
Develop resource estimates and milestone	MTOP-CD			▬			

Figure 4-3.
Surface Clearance Milestones

APPENDIX A

Sustainment Cargo Moving in Commercial Containers

INTRODUCTION

In Chapter 2 of this report, we concluded that attaching robust automatic identification technology (AIT) tags to commercial containers would offer few benefits to the Military Traffic Management Command (MTMC) in carrying out its water port responsibilities. We reached that conclusion after examining four AIT tagging scenarios. Our analysis of those scenarios is presented in this appendix, beginning with the scenario having the least impact on MTMC operations and proceeding to the scenario with the most impact.

Scenario 1 — MTMC and Commercial Carriers Have No Tag Placement or Interrogation Responsibility

DESCRIPTION

In this scenario, MTMC would work with shippers to improve the documentation and reporting of container content through use of better data bases and communications interfaces, and more stringent controls on export traffic releases. Commercial carriers would report movement status by container identification number, just as they do currently, with many doing so by reading the AIT devices permanently mounted on their containers. The Military Services would place a second, temporary AIT device on every container in such a way as to ensure that the device does not damage the container or interfere with the carrier's operations. The carriers would be neither responsible for reading DoD's AIT tags nor accountable for them. The Department of Defense's (DoD's) tags would be used only at shipper and consignee locations, and in contingency port operations where content identification of staged containers is important.

ANALYSIS

This scenario acknowledges the direction that commercial carrier's are taking with respect to AIT and suggests that DoD applications could be on a noninterference basis with commercial operations. It also is based on the premise that accurate shipment documentation would be transmitted directly to MTMC's Worldwide Port System (WPS). It further capitalizes upon the carrier's efforts to improve the timeliness and accuracy of container location reports through

near-real-time reporting of container locations by container number. MTMC could capitalize on the carrier industry's conservative, "license plate" AIT tag approach in the Military Sealift Command (MSC) rate guide negotiations. The objective would be to require the carriers to gradually move to real-time or near-real-time movement status reporting of receipt, lift, offload, and port departure information. This approach is the most feasible and economical because it capitalizes on AIT investments made by commercial ocean and rail carriers, demands modest improvements in carriers reporting movement status, and recognizes the most difficult part of exploiting AIT is the need to fix the problem of inadequate source data. This scenario will require some investment by MTMC for system development and communications.

An added advantage of this scenario is the cooperative position that it would offer MTMC. The Military Services, at their own discretion and cost, would have any automated data they desired on whatever device they acquired as long as they could initialize the device, read it, and maintain it. This temporary AIT mobile data base would not interfere with or be used in either the commercial seavan transportation system or MTMC normal operations. MTMC, in its role as developer and maintainer of WPS, could cooperate with the Military Services by developing a standard AIT tag support module and add hardware to WPS configurations for use in bare-based contingency port operations and container freight station (CFS) operations. The functionality added to WPS would enable the port operator to read tags on staged or frustrated containers, upload data to WPS, and produce information on the contents of containers that would be useful to port activities and material managers within a theater. The same hardware/software interface would also be used to upload and download data from tags in a retrograde operation. All parties must follow DoD AIT standards, as they are developed, to ensure compatibility and operability across all Military Services.

Scenario #2 — Third-Party Logistics by an Independent Contractor

DESCRIPTION

In this scenario, a DoD activity staffed with either government or contract support personnel would perform the task of placing correct content data on AIT tag devices. The responsible organization would read, or arrange for carriers to read, the tags at each node in the pipeline, reporting movement status as required, recovering the tags from consignees, performing maintenance on the tags, and redistributing the tags. Such a contract could be fairly open in terms of services performed. In addition to affixing AIT tags with content data on them, the third party could also offer an extensive menu of services. Those services could include preparing shipment documentation, offering a dial-up movement status information service that could include all content data the shipper wanted to convey about the shipment, submitting predefined reports to one or more DoD activities, manifesting, clearing shipments through customs, arranging physical movement of the seavan, and processing receipt documentation at the consignee.

This scenario would be labor intensive, with an unknown potential to achieve economies of scale in documenting cargo. As a "turn-key" solution, the scope of the contract could be large. The logistics task to be performed may require contract employees to be present at all vendors, depots, and transportation nodes worldwide. The shipper's documentation furnished to the contractor may only be a material purchase order or supply system material release order. The contractor would create all the content-level supply and transportation data, upload the data to a tag, and report the data at every node until the container is offloaded. Such a comprehensive contract would require the contractor to maintain a global workforce with sufficient personnel to be on-site or in the immediate vicinity of every DoD shipper, DoD vendor, military exchange shipper vendor, water port, and consignee location worldwide. Such a contract could easily become the largest contract ever managed by MTMC, well beyond all of the stevedoring services contracts combined. If MTMC continued to manifest container traffic, the quality of source documentation would probable improve.

An analysis of the costs for this concept would be difficult without a DoD-wide consensus of what services will be included. Such issues as support from and to bare bases would need a detailed study before resource estimates could be derived.

Scenario #2A — Third-Party Logistics by a Commercial Carrier

DESCRIPTION

This scenario is a variant of the above concept. In terms of impact on MTMC, a significant difference would be the elimination of an intermediary organization and the contracting activity would be MSC, rather than MTMC. In its simplest form, this concept would require commercial container carriers to affix tag devices specified by DoD to their containers prior to positioning at shipper locations. The concept could also require the carriers to inspect seavans at the sea port of embarkation (SPOE) for proper operation of the tag and compliance with MILSTAMP documentation. If the seavan is missing a tag device or the tag does not contain complete and accurate content-level details, the carrier would be required to frustrate the container and go back to the shipper for the missing information. Carriers would then be required to mount a tag device on the container, upload the data, read it when it is loaded to the ship (lift report), and transmit the tag's full MILSTAMP documentation contents to the appropriate MTMC port activity. The carrier could then read the tag at the sea port of debarkation (SPOD) and report the full MILSTAMP content-level detail to the overseas MTMC port activity. Finally, the carrier may be required to capture and download the full Military Standard Requisitioning and Issue Procedures (MILSTRIP) content-level detail to the receiving supply activity or consignee.

