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An analysis of depot level repairables carcass management and position controls under the Advanced Traceability and Control (ATAC) program

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An Analysis of Depot Level Repairables Carcass Management and Position Controls Under the Advanced Traceability and Control (ATAC) Program

By

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and
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December 1990

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An Analysis of Depot Level Repairables Carcass Management and Position Controls Under the Advanced Traceability and Control (ATAC) Program

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ABSTRACT

Defense Management Review Decision (DMRD) 901's objective to reduce supply system costs includes an initiative to achieve savings by retaining retrograde carcasses returned from the fleet at the first turn-in point rather than shipping them immediately to the repair depot or designated storage site. The purpose of this thesis is to analyze the operation of the Advanced Traceability and Control (ATAC) Program to determine a "ship or hold" decision for returned carcasses and to identify system shortcomings. A thorough study of ATAC's background, current management controls and operating procedures, and results from previous studies were combined with on-site HUB observations to show how and why the ATAC system works. Because of ATAC, the DMRD 901 initiative to retain carcasses at their first turn-in point is not cost effective except for those items experiencing rapid phase-out or numerous upgrades. Detailed indicators to measure and monitor ATAC cost and performance effectiveness do need to be implemented.

TABLE OF CONTENTS

I. INTRODUCTION

A. BACKGROUND

Repairables are components and/or sub assemblies which can be repaired if they become unserviceable. Repairables are typically high cost, long procurement lead-time items. Because of these characteristics, significant economies can be achieved by repairing these items rather than discarding them as "consumable" when they become unserviceable.

Historically, these carcasses have been difficult to manage because when they broke, the maintenance personnel were primarily concerned with replacing them with Ready-for-Issue (RFI) units as soon as possible. What happened to the carcass was of little concern.

Prior to 1981, repairable items were "free" to the customer. Because they were bought and repaired with funds voted each year by Congress, no financial motivation existed for the customer to return the failed unit. In 1981, the repairables managed by Ships Parts Control Center (SPCC) were no longer free. If a carcass was not turned-in, the Navy activity paid for the carcass out of operating funds. Thus, the Commanding Officer became involved in the accountability of Depot Level Repairables (DLRs) because of the strong financial motivation to properly turn-in the carcass. The Aviation Supply Office (ASO) followed SPCC's lead with the application of the same funding strategy in 1985. However, even with all repairables being stock-funded, problems of monitoring the return of carcasses still existed.

The Navy's first effort at controlling carcass accountability was the creation of Total System Carcass Tracking in 1984. Total System Carcass Tracking provides turn-in discipline by tying the activity financially to the proper disposition of the carcass.

This financial relationship is accomplished through mechanized means at the Inventory Control Point (ICP) by matching a requisition transaction from a Navy activity for a replacement component to the receipt transaction of the failed component. If the requisition document is not matched within a certain number of days, the ICP sends a follow-up to the Navy Activity. Navy activities are expected to respond to these follow-ups. The process is finally completed when the ICP receives a Transaction Item Report (TIR) from the Designated Overhaul Point (DOP)/Designated Support Point (DSP) saying the carcass has arrived, or the Navy activity pays for the missing carcass. However, this system was criticized by the Navy Inspector General for giving poor visibility to DLRs in the turn-in pipeline and having very limited capability to trace or measure DLR movement.

The Advanced Traceability and Control (ATAC) Program was designed to address these deficiencies. ATAC provided new procedures for carcass movement. It directs carcass shipments to a specific HUB activity within designated zones on the East or West coast or to a Transportation NODE overseas (e.g., Naval Air Station Sigonella) which consolidates shipments and forwards the consolidated freight to the closest HUB for processing. The HUB provides full technical screening, packing and transaction reporting to the ICPs. HUB activities transship carcasses to the appropriate DSP/DOP in accordance with the Master Repairable Item List (MRIL). An ATAC management information system tracks the carcass from the NODE through to the DOP/DSP.

The projected decline in Defense appropriations for the next five years has led to re-evaluation of logistic support in a cost/benefit context. The Defense Management Report Decisions (DMRDs) are the primary mechanism being used by the Office of the Secretary of Defense to investigate alternatives in "downsizing" logistic support operations consistent with planned force reductions and to achieve increased efficiency and lower costs. DMRD 901 is applicable to ATAC. This DMRD (approved in early 1990) states in part, "retain material turn-ins at closest depot to reduce transportation/double handling costs." [Ref. 1] The implications are clear for a system such as ATAC that immediately moves DLR carcasses to the assigned DOP/DSP. Unfortunately, DMRD 901 authors seem to have assumed that most carcasses will not need to be repaired. That is not true except for those being phased out or replaced by the head of the family. Arguing against DMRD 901 is one goal of this thesis.