A fully exploited version of the carrier scenario would expand the role of the carriers to provide a turn-key container delivery service, moving outside of the

conventional documentation and manifesting methods prescribed by MILSTAMP. In such cases, the MSC rate guide could be negotiated to provide a new, single fee per container based on delivery distance, consignee location, and predominant type of cargo. As was the case for the independent contractor scenario, the turn-key service would include all shipment documentation and offer a dial-up movement status information service that could provide all content data the shipper wanted to convey about the shipment, submitting predefined reports to one or more DoD activities, manifesting, clearing shipments through customs, moving the seavan, and processing receipt documentation at the consignee.

ANALYSIS

The primary differences between this and the previous scenario is eliminating the third-party organization and MSC managing the services and contracts based on rate agreement negotiations. Some U.S. carriers already offer, either directly or through a subsidiary company, similar door-to-door services. The carriers have the personnel and agent infrastructure already in place to compete in certain markets and would probably compete within those trade routes rather than try to establish a worldwide presence. Thus, this scenario would probably result in a DoD customer having to accomplish information retrieval from more than one carrier. Not all carriers have representation in all parts of the world, therefore, many subcontractors could be involved, especially in "hard lift areas." If the second version of this scenario were adopted with carriers taking direct bookings, manifesting and customs clearing all shipments on a single rate guide container fee, MTMC would have reduced responsibilities for commercial container movements. Since the container workload, contents, and cube utilization could be audited by the government through shipper and carrier records, MTMC's role in validating carrier billing data would be reduced. The business transaction would then be primarily between the shipper, carrier, and finance office.

The cost analysis of this scenario may not be as difficult to perform as for the previous scenario. One aspect of this scenario, transition from and to a bare-base contingency operation, would need a more detailed study before accurate resource estimates could be estimated. This scenario could be very costly especially if carriers assumed the role of documenting all the containers they move.

Scenario #3 — Shared AIT Responsibilities

DESCRIPTION

In this scenario, the Defense Logistics Agency (DLA) and the military exchange depots, as well as their vendors, would be required to load data to tags and then affix them to containers stuffed at their facility. Commercial carriers would read the tag data and transceive the information to the manifesting MTMC port activity. The cost of equipment and communications needed to

interrogate tag at all commercial container port facilities and transfer the data to the MTMC port would be recouped by carriers through higher container rate fees. MTMC would perform near real-time monitoring of tags being read by the carriers and if the content data was incorrect or missing, the carrier would be notified to frustrate the shipment until MTMC could obtain the proper data, upload it on a tag, and affix the new tag to the van. The tags would be removed from containers by the final consignee and shipped back to the activities that stuffed them. All tags will have a return address label on them.

ANALYSIS

Carriers are positioning themselves for a different tag technology and database concept. If DoD pursued this scenario, it would need to negotiate compensation for the carrier industry for duplicating their tag reading process with a different system. The additional AIT reader and upload devices, communications installation, and maintenance costs for carriers would need to be included in new rate structures. Aside from the initial investment cost to DoD for obtaining AIT tags and the equipment needed for uploading and downloading tag data, the carrier's daily interrogation and data transmission efforts would be recurring costs for every container shipped.

In the case of direct vendor shipments, DLA or service contract offices and exchange system central export clearance offices submit Export Traffic Release Request (ETRR) and transportation control and movement document (TCMD) data direct to the MTMC area command at time of booking, well in advance of the actual shipment. The vendor loading the container does not prepare the military shipment documentation. Under this scenario, modifications to contracts would be required for making all vendors accomplish their own MILSTRIP/MILSTAMP documentation at the location where the container is loaded and then upload the data to the AIT device. An alternative would be to develop and implement a method of having central contracting offices produce the shipper's documentation and electronically position these data with thousands of vendors. This option, however, would require the government to provide all or some subset of vendors with a standard automated system to upload and read the data to an AIT tag device. It would also constitute a significant change in process and increase the cost of the acquisition. Additionally, hundreds of vendors are added and dropped as government supply sources change every month, thus, keeping up with equipment distribution and training would be a challenge.

As noted in the body of this report, approximately 50 percent of all commercial container shipments are exchange system resale items, not sustainment. Both the Army and Air Force, and Navy exchanges are reasonably satisfied with their data base in-transit visibility information. The cost of tagging and monitoring these shipments represents one-half of the total AIT cost, but could not be justified as critical to the warfighter's operation nor required by the exchange system. We believe the economics involved with this segment of container shipments would place a significant amount of pressure on advocates of AIT

applications to change this scenario to exclude tagging exchange system vans. This exclusion, however, would be easier to direct than to implement. Within the commercial environments of vendors and carriers, there is not an easy way to identify the military exchange vans from other DoD-sponsored shipments and exclude them from the tagging and tag reading effort. Most vendors could recognize the difference of those vans and shipments based on who issued the purchase order, but carriers would have more difficulty in making the distinction. Having an intermingled mix of DoD-sponsored commercial vans, some with tags others without tags, would greatly complicate implementing this scenario.

Since the late sixties, the DoD has adopted a general philosophy of not delaying the movement of loaded containers if they lack the appropriate documentation. To do so would be considered tantamount to imposing unreasonable bureaucratic requirements on an otherwise manageable problem. This scenario, would reverse this long-standing philosophy. Frustrating containers at the SPOE would initially result in excessive container charges and increases to time in transit. Agreement must be reached on who would pay the cost of frustrating and researching improperly tagged containers and a method of record keeping, accounting, and billing would need to be implemented.

Although this scenario would expose shippers that do not document their containers in accordance with MILSTAMP, it would also bring pressure on MTMC port activities to clear frustrated containers more quickly. MTMC currently has to research documentation after the fact and does so with available manpower as time permits. Today, the consequence of not rapidly resolving a documentation problem include issuing a late ocean cargo manifest or making a subsequent correction to a previously issued manifest. In this scenario, container detention charges would most likely force MTMC to focus more manpower and automated assistance than it does in correcting today's manifests.

Because of limited facility storage capacities, many carriers dray containers into port either the evening before or day of a ship sailing. With the exception of contingencies, special operations, and ship loading from military ports, MTMC is manned for single shift operations. For this scenario to be fully successful, MTMC would need to be capable of responding to carriers that operate more than one daily shift and process containers on weekends.

In terms of impact on current systems, MTMC would need to modify WPS and local communications networks to accept AIT tag data on a real-time basis, 24 hours a day, 7 days per week. Systems development and integration work would be needed to pull consolidated MILSTAMP container record data from the WPS data base and upload AIT tag devices at CFS operations.

Finally, in view of the cost of data-rich RF AIT devices as described in the Army's Operational Requirements Document, 26 August 1994, the tags would most likely have to be managed, maintained, and redistributed for reuse. In this scenario, the consignee would be the recovery activity. It is conceivable, however, that theater material managers would want a central in-theater activity, such as DLA or MTMC, to assume the responsibility for AIT maintenance and a

return-to-shipper distribution program. However, if MTMC was assigned that responsibility, it would need additional resources.

Scenario #4 — MTMC-Operated Seavan Clearing Points

DESCRIPTION

This scenario would require MTMC to assume responsibility for operating a seavan AIT data capture point at a designated facility near every commercial SPOE and SPOD. All DoD-sponsored seavans would need to be routed through these points for capturing port arrival data, as well as the equivalent of ATCMD data, if the water port activity did not already have such information. The commercial carrier would not be responsible for reading the DoD tag in this scenario.

This scenario is based on the premise that AIT tag devices would be mounted on all commercial containers and shippers would upload the tag with full MILSTRIP and MILSTAMP container and content data. The MSC rate guide would be written to require all DoD-sponsored containers from all carriers be routed through a number of MTMC-owned or contract facilities that would interrogate the container AIT device, evaluate the adequacy of the data, send a SPOE arrival transaction to WPS, and direct the container to the commercial carrier's facility at the SPOE. Military exchange system shipments would be reported, by keyboard entry, as they arrive at the SPOE, but they would not require an AIT tag. If no tag is affixed to a sustainment container or if the data are incorrect or not readable, MTMC personnel would frustrate the shipment, do the necessary research with the shipper, mount a tag on the van, upload the data on a tag, and re-enter the seavan into the shipment process. Port departure reporting would be required from carriers in near real-time, with carriers reading their AIT tags. When the container arrives at the SPOD, container offload from the vessel would be reported to the MTMC port by the carriers reading their tag. The container would then be routed through a MTMC clearing point where the DoD AIT device would be interrogated, SPOD port departure updates made to WPS, and if the container record and contents were not on file, the full MILSTAMP data would be uploaded from the DoD AIT tag device to WPS. The consignee would then be tasked with tag retrieval and redistribution back to the shipper.

ANALYSIS

MTMC clearing point operations do not exist today and would have to be created in the immediate vicinity of every commercial port that DoD would use during both peacetime and wartime. Containers entering the carrier's facility by rail would challenge the economic feasibility of this scenario because of their differences in operation. As an example, the scenario would have to recognize the potential additional expense of having MTMC set up data capture points in multiple locations within a general port area, such as Seattle-Tacoma, Southern California, and Rotterdam. The operation could be run with government employees

or contractors. Given MTMC's current manpower ceiling strengths and the general trend toward contractor reliance within DoD today, contractual arrangements would be the most likely source of labor. A deployable capability or agreement with the regional Commanders-in-Chief would need to be developed to set up clearing points in contingency operations. All clearing points, CONUS and OCONUS, would need container storage space for frustrated containers that do not have AIT devices, or the devices are inoperative or missing data. The scenario does not address mechanisms for correcting current source data problems, thus, at least initially, large numbers of frustrated containers could be anticipated. Additional commercial carrier inland drayage cost would be incurred to cover the "extra step" of routing containers through a central location as well as the return trip to pick-up containers frustrated by the MTMC clearing point. Frustrated containers would incur container detention charges while they are waiting for the documentation to be researched. MTMC would need to develop and implement a systems integration project designed to enable the software from WPS to interface with the software selected for the AIT data capture system. Communications linkage would have to be set up between each clearing point and the WPS serving that port area.

We believe the recurring cost of injecting additional physical nodes, through which each seavan must be routed, would render this solution infeasible in terms of transit time and expense. The creation of a new organization within MTMC port activities and the cost associated with the clearing point operations could be perceived by both the transportation industry and congressional oversight offices as a bureaucratic solution rather than a necessity.

While this scenario is not considered feasible on a large scale throughout the world, MTMC might want to consider development of a deployable capability to operate two to four clearing points in a small-scale contingency requiring support through a designated SPOE and SPOD.

CONCLUSION

Using the above scenario as the framework for our analysis, we conclude that there is no advantage to be gained by reading a DoD AIT tag on containers moving through commercial facilities, which applies to more than 90 percent of the total DoD commercial container traffic. If MTMC reads the tags at the POE or POD, it would be doing so for the purpose of capturing accurate and complete documentation with which to manifest the ship and to provide others with information about commercial container shipments. However, if the shipper can upload shipment information onto an AIT tag, it can also follow standard procedures that require transmitting that same information to MTMC electronically for input into WPS. Conversely, if the data are not complete and accurate at the time it is uploaded to an AIT tag at origin, then the data have no value to either MTMC or the commercial carriers at the POE or POD. Thus, we do not recommend MTMC attempt to read DoD AIT tags or have carriers read them at the POE and POD as a routine business practice.

Appendix B

Available Technologies

This appendix provides an overview of automatic identification technology (AIT).

Characteristics

The following major categories of characteristics are important when discussing different AITs:

◆ *Capability.* The technology's capability includes the environment in which the tag operates and how reading and writing information to the tag is accomplished.

◆ *Capacity.* The capacity covers the amount of information that can be stored on the tag.

◆ *Cost.* The cost includes the cost of the tag and the other costs associated with implementing the tagging technology.
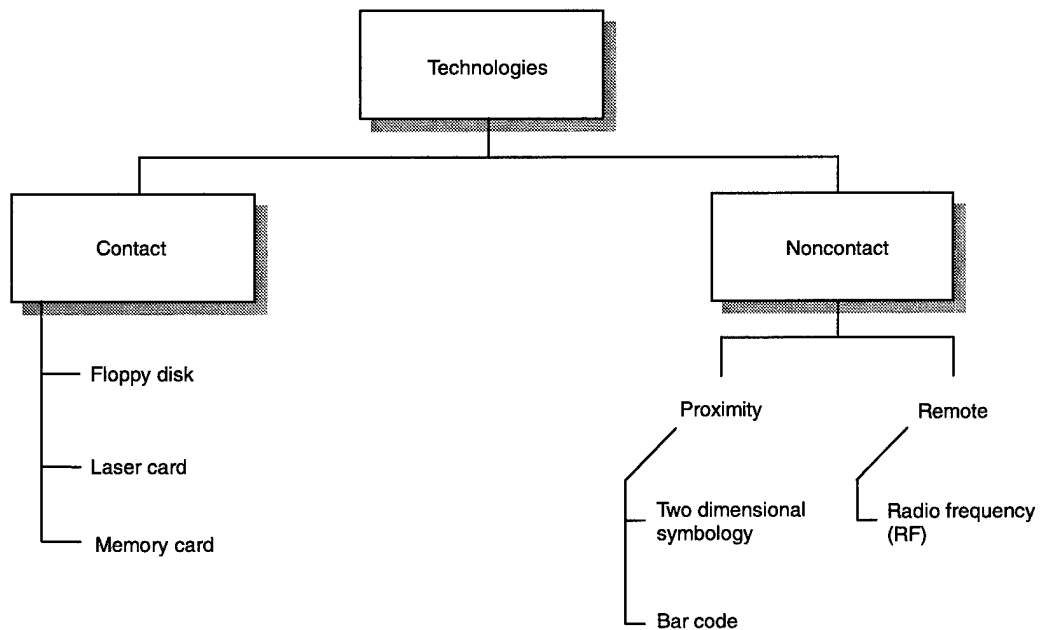
Technologies