B. OBJECTIVES

In response to the challenges of DMRD 901, the following objectives were developed for this thesis:

1. To document in detail how the current ATAC system operates;
2. To use the knowledge of the detailed operating procedures of ATAC to address the economics of the "ship or hold" decision with respect to holding the asset at the first turn-in point or moving the asset through the ATAC system to the DOP/DSP;
3. To use the detailed working knowledge of the ATAC system to identify current system shortcomings and recommend corrective management action.

C. SCOPE

To support the authors objectives, this thesis will focus on the actual operating procedures of the NODES, HUBs, Guaranteed Traffic Award (GTA) carrier, and the workings of the management information systems. The role of organizations involved in developing these procedures and the information systems are also examined.

Before carcasses reach the NODE or HUB, they must be shipped from the Navy activity. This thesis does not address the various modes of transport available and the possible carcass movement priorities. While transportation to the NODE is an important contributor to retrograde time, it is not pertinent to the "ship or hold" decision.

To develop an understanding of the workings of a system as complex as ATAC proved quite time consuming. Therefore, the authors were not able to integrate all of the system variables into a working model to use in support of a decision process. However, this limitation did not prove detrimental to a general queuing theory model formulation.

D. METHODOLOGY

Four research questions were derived from the thesis objectives. The answers to these four questions should provide a solid framework for evaluating the ATAC system.

1. Why was ATAC developed and what were the original goals and objectives?

The answer to question 1 provided the reasoning behind the structure of ATAC. Additionally, we hoped to understand how ATAC's goals and objectives impact the detailed operating procedures. This information was acquired by conducting interviews with those involved with ATAC implementation and through review of original studies on the subject.

2. What are the detailed operating procedures for the ATAC system? Are they effective and what are the problems?

The answer to question 2 provided the necessary information to develop an understanding of how this complex system works. Information was acquired mainly through visits to the HUBs. Carcasses were followed through the process and workers were interviewed at each step. In addition, interviews were conducted with several agencies directly and indirectly involved with the ATAC Program.

3. Given the data from questions (1) and (2), can we answer the "ship or hold" question?

Answering this question was essential to our responding effectively to DMRD 901.

4. Can improvements be recommended in the ATAC system that will lead to immediate and long term system improvements?

The thesis authors evaluated the "fit" of management controls, procedures, and organization with established goals and objectives. Given the decreasing defense logistic budget, this question was intended to support the effective management of ATAC in this funding environment. To answer this question, information from the previous three questions was used and interviews were conducted with agencies directly and indirectly involved with the ATAC Program.

E. ORGANIZATION OF STUDY

Chapter II begins with a description of the carcass disposition process prior to ATAC. Based on a thorough evaluation of the environment prior to ATAC, reasons are provided for the development of ATAC.

Chapter III begins with a description of the Navy's testing procedures that led to acceptance of the ATAC Program. Next, the current system is described in detail. The current system is evaluated through review of several previous studies. Finally, Chapter III explores ATAC's management controls and information systems in an attempt to evaluate the effectiveness of ATAC management.

In Chapter IV the carcass disposition process is examined in detail from both the Navy activity and ICP perspectives. Based on an analysis of processing and transportation costs, a "ship or hold" decision is derived. The results of this decision making process are explored in detail. Finally, queuing theory is applied to the relationship between the flow of carcasses to DOPs/DSPs and HUBs and their respective repair, storage and processing rates.

Chapter V summarizes the thesis effort, draws conclusions about the "ship or hold" decision and ATAC management controls, and recommends improvements that could lead to immediate and long term ATAC Program improvements. Finally, other areas needing study are discussed.

II. BACKGROUND OF ATAC

This chapter gives the reader a flavor for why the ATAC Program was developed and the subsequent evolution of the ATAC Program's policies and procedures. A brief description of the current ATAC Program environment will aid the reader in understanding this chapter.

A. ATAC GOALS AND POSITION IN THE NAVY SUPPLY ORGANIZATION STRUCTURE

The Commander, Naval Supply Systems Command (NAVSUP) is ultimately responsible for the ATAC Program. Specifically, NAVSUP code 063, the DLR project manager is responsible for ATAC's performance, while the Navy Material Transportation Office (NAVMTO) is responsible for monitoring the performance of Morrison-Knudsen Services, Inc. (MKSI) and Pilot, freight transportation corporations. MKSI, under the stipulations of a government contract, provides freight handling, receiving and data processing services at the NODES and HUBS (see Appendix B for complete lists). Pilot moves the DLR carcasses from NODES to HUBs to DOPs/DSPs under the guidelines provided in a GTA. Government employees at the HUBs perform screening, mechanized MRIL processing, and DLR packaging. They are under the purview of the local Naval Supply Center (NSC) which reports to NAVSUP. This represents a functional type organization with matrix interface between the NSC and NAVMTO.