The technologies reviewed as candidate container tags are shown in Figure B-1. Each tag can store moderate to large amounts of information. The bar code is included because of the new high density variations that permit more information storage than the common linear bar code. Each of the technologies is discussed in detail below.

Technology Description — Contact

Floppy Disks

The floppy disk is a common means of data storage and exchange on personal computers (PCs). The floppy disk is inserted into a floppy disk drive for reading and writing. The floppy disk could be placed in an envelope or pouch

Figure B-1.
Available Technologies

on the outside of a container. The common characteristics of the floppy disk are as follows:

◆ Capability

  ► Typical storage temperature range is 50° – 125° F for the 5¼″ disk

  ► Typical storage temperature range is 40° – 130° F for the 3½″ disk

  ► Data format must be specified.

◆ Capacity

  ► 1.44 M (megabytes) for 3½″ IBM PC-compatible disks

  ► 1.2 M for 5¼″ for IBM PC-compatible disks

  ► 1.40 M for 3½″ MacIntosh PC-compatible disks.

◆ Cost

  ► $0.50 for each floppy

  ► $200 for a floppy disk drive.

Laser cards use optical technology. The card is inserted into a card reader for reading and writing, similar in user operation to the floppy drive. Again, the laser card could be placed in an envelope or pouch on the container. The characteristics of laser cards are as follows:

- ◆ Capability

  - ► Write once, read many (WORM) times

  - ► Nonerasable media provides audit trail

  - ► Survives harsh environments

  - ► Not affected by electromagnetic energy

  - ► Reader/writer may not survive the same environment as cards.

- ◆ Capacity

  - ► Stores 2.86 M of data with error correction.

- ◆ Cost

  - ► $4.00 for each laser card

  - ► $4,000 for a laser card reader/writer.

MEMORY CARDS

The memory card reviewed follows the Personal Computer Memory Card International Association (PCMCIA) standard. This standard is finding wide use among the laptop and notebook classes of computers. The PCMCIA standard is also used for other devices such as modems. The memory card plugs into a slot on the outside of the computer and makes contact with the connector. It can then be read from or written to. Similar to the floppy, it could be placed in an envelope or pouch on the outside of the container. The common characteristics of PCMCIA memory cards are as follows:

- ◆ Capability

  - ► 68 pin connector

  - ► Size and shape of credit card, which is ¼ inch thick for type II

  - ► Not affected by electromagnetic energy.

- ◆ Capacity

  - ▶ 8 K to 512 K characters with battery-backed memory

  - ▶ 1 M to 16 M characters with nonbattery-backed up memory.

- ◆ Cost

  - ▶ $30 to $190 for the 8 K to 512 K character card

  - ▶ $360 for a 1 M character card

  - ▶ $2,250 for a reader/writer.

Technology Description — Noncontact

BAR CODING

Linear

The linear bar code uses variation in widths of light and dark bars to record information. It is printed on a label that is read by a scanner. Linear bar codes share the following characteristics:

- ◆ Capability

  - ▶ Scanned at a distance

  - ▶ Can be printed on paper, vinyl, polyester, Keflar, or aluminum.

- ◆ Capacity

  - ▶ 9.4 to 17.8 characters per inch.

- ◆ Cost

  - ▶ $0.20 for a label

  - ▶ $2,200 for a scanner/decoder

  - ▶ $500 for a cradle

  - ▶ $3,000 for a laser printer.

A high-density or two-dimensional bar code carries more information than the linear bar code. It carriers the additional information by encoding information in both vertical and horizontal directions. The high-density bar code is handled in the same way as the liner bar code. It is printed to a label, which can be repeatedly read by a scanner.

Common characteristics of high-density bar codes include the following:

◆ Capability

 ► Read in any orientation

 ► Error detection and correction

 ► Scanners/decoders used in downward directions are compatible with linear bar codes

 ► Supports data encryption

 ► Label can be partially destroyed and still readable

 ► Can be printed on paper, vinyl, polyester, Keflar, or aluminum

 ► Not susceptible to electromagnetic or electrostatic interference.

◆ Capacity

 ► Maximum of 2 K to 5 K characters per symbol.

◆ Cost

 ► $0.20 for a label

 ► $2,700 for a scanner/decoder

 ► $3,000 for a laser printer

 ► $500 for a cradle.

The U.S. Army's project manager for ammunition logistics tested the Portable Data File 417 (PDF-417) and Datamatrix codes. The project manager recommended the Army use the PDF-417 when there is a need for enhanced bar-code applications or forms automation. Datamatrix was recommended for use because of its capability to read from any angle, tolerate low contrast between the code and substrate, and nonreliance on precise edge detection. Only the PDF-417 readers are commercially available at this time. A 6 July 1995, Deputy Under Secretary of Defense (Logistics) memorandum designated PDF-417 as the

Department of Defense Standard Two-Dimensional Bar Code Symbology for Defense Logistics Applications. Annex 1 summarizes the characteristics of the PDF-417 high-density bar code.

REMOTE

RF Tags

RF tags come in a wide range of shapes, sizes, and capabilities, serving a broad spectrum of applications. The focus here is on those tags that can carry moderate (2 kbytes and up) amounts of information.

A reader is used to exchange information with the tag by generating and receiving RF signals. The general characteristics of RF tags are as follows:

◆ Capability

► Less manpower for presenting the tag to reader.

► Works in inhospitable environment.

► RF signal can penetrate nonconductive materials, such as asphalt, cement, wood, and plastic.

► Some frequencies are prohibited by various countries.