The primary goals of the ATAC Program are reducing carcass tracking follow-ups, shortening carcass processing time, and improving repairable accountability [Ref. 2].

In the remainder of this chapter we will investigate:

1. The environment prior to ATAC;
2. Other factors motivating the need for improved carcass tracking.

B. THE ENVIRONMENT PRIOR TO ATAC

Prior to ATAC, supply department personnel at shore activities and ships around the world were required to research each turn-in using the MRIL to determine the proper destination and movement priority of each DLR F-condition (failed repairable) carcass. The supply department could use any one of a number of methods (if not prohibited in the MRIL) to send the carcass to the DOP/DSP. Carcasses could be shipped to the DOP/DSP via the Navy supply pipeline established to support deployed units or sent via United States mail. The use of established supply channels to return carcasses was slow, with little or no controls in place to track material and establish accountability. Upon receipt of the carcass at the DOP/DSP, the material had to be screened to verify that the part number related to the National Stock Number (NSN) identified on the turn-in document (DD1348-1) and the quantity agreed with the documentation (the quantity should always be one, but occasionally turn-in activities make mistakes). The duplication of the screening process at all the DOPs/DSPs was inefficient.

Navy Supply Corp leadership became concerned with the financial implications of the lack of controls to track material and establish accountability. This concern resulted in the development of Total System Carcass Tracking in the early 1980's. The following two paragraphs will give some insight into the goals and objectives of carcass tracking and its general workings.

Since repairables are normally expensive and require long procurement lead time, the repair of defective units becomes the primary source of replenishment. Therefore, unserviceable units must be returned in accordance with prescribed DLR turn-in procedures to be repaired as quickly as possible and returned to stock in 'A' Condition Ready for Issue (RFI). Carcass turn-ins which are delayed, not turned in, shipped to the wrong destination or lost in transit, adversely affect the system support of repairables;

therefore, strict carcass turn-in discipline must be maintained. This discipline is provided by local and Total System Carcass Tracking procedures. Total System Carcass Tracking is implemented when an unserviceable unit cannot be repaired locally and must be returned for repair at a repair facility. [Ref. 3]

Carcass Tracking Records (CTRs) are the data records of information essential for effective carcass tracking/monitoring. They are established and maintained at both Navy ICPs and afloat and ashore user activities which stock and issue DLRs. ICP CTRs serve as the basis to monitor user turn-in of exchange carcasses. Transactions recorded on these CTRs determine whether the ICP will generate follow-up actions/additional billing to user activities for outstanding (delayed) carcass turn-ins. User Carcass Tracking Record Files (CTRFs) record information to monitor local customers (e.g., department or squadron carcass turn-ins related to exchange requisitions satisfied from local stocks or Direct Turn Over (DTO) requisitions, and to respond to ICP follow-up inquires). Transshipping/HUB activities' CTRFs record information to respond to ICP follow-up inquiries regarding transshipment of unserviceable DLRs from user activities. [Ref. 3:p. 1-22]

Despite the implementation of Total System Carcass Tracking, DLR carcass movement was still slow and asset visibility for the item manager was poor for DLRs with high demand. As a consequence, NAVSUP began to explore further ways to shorten and improve asset visibility in the retrograde pipeline.

C. OTHER FACTORS MOTIVATING THE NEED FOR IMPROVED CARCASS TRACKING

Audit results, budget concerns, and inefficiency indicated a change was necessary. Despite the improvements made by the implementation of the new procedures of

Total System Carcass Tracking, the Navy Inspector General found that,

> Today's system gives poor visibility to DLRs in the pipeline and has very limited capability to trace or measure DLR movement. Physical distribution functions of receiving, storing, issuing, and shipping are paper bound and sluggish. DLRs are frequently commingled with dissimilar cargo, resulting in repeated and unnecessary handling and routing. Frequently, Not-Ready-For-Issue (NRFI) DLRs in the pipeline are improperly packed and mismarked, creating the potential for damage, loss and degradation of inventory accuracy. [Ref. 4]

NAVSUP considered that the system in place was inefficient and had many potential accountability weaknesses. Approximately 700 Navy shore and afloat units were required to send failed repairables to a storage point or depot. These storage points and depots numbered approximately 600 facilities. The "free flow" retrograde environment that existed used parcel post, local delivery, small freight units and organic transportation and provided no in-transit reporting, traceability or accountability [Ref. 2].