► Power of the RF signal may be of concern when used around ammunition.

► Active RF tags are powered by battery, although lower power signals can be used; they also provide longer reading range.

► Battery life for active tags is relatively short.

► Passive RF tags are powered by the reader/writer, with the incoming signal changed and reflected back (reflective backscatter).

► Nonline of sight read capability.

► Sensor and alarm capabilities.

► Electronic signature — emits signal.

► Avionics — navigation interference.

► Can be either omnidirectional or focused.

► Typical data transfer rates are 8 K – 1 M.

- ► Typical operating temp range -40° to 185° F.

- ◆ Capacity

  - ► Up to 128 Kbytes.

- ◆ Cost

  - ► $40 for a 8 Kbytes tag.

  - ► $70 for a 64 Kbytes tag.

  - ► $190 for a 128 Kbytes tag.

  - ► $2,000 to $4,000 for readers.

Portable Data File 417 (PDF-417)

Portable Data File 417 (PDF-417)

This annex summarizes the characteristics of the Portable Data File 417 (PDF-417) high-density bar code. The information in brackets at the conclusion of the description is the source of description.

Characteristic	Description
Data storage	The maximum number of ASCII characters per symbol is 1,850. The maximum number of binary bytes is 1,108 per symbol and the maximum number of numeric digits is 2,725 per symbol. [Symbol]
Read rate	The read rate is a function of symbol size. Typical read times range from less than 1 second to 6 seconds. [Idaho] In overhead sortation testing, PDF-417 scanned at up to 3 symbols/per second. [PGH]
Concatenation	899,999 symbols can be concatenated. [ANSI]
Redundancy	There are nine levels of Reed-Solomon error correction. Level 0 is just error detection. Levels 1 through 8 add increasing levels of error correction at the expense of greater overhead and less information capacity. [Symbol]
Self checking	Yes
Scanning distance	The scanning distance is a function of the minimum element width in the symbol. The distance ranges from 1.25 to 15.00 inches for the laser scanner. [ANSI]
Depth of field	PDF-417 meets 4 – 6 inch depth of field. [Army]
Symbol size	Based on today's printing technology, 500 ASCII characters or 360 binary bytes can be encoded per square inch. The maximum size is 5.9 inches wide by 2.3 inches high for the PDF-1000 scanner. [Symbol]
Scanable on objects that are not flat	Testing showed that symbols with up to 11 data code words per row and having a cell size of 10 millimeters or greater can be placed on diameters of at least 4.5 inches and be read with good reliability. [Idaho]
Scanable under adverse environmental conditions	Third-generation copies and first-generation fax symbols with cell size 10, security level 5 with 100 and 250 characters passed. [Idaho] The scanner was unable to decode information at anything above an optical density of 0.25 in the smoke-filled obstruction test. [Idaho] In corruption testing, symbols with a security level 8 passed at 100 percent. Symbols with security level 5 had a more difficult time. [Idaho]

Note: ASCII = American Standard Code for Information Interchange; ASC = Accredited Standards Committee; fax = facsimile; AIM = Automated Identification Manufacturers; USS = United States Standard; MIL-STD = Military Standard.

Characteristic	Description
Scanable under adverse orientations	The skew angle defined as the angle between a line normal to the surface and the line of sight to the scanner is specified for the symbol reader at 15. The rotational tolerance for the laser scanner is specified at 3. Imaging systems are omnidirectional. [Symbol] The ability to successfully scan is a function of the security level used. The Idaho National Engineering Laboratory recommends a minimum security level of 5 to ensure readability.
Availability of scanners	PDF-417 can be scanned with linear laser, raster laser, or linear charge-coupled devices. Hand-held and over-the-belt scanners are available. [ANSI]
Durability	Symbols with security level 8 passed with 20 percent cell damage at 100 percent. [Idaho] Scanner operates after 4 foot drop to concrete. Windblown dust and rain resistant. [Symbol]
Compatibility	Published AIM USS specification.
Auto-discrimination	Scanners (decoder) can automatically discriminate between PDF-417 and two-dimensional and one-dimensional bar codes. [Symbol]
Character set	PDF-417 supports ASCII 256, numeric, and binary data.
Proven capability	Tested at University of Pittsburgh, Ohio University, Idaho National Engineering Laboratory, and DoD. In use at more than 500 sites. [ANSI]
Encode binary	Can encode binary data.

Note: ASCII = American Standard Code for Information Interchange; ASC = Accredited Standards Committee; fax = facsimile; AIM = Automated Identification Manufacturers; USS = United States Standard; MIL-STD = Military Standard.

Reference

Symbol = Symbol Technologies, Inc.
Idaho = Idaho National Engineering Laboratory
PGH = University of Pittsburgh
ANSI = American National Standards Institute

APPENDIX C

System Descriptions

This appendix provides a brief description of automated systems that DoD Components use in supporting the movements of materiel and personnel. The developing Component is in brackets.

AMS = Automated Manifest System [DLA]

This system produces a laser card containing line-item content for all items loaded inside a seavan container.

ASPUR = Automated System for Processing Unit Requirements [MTMC]

Used in the sea deployment process, ASPUR receives unit movement requirements from Transportation Coordinator's Automated Command and Control Information System (TC ACCIS), processes those requirements, sends the movement release to the installation transportation office, and creates advance Transportation Control and Movement Documents (TCMDs) for the Terminal Management System (TERMS). It is a legacy system that will eventually be replaced by the Integrated Booking System (IBS).

CAEMS = Computer-Aided Embarkation Management System [USMC]

Assists Marine Corps personnel in planning, documenting, and executing amphibious, Marine Prepositioned Force, and commercial load plans. It supports tactical and administrative loading and provides advanced artificial intelligence capabilities to assist planners in making accurate and efficient stowage decisions.

CFM = CONUS Freight Management system [MTMC]

Provides support to DoD transportation processing and planning through interfaces with Defense transportation and commercial transportation systems. It automates shipment planning and document preparation. Through the use of electronic data interchange techniques, it exchanges shipment information with users from transportation offices, carriers, and the Defense Finance and Accounting Service.

CMOS = Cargo Movement Operations System [USAF]

The Air Force's Transportation Coordinator's Automated Information for Movement System (TC AIMS) that automates base-level cargo movement processes and provides transportation movement officers with current unit movement information.

CODES = Computerized Deployment System [MTMC]

A personal computer-based automated tool used to assist vessel stowage planners in developing and optimizing stow plans.

DAMMS-R = Department of the Army Movements Management System — Redesigned [USA]

Provides transportation information to movements managers, highway regulators, and mode operators. It consists of seven interrelated subsystems: shipment management, movement control team operations, mode operations, addressing, highway regulation, convoy planning, and movement programming.

DASPS-E = Department of Army Standard Port System-Enhanced [USA]

Records cargo arrival, staging, and outloading information for OCONUS ports. It will be replaced by the Worldwide Port System (WPS).

DDN = Defense Data Network [DoD]

This network is DoD's primary communications network.

DSS = Distribution Standard System [DLA]

The Corporate Information Management (CIM) migration system that will replace many existing distribution legacy systems. Those legacy systems include DLA's Defense Warehousing and Shipping Procedures (DWASP) and the Army's Supply Depot System (SDS). It is currently being developed and fielded.

DTTS = Defense Transportation Tracking System [DoD/USN/MTMC]

Monitors all intra-CONUS arms, ammunition, and explosives shipments moving by truck. It performs this task using a commercial satellite tracking surveillance service, which provides hourly truck location reports, in-transit truck status changes, and emergency situation notifications.

DWASP = Defense Warehousing and Shipping Procedures [DLA]

Provides automated processing and documenting capability for line items from receipt of material at depots through packing and shipping. It will be replaced by DSS.

ETADS = Enhanced Transportation Automated Data System [USAF]

An on-line, integrated system that assists in managing and controlling Air Force Materiel Command CONUS transportation systems, monitors the movement of Air Force cargo overseas, and manages Air Force transportation funds.

GTN = Global Transportation Network [USTRANSCOM]

Provides USTRANSCOM with the integrated transportation data necessary to accomplish transportation planning, command and control, patient movement, and in-transit visibility of units, passengers, and cargo during peace and war.

IBS = Integrated Booking System [MTMC]

A new traffic management system at MTMC area commands that will register cargo for sealift, provide schedules for unit arrival at ports, and issue port calls to units. It will include the functionality of the Military Export Traffic System II (METS II) and ASPUR, and have a direct interface with the CFM system.

ICODES = Integrated Computerized Deployment System [MTMC]

This is an automated stow planning system under development; it is intended to replace CODES.

JOPES = Joint Operations Planning and Execution System [JCS]

The foundation of DoD's conventional command and control system. It is comprised of policies, procedures, and reporting systems supported by automation. It is used to monitor, plan, and execute mobilization, deployment, employment, and sustainment activities in peace, exercises, crises, and war.

LIF = Logistics Intelligence File [USA]

Records Army MILSTRIP transactions placed at the wholesale resupply level and MILSTAMP transactions for transportation from origin to CONUS destination, or from port of embarkation to port of debarkation.

LOGAIS = Logistics Automated Information System [USMC]

Consists of a family of Marine Corps planning, deployment, and redeployment systems that help to bridge the gap between JOPES and other systems.

MAGTF II = Marine Air Ground Task Force War Planning System II [USMC]

A microcomputer-based planning system that supports a wide variety of high-intensity operational requirements. It accelerates the development, sourcing, analysis, and refinement of plans resulting in executable JOPES Time-Phased Force Deployment Data Bases.

MDSS II = Marine Air Ground Task Force Deployment Support System II [USMC]

Aids in planning for and supporting rapid military deployments anywhere in the world. It builds and maintains a data base of force and equipment data for various MAGTF configurations.

METS II = Military Export Traffic System II [MTMC]

Provides schedules for units arriving at ports and issues port calls to the units. It supports the booking of all surface cargo and is the current traffic management system at MTMC area commands. It will be replaced by IBS.

SC&D = Stock Control and Distribution [USAF]

Controls storage, allocation, and movement of Air Force logistics center inventories by processing requisitions and reporting on status. It provides asset visibility, timely items status to customers, and on-time issue and shipment actions. It will be replaced by DSS.

SDS = Standard Depot System [USA]

Receives data from depot supply and maintenance packaging preservation centers, warehouse workers, managers, inventory clerks, shippers, planners, transportation personnel, item managers, and finance officers on all material stored, maintained, processed, shipped, or handled at an Army depot. It supports day-to-day depot operations and management. It will be replaced by DSS.

STRADS = Strategic Deployment System [MTMC]

Enables MTMC to rapidly retrieve, process, analyze, and monitor data associated with unit deployments and mobilizations. Using JOPES data, it assists users in determining the feasibility of deployment plans, provides force closure and surface modes, and evaluates installation outloading and port throughput capabilities. When fully operational, it will be MTMC's secure command and control system, providing movement and ocean terminal information to permit worldwide monitoring.

SPAN = Sunny Point Automated Network [MTMC]

SPAN is a local unique network and data base operating at the MTMC's 1303rd Major Port Command in Sunny Point, North Carolina. It is used by the port to capture, store, and retrieve various data related to ammunition shipments that are not needed by other MTMC water ports and are not included in MTMC's TERMS or TSM system.

TC-ACCIS = Transportation Coordinator Automated Command and Control Information System [USA]

The Army's version of TC AIMS that is used to plan and execute unit deployments and redeployments worldwide, communicate data to the Forces Command for updating the JOPES, and communicate data to MTMC for port operations and load planning. It generates air load plans, air cargo manifests, unit movement data, convoy march tables and clearance requests, rail-load plans, bills of lading, and bar-code labels.

TC AIMS = Transportation Coordinator's Automated Information Management System [USA/USMC/USAF]

A family of systems that automates the planning, organizing, coordinating, and controlling of unit-related deployment activities supporting the overall deployment process. It permits transportation offices to maintain an automated data base of current unit movement data. TC AIMS is a generic term for TC-ACCIS, LOGAIS/TC AIMS, and CMOS.

TERMS = Terminal Management System [MTMC]

Records cargo data for surface movements at MTMC area commands. It also facilitates cargo receipt, staging, and planning at ports and generates the ship manifest upon completion of loading. This system will be replaced by the WPS.

TSM = Terminal Support Module [MTMC]

Functions as a minicomputer-based terminal management and cargo documentation system. It uses LOGMARS technology for automated data capture. It will be replaced by WPS.

WPS = Worldwide Port System [MTMC]

A new system being fielded that will function as the port operating system for military ocean terminals, Navy port activities, Army transportation terminal units, and automated cargo documentation detachments. The standard automated system of hardware and software developed to document cargo through a port, account for and track its movement, provide management information to terminal and regional commanders, and to feed in-transit visibility information to other DoD systems. It will replace TERMS and DASPS-E.