There were other powerful incentives to improve repairable management. There was fleet-wide concern that the retrograde time for DLRs was too long. A 1983 Mediterranean Air Logistics Conference, sponsored by Commander, U.S. Naval Forces Europe (CINCUSNAVEUR), and attended by many participants in the Navy's Mediterranean theater of operations, documented that transit times were unacceptably long (for Aviation Depot Level Repairables (AVDLRs) 20% were taking 72 days or longer), thus creating problems such as repair scheduling for inventory managers. Also, this problem was identified as a recurring condition from the 1976 conference. Consequently, it became NAVSUP's goal to create a new system using techniques and concepts borrowed from commercial freight carriers. [Ref. 5]

III. Current ATAC System

Chapter III focuses upon the evolution of the ATAC process, summarizes results of ATAC studies and audits and analyzes the effectiveness of ATAC management controls. The evolution of the ATAC system reviews the initial system test, development of contract and GTA relationships and how the system works today. The studies and audits summary presents several authors' views on the ATAC system's ability to achieve ATAC's stated goals. The management control evaluation examines goal formulation for two carcass management programs and how established management information systems support the ability of managers to control performance of these carcass management programs. From the analyses discussed below, the reader should acquire an understanding of how the ATAC program can be improved.

A. CONCEPT TEST

The original ATAC concept was based on successful innovations in the private sector, led by Federal Express, United Parcel Service, Emery Air Freight, and Flying Tigers Air Freight. The ATAC Program, using commercially proven movement concepts that provided in-transit accountability and centralized return HUBs for uniform identification, consolidated shipment and traceable movement to storage and repair sites, was planned, proposed and implemented in a test phase in April 1985.

The test was conducted on a carrier battle group operating in the Mediterranean. This battle group used the newly conceived retrograde procedures. When a repairable component failed, instead of looking up the DOP in the MRIL, and then mailing or shipping the item directly to that DOP, the ships all had pre-addressed labels which directed components to a contractor, Burlington Northern, in Norfolk, Virginia. In Sigonella, Sicily, a major way-station for Navy materials going into and out of the

Mediterranean, a contract freight forwarder (Burlington Northern) received the repairables en route to Norfolk. He documented the arrival of each component, using its Transportation Control Number (TCN) as an identifier, and consolidated the component into cost-effective loads which qualified for lower Military Airlift Command (MAC) tariffs. He also booked the shipments on MAC, then entered flight departure data into his computer data bank, and electronically sent this information to the Burlington Northern representative at Norfolk [Ref. 5:p. 17].

Back in Virginia, the contractor met the incoming MAC flight at the Norfolk MAC terminal and took possession of the shipment. The contractor then broke down the load, unpacked each component, performed a technical screen of each item comparing the item with its accompanying turn-in documentation, prepared appropriate shipping manifests and labels, and repackaged the item for onward movement to its final destination. Finally, he arranged next-day deliver at the DOP via air or ground transportation.

All of the different consignment and processing dates and times were electronically documented, and this computer data was eventually forwarded to NAVSUP for record purposes. The program's test results were so positive that NAVSUP decided to implement the ATAC system fleet-wide in FY86 [Ref. 5:p. 18]. The most significant example of the prototype's success was the reduction of the average retrograde pipeline time from 55 days to 13 [Ref. 6].

B. THE ATAC SYSTEM TODAY

1. How ATAC Works Today

ATAC combines the function of a commercial freight agent, information system, and a centralized Navy DLR technical screening process to ensure traceability/

accountability over the movement of thousands of carcasses valued at approximately $8 billion annually. The material typically moves from a NODE to a HUB, and then on to the DOP/DSP (see Figure 1). Appendix A provides a detailed description of how a HUB operates.

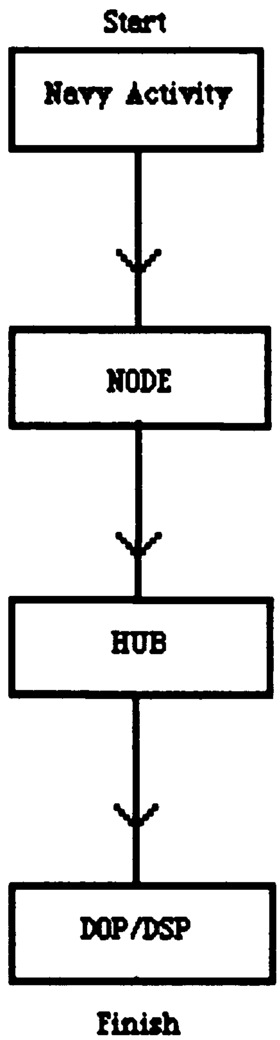

Figure 1. Diagram of Basic Carcass Flow From Navy Activity to the DOP/DSP

The process typically begins when the freight agent receives in-transit shipments of DLR carcasses from various sites/activities around the world. The first point of receipt is normally a NODE. At the NODE the document numbers of the DLR are entered into the Navy Regional Data Automation Center (NARDAC) ATAC data base and the tracking begins (see Figure 2). At a NODE location within the continental United States, the DLR is turned over to QUICKTRANS (a Navy acronym for a GTA contractor covering specific routes) for air or truck transport or Pilot. Pilot must send an electronic data update (EDI) to NARDAC Norfolk (site of the ATAC data base) within 24 hours of delivery of the DLR carcass to the HUB. The EDI representing Proof-of-Delivery (POD) includes the Government Bill of Lading (GBL) number, weight, and signature of the receiving MKSI agent.

Upon receipt at the HUB the data is once again entered into the NARDAC ATAC data base. This is not a "real-time" process. At the end of each workday, the information is transferred in batch form to NARDAC Norfolk via the Navy Logistics Network. The DLR NSN is also entered into the mechanized MRIL and a TIR is sent to the ICP (see Figure 3). Thus, from this point on we now have the NARDAC ATAC data base and the Navy's ICP's data bases both tracking the movement of the DLR carcass.

Based on the disposition instructions of the mechanized MRIL (discussed in detail in Chapter IV), if the item is going from a HUB to another HUB or to Marine Corp Air Station (MCAS) Cherry Point, NSC Jacksonville or NSC Pensacola, an electronic advance shipping notice is sent via the Uniform Automated Data Processing System (UADPS). Once the HUB's screening function is completed the item is turned over to MKSI.