APPENDIX D

Glossary of Terms and Acronyms

This appendix defines some of the terms and acronyms used in this report.

Army and Air Force Exchange System (AAFES): One of two U.S. military non-appropriated fund retail sales exchange activities.

ATCMD: Advance Transportation Control and Movement Document

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 devices, magnetic stripes, smart cards, and optical laser cards. In Department of Defense (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.

Containerized Ammunition Distribution System (CADS): A Department of the Army program consisting of special DoD-owned milvans, chassis, materials handling equipment, and transportation services for moving DoD ammunition. The purpose of the program is to promote increased containerization of ammunition shipments.

Cargo booking: The assignment of cargo to a specific vessel for delivery to a particular destination.

Cargo staging: The placement of cargo in assigned areas to facilitate vessel loading or port clearance, considering warehouse and open storage areas, nature of cargo, consignee, and physical security.

Common-user water port: Water port and terminal services provided to two or more Military Services or Defense agencies and, as authorized, for non-DoD agencies on a common use, fee-for-service basis.

Computer clipboard: A generic term used to refer to small, hand-held electronic devices that have been designed to perform as an automated clipboard. The operator writes on the clipboard and the device translates and stores the writing in electronic character format readable by computer programs. The stored data on the computer clipboard can then be uploaded to a larger computer such as a personal computer.

CONUS: Continental United States (excludes Alaska and Hawaii).

Container consolidation point (CCP): A Defense Logistics Agency (DLA) activity designated to receive sustainment cargo and consolidate shipments into seavan containers destined to one or more drop-off points.

Container content-level detail: As used in this report, this term refers to describing line items within a seavan container down to individual MILSTRIP requisition, individual DoD stock item number, and lowest level MILSTAMP shipment unit number. Full line-item detail refers to providing a complete description, in accordance with MILSTAMP, MILSTRIP, and supply catalog descriptions.

Container freight station (CFS): A container consolidation operation managed by Military Traffic Management Command (MTMC) water port activities.

Container identification number: As used in this report, this term implies both the container owner's four character abbreviation and the eight character seavan number.

Contract supervision: Monitoring the performance of the contractor to assure that the elements of the performance work statement are met using performance indicators and standards.

Contract requirements: Mission needs that can be accomplished by contracting and form the basis for the performance work statements in stevedoring and related terminal services contracts.

Contractor pay codes: A system of alphanumeric codes used in MTMC's automated systems to indicate the type of contractual services that was performed in a stevedore contractor's cargo operations.

Customs clearance: The actions taken with sovereign nation officials to allow U.S. cargo to enter a country.

DD Form 788 (Private Vehicle Shipping Document for Automobile): A form used to receive, transfer, and release a service member's or DoD employee's privately owned vehicle. The owner and service provider jointly inspect the vehicle using this form to record visual damage and conditions noted during the inspection. This document becomes the basis for filing damage claims when the member's or employee's vehicle is delivered.

DD Form 1085 data: Data required by the Defense Traffic Management Regulation to request CONUS transportation for unit movements. These data contain such information as the number of rail cars and passenger buses needed, date and place the movement is to commence, and latest acceptable arrival date at the CONUS destination.

Deployment: The relocation of forces to areas of operation.

Destination: The location to which units, materiel, or individuals are traveling.

DLA: Defense Logistics Agency.

Electronic data interchange (EDI): The computer-to-computer exchange of data from common business documents using standard data formats.

Export traffic release (ETR): A transactional process included in the MILSTAMP regulation that, when issued by the air or water clearance authorities, signifies that cargo booking arrangements have been confirmed and all shipment documentation is complete and accurate. Receipt of the ETR by a shipper signifies approval to start transporting the items overseas.

Fixed port: A water terminal where deep-draft vessels come alongside for berthing and discharge directly onto a wharf, pier, or quay. Fixed ports are characterized by a high degree of sophistication in facilities, equipment, and supporting organizations to handle large volumes of equipment and containerized cargo. Synonymous with the term mature port.

FORSCOM: U.S. Army Forces Command.

Frustrated shipment: A shipment that has been temporarily halted from further movement waiting for a problem to be corrected of disposition instructions.

International Maritime Satellite (INMARSAT): A system for navigating and positioning that can be accessed using commercially available equipment for communications from remote locations.

In-transit visibility (ITV): The ability to track the identity, status, and location of DoD unit and non-unit cargo (excluding bulk petroleum, oils, and lubricants); passengers; medical patients; and personal property from origin to the consignee or destination during peace, contingencies, and war.

Lift transaction: A document that signifies a particular piece of equipment, material, or container has been loaded aboard a vessel.

Material release order (MRO): A MILSTRIP transaction that describes the item and quantity of supply being issued from stock.

Military Sealift Command (MSC) rate guide: Also referred to as the MSC Master Tariff Agreement. A contractual agreement negotiated by MSC with all interested commercial carriers, it specifies the services to be provided and the carrier's rates submitted for each type of service and/or route. The negotiations are conducted and rates published semiannually.

Military Standard Requisition and Issue Procedures (MILSTRIP): Uniform procedures, codes, formats, forms, and time standards that control the interchange of logistics information relating to requisitioning, supply advice, supply status, material issues and receipts, and material return processes.

Military Standard Transportation and Movement Procedures (MILSTAMP): Standard data elements, codes, formats, documents, forms, rules, methods, and procedures that DoD Components and other Federal agencies use in the transportation and movement of materiel to, within, and beyond the Defense Transportation System.

Movement control: The planning, routing, scheduling, and control of personnel and freight movements over lines of communication. It includes the reception and onward movement of personnel, equipment, and supplies.

Ocean Cargo Clearance Authority (OCCA): A MTMC management element that performs surface traffic management and contract administration functions for military traffic moving via surface intermodal transportation. It books cargo to commercial/government ships and administers ocean carrier agreements and contracts. In coordination with theater Commanders-in-Chief, it provides surface traffic management for cargo shipped through military and commercial ocean terminals worldwide.

Ocean cargo manifest: A detailed listing of cargo carried aboard a ship's voyage.

OCONUS: Outside of the Continental United States.

Origin: The location from which personnel or materiel commence movement to a destination.

Overwriting zeros: As used in this report, this term refers to a method of erasing or nullifying existing data on an AIT device by recording nonsignificant data such as all zeros or all ones in the same physical space that is occupied by the data to be erased.

PCS: Permanent change of station.