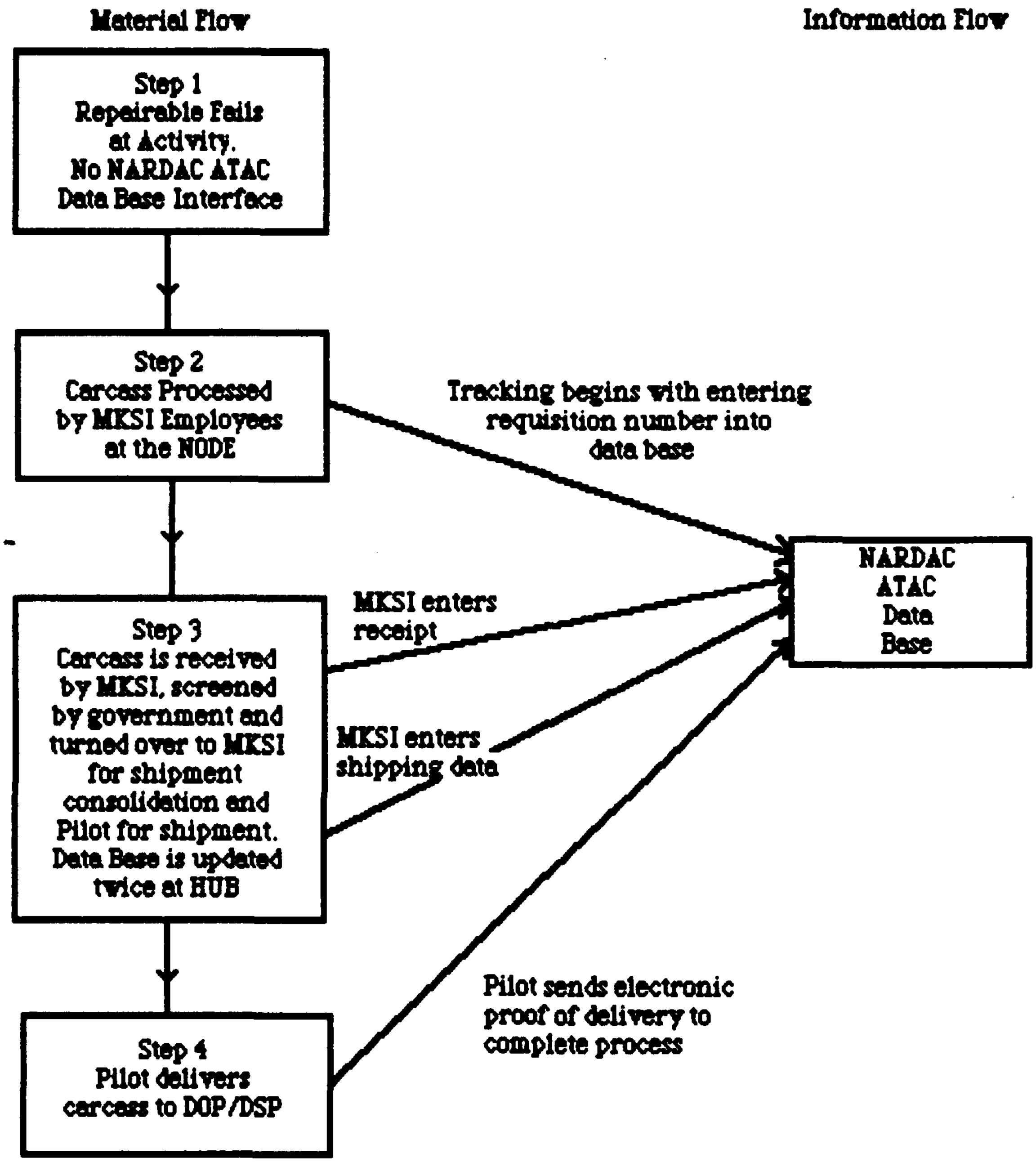

Figure 2. Diagram of Interface Between Carcass Flow and NARDAC ATAC Data Base

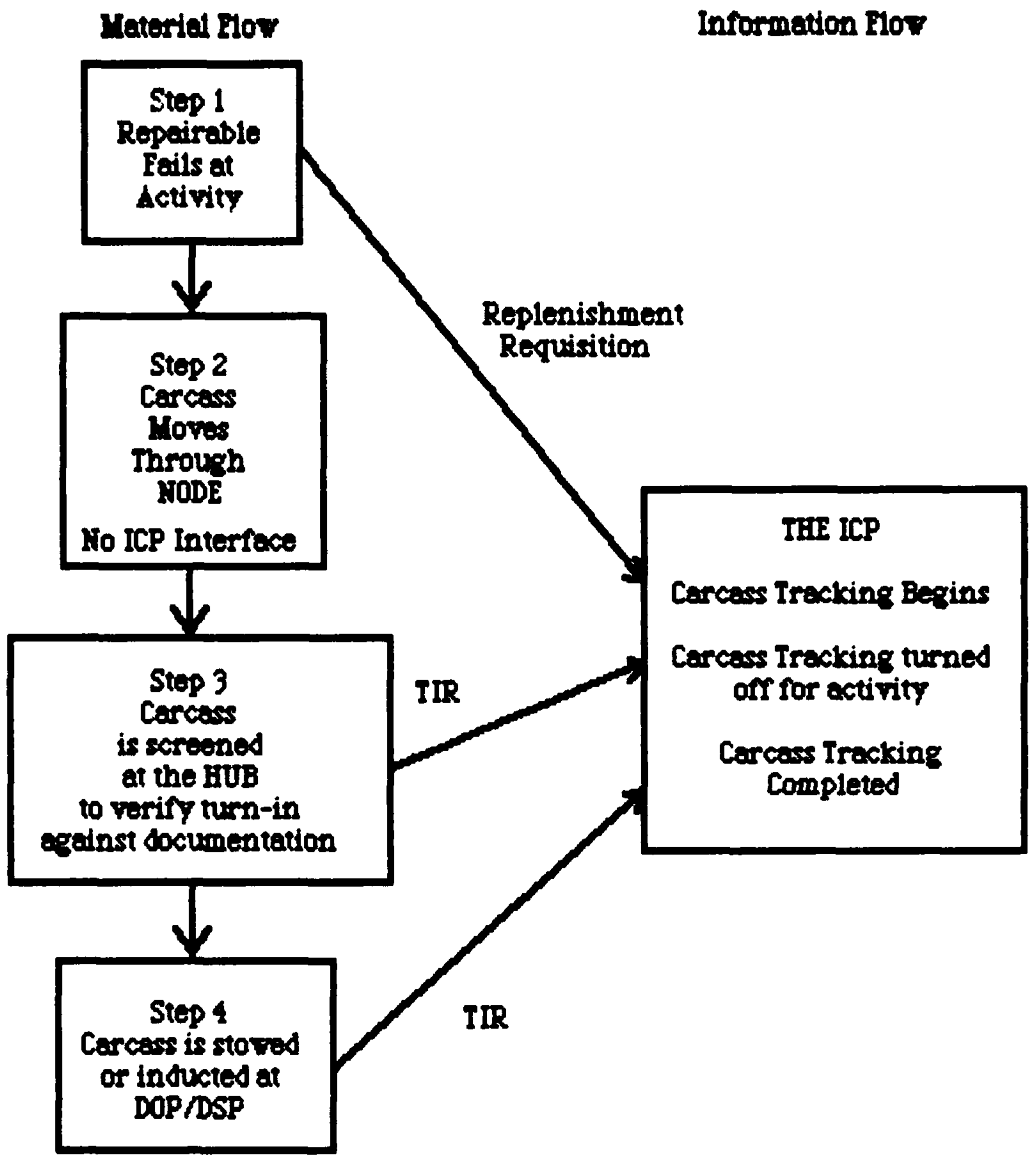

Figure 3. Diagram of Interface Between Carcass Flow and ICP Data Base

MKSI creates a manifest for the DLR carcasses to be verified by Pilot and shipped. MKSI loads this information into the NARDAC ATAC data base. Upon completion of Pilot's delivery to a DOP/DSP, Pilot has 24 hours to send an EDI to NARDAC Norfolk. The process is complete for the NARDAC ATAC data system upon receipt of POD from the DOP/DSP. The process is complete for the ICP tracking system upon receipt of TIR from the DOP/DSP.

2. History of ATAC Service Agreements and Contracts

The history of the Government/Contractor relationship is important if one is to understand how the current organization structure and procedures were developed. The following events occurred under the auspices of the NAVMTO. The initial test run performed in the Mediterranean was accomplished through a service agreement with Burlington Northern. Service agreements are created under the cognizance of the Military Transportation Management Command (MTMC). As the operation expanded, the service agreements were modified to support the effort. Burlington Northern covered the Eastern continental United States and Commander in Chief, Atlantic Fleet (CINCLANT) theaters while Emery served the Western continental United States and Commander in Chief, Pacific Fleet (CINCPAC). This arrangement continued until 1 November 1986 when MKSI won the right to perform the service agreements for both theaters of operation.

Initially, MKSI performed both the handling and processing in addition to the transportation functions for the DLR carcasses. Additionally, at this time in the organization's evolution MKSI owned and operated the data base. Handling and processing consisted of data base entry, receiving, and physical material movement. Under the handling and processing side of the business, actual material movement consisted of the pick up of DLRs from ships at pier side and delivery to the HUB. Under the transportation function, carcasses were shipped from the HUB to all commercial and government DOPs/DSPs. [Ref. 7]