Port selection: Designation of one or more sites for the receipt of unit and sustainment cargo based on a theater-level geophysical study of available ports, beaches, and supporting logistical networks.

Port clearance: Clearing of cargo from a water terminal and/or the beach on which it is located. Ideally, cargo is discharged directly from ship to clearance transport.

Port infrastructure: The facilities, equipment, and port-support activities that determine a water port's capability to load or discharge vessels.

Prelodge: The term prelodge refers to a process where a commercial carrier pre-announces an intent to deliver a shipment to a MTMC sea port of debarkation (SPOD). The process is used to ensure that the SPOD is ready to handle the shipment when it arrives, has the necessary paperwork prepared, and knows where to initially direct the carrier for offload.

Rail spur: A short length of rail track that is connected to a main railway track. Rail spurs are used primarily for temporary placement of rail cars until they are ready to be moved, loaded, or offloaded.

Report of shipment: This term refers to a disciplined, formatted transaction contained in MILSTAMP that may be used to notify consignees, ports of embarkation, and ports of debarkation of impending shipments. It may be used for any type of shipment, but is mandatory for ammunition shipments.

Redeployment: The process of evacuating, moving, or returning units, non-unit cargo, and non-unit personnel from a theater of operations to another theater of operations.

Retrograde: Non-unit cargo and personnel evacuated from a theater of operations to CONUS.

SAVI RF tag: A proprietary type of radio frequency (RF) AIT device developed and sold by the SAVI Corporation. This type of tag, which has been acquired by the Department of the Army, has been used in various deployment test and proof of concept demonstrations.

Sea port of debarkation (SPOD): A station that serves as an authorized port to process and clear aircraft, ships, and traffic for entrance to the country in which located.

Sea port of embarkation (SPOE): A station that serves as an authorized port to process and clear aircraft, ships, and traffic for departure from a particular country.

Shipment unit identification number: The unique number that identifies a shipment.

Source-stuffed container: Containers that are loaded by the activity that provides the items and material being shipped. These containers normally do not transit government facilities until arrival at the consignee.

Stevedoring operations: Those operations directly associated with vessel loading or discharge. The DoD Federal Acquisition Regulation Supplement defines stevedoring as "the loading of cargo from an agreed point of rest or a pier or lighter and its storage aboard a vessel, or breaking out and discharging of cargo from any space in the vessel to an agreed point of rest dockside or in a lighter."

Stevedoring and related terminal services: Those services that support the terminal and terminal operations. In addition to stevedoring, they include ordering, receiving, loading/unloading, releasing, and dispatching rail cars, containers, and trucks. They also include container freight station operations, privately owned vehicle processing, and terminal management, when applicable.

Storage pad: As used in this report, this term refers to a trailer or container parking facility within an ammunition water port. It has a burm or mound of dirt around its perimeter for safety purposes.

Stow planning: The analytical steps for determining the optimum placement of cargo in a vessel taking into consideration ship characteristics, nature of cargo, and desired order of discharge.

Sustainment cargo: As used in this report, this term applies to materiel and consumables necessary to sustain deployed forces, shipped in either commercial seavan containers or as break-bulk cargo. Since these shipments are supplies in transit that are not part of a unit or its equipment, they are often referred to as non-unit cargo. Other shipments, such as military exchange resale items and personal property, are excluded from this term.

Theater: A geographical area outside CONUS for which a commander of a unified command has been assigned military responsibility.

Time phased force deployment list (TPFDL): A disciplined data file, which is produced by the Joint Operational Planning and Execution System, that contains a prioritized force deployment list.

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 materiel. It includes assets that are in storage, in process, and in transit.

Traffic analysis: The detailed examination of cargo movement trends, available transportation capabilities, and transportation economics for the purpose of forecasting future transportation workloads and the optimal mix of services that should be acquired to meet future requirements.

Traffic control: The procedures and actions necessary to prevent congestion in the terminal area to allow the efficient movement of cargo to ship's side for loading and prompt clearance of the terminal of inbound cargo.

Traffic management: The direction, control, and supervision of all traffic, freight management, and transportation services' functions incident to the procurement and use of freight and passenger transportation services.

Transportation control number (TCN): A unique 17-position alphanumeric data element assigned to control a shipment unit throughout the transportation pipeline.

Transportation Control and Movement Document (TCMD): The MILSTAMP shipment information document (DD Form 1384). It provides advance notice of shipments and the information necessary to process the shipments through the Defense Transportation System. It is the basis for preparation of air and surface manifests and compilation of logistics reports.

Truck shack: A term commonly used by MTMC water port activities that refers to the office where truck carriers report to pick up their shipment documentation and papers and receive instructions on where to deliver their cargo within the water port facility.

Unit: Any military element whose structure is prescribed by an authority, such as a Table of Organization and Equipment.

Unit equipment: The equipment prescribed to be in a unit's possession by an authority such as a Table of Organization and Equipment. The transportation of unit equipment is documented with a MILSTAMP unit movement transportation control number.

Unit identification code (UIC): A unique six-position alphanumeric code that is assigned to each activity or unit within the DoD.

Unit movement data (UMD): A data file produced from processing TC-ACCIS deploying equipment through the MTMC Automated System for Processing Unit Requirements. This file is used as the basic unit movement information from which MTMC constructs MILSTAMP advance TCMD data records

Unit line number (ULN): Two alphanumeric characters (the fragmentation and insert codes) added to a force requirement number to identify military units for a particular operational plan.

Unit personnel: All personnel assigned or attached to a specific unit and requiring movement as a unit to or from a theater or area of operations.

Unimproved port: A site not specifically designed for deep-draft cargo vessel discharge. It is lacking in water depth and berthing space and has inadequate equipment.

Write once, read many (WORM): A term used to describe an AIT device that can be written to once but read many times. Bar-code labels are an example of WORM technology.

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Since widespread use of automatic identification technology (AIT) has the potential to dramatically affect the business processes it uses, the Military Traffic Management Command (MTMC) seeks answers to the following questions:
- What business processes does it need to modify or redesign to accommodate AIT?
- What automated systems will be affected by those process modifications or redesigns?
- Where should MTMC focus its initial AIT efforts?

This report answers these and other questions related to the potential impact of AIT on MTMC's business processes.

14. SUBJECT TERMS

Automatic Identification Technology; AIT; Intransit Visibility; ITV; Export Traffic Release; ETR; container shipping; containerized ammunition; ammunition port operations; unit moves; sustainment operations

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