NAVMTO reached the conclusion that MKSI was charging too much. NAVMTO further concluded that a good price in handling and processing was always lost to a high price for the transportation function. In approximately November of 1987 NAVMTO broke the functions apart to facilitate competition using the existing service agreements for the handling and processing and a GTA for the transportation. Under the separation of the functions, the GTA would handle all material movements from the HUBs to the DOP/DSP while the handling and processing function would include movement of carcasses from ships at the pier to the HUBs. Service agreements remained the documents of choice at this time because not enough data had been collected to create a satisfactory contract agreement. [Ref. 7]

Finally, during the early part of 1989 NAVSUP, NAVMTO and NSC Norfolk procurement personnel concluded that ATAC had been in business long enough to have adequate data to develop a contract. To facilitate the contracting process, NAVSUP and NAVMTO decided that the government should take over the data base because the complexities involved in managing the data base would make contractor turn-over very disruptive to adequate data base updates. The contract process concluded with MKSI winning the contract for the handling and processing functions. MKSI has kept their data base as a backup because the government's new data base occasionally drops data due to software bugs. Furthermore, MKSI also wanted to ensure they are paid for each part touched. The current data base is considerably different than MKSI's so it is difficult to determine if MKSI's data base development biased the contracting process in their favor.

Transportation continues to be covered by GTAs with Pilot providing the current service.

C. SUMMARY OF ATAC PERFORMANCE STUDIES

This section summarizes three important studies related to the evaluation of ATAC performance. This section will evaluate theses by Bruner and Honeycutt [Ref. 8], Stapleton [Ref. 5] and a memorandum by Klaczak [Ref. 9]. Both theses were designed to answer questions that were driven by stated ATAC goals. The theses had two central questions:

1. Does ATAC shorten the shipping time of DLR carcasses from the end user to an overhaul point?

2. Does ATAC reduce system inventory investment due to fewer parts in the repair pipeline [Ref. 8:p. 71]?

To answer Question 1, both analyses compared pre-ATAC and post-ATAC retrograde movement times for sample populations of items. Both studies indicated that there was significant reduction in retrograde time for the data bases investigated.

One would think Question 2 is directly related to Question 1. If retrograde time is shortened should not inventory investment shrink? Burner and Honeycutt observed that,

> There is not, however, a direct correlation between the DLR carcass retrograde times and the level of inventory investment when stock replenishment budgets are compiled at the ICPs. What is encouraging and germane to the inventory level question is that the standard deviation of the post - ATAC sample population showed significant to outstanding improvement in the retrograde pipeline performance. This should warrant inventory modeling review to update pipeline estimates established during the provisioning process. [Ref. 8:p. 71]

Stapleton [Ref. 5] takes a different approach to answer Question 2. He begins by reminding the reader of ATAC's goal of reducing total repair cycle time. He points out that theoretically this reduction in time can be achieved through reductions in retrograde time, or via reductions in repair turnaround time (RTAT). Based on computer simulation of the relationship between annual replenishment costs and repair turnaround time, cost savings due to reduced RTAT were predicted. Stapleton goes on to illustrate the magnitude of the cost avoidance possible with reductions in RTAT; the results are certainly impressive. Stapleton uses the RTAT example to demonstrate what could be achieved with a similar reduction in retrograde time if retrograde time were included in the ICP replenishment models. It is, however, not included in the ICP replenishment models at present.

The Klaczak memorandum proposed to do a feasibility/cost/benefit analysis of funding a full repair pipeline model for the Navy. What conclusion can we draw from the Klaczak memorandum? Depot repair cycle time is composed of 4 elements [Ref. 9:p. 2]:

1. Remain-in-place (RIP) Time: RIP items are not removed from equipment until a RFI replacement has been provided. The RIP time measures the difference between the date that a carcass is shipped to the depot and the date that the item is demanded. For asset requisition control procedures, RIP items are identified by the appropriate ICP.

2. Retrograde Time: Retrograde time is the difference between the depot receipt date and the date when the item is determined to be beyond the repair capability of local maintenance, or the date when carcass is shipped for RIP items.

3. Administrative Time: The difference between the date that an unserviceable item is received by the depot maintenance activity and recorded as "M condition" and the date the item is received at the depot. Administrative times include times to schedule depot maintenance, prepare required documentation, and physically move items from depot supply to depot maintenance activities.

4. Depot Maintenance Time or RTAT: The difference between the date the item is restored to serviceable and issuable condition and the date the item is received and recorded as "M" condition by the depot maintenance activity. The time basically measures how long it takes to repair the unserviceable carcass.

Klaczak reached an important conclusion; ATAC only impacts retrograde time. As noted above, the Navy currently includes only the RTAT for ICP stock replenishment computations. Requirements are not computed for the retrograde time segment except for the initial buy of stock or wholesale provisioning when a new system is phased into the Navy. In that initial provisioning process the ICPs use a standard time of either 30 or 45 days for retrograde time. Thus, although ATAC has reduced retrograde time no savings in pipeline investment have been explicitly realized.

D. MANAGEMENT INFORMATION SYSTEMS, MANAGEMENT CONTROLS AND AUDIT RESULTS

1. ICP and ATAC Carcass Processing System Goals

There are two important information systems applicable to DLR carcasses, the ICP data base (also referred to as Total System Carcass Tracking) and the NARDAC ATAC data base. Both information systems act as transaction processing systems and provide management information. To understand these information systems and the data gathered, one must know the goals of NAVSUP. After review of the goals, a procedural review of each system will be given to aid the reader in understanding the process.

a. Total System Carcass Tracking

Total System Carcass Tracking was developed with the primary goal of maximizing carcass returns to support the replenishment of repairables. Primary objectives of the system are to assist the inventory managers in tracking carcasses and to generate statistical reports which will highlight activity performance in the processing of turn-ins [Ref. 10].

b. ATAC Program Goals and Objectives

ATAC's general goals are as follows:

1. Reduce customer response time;
2. Reduce retrograde time and thus realize a savings in the value of inventory in the pipeline;
3. Reduce receipt processing time;
4. Reduce system loss;
5. Enhance inventory accuracy;

6. Reduce resource requirements. This includes realizing savings in transportation costs through consolidation of shipments and obtaining labor dollar savings with reductions in personnel because of economies of scale attained at the HUBs.

7. Provide accurate information to the inventory manager to support enhanced requirements determination, improved inventory visibility and accountability, and redistribution and reutilization of spares. [Ref. 6]

Although most of these ATAC goals were not quantified, potential savings were quantified in a study done by Captain McCann, SC, USNR-R [Ref. 11].

When ATAC was established, NAVSUP set a goal of 10 days from the time when a DLR requisition was submitted to the time the carcass was stowed at the DOP/DSP. As the system evolved it became apparent that the Navy did not possess the resources to attain the 10-day objective, so the objective was expanded to 25 and then 30 days. In addition, the desired time from the HUB to delivery at any DOP/DSP was set at 24 hours.

The objectives have continued to change with the ATAC process and the availability of resources. The 30-day goal no longer exists because of the lack of financial resources and the variability of time problems resulting from customer activities inability to ship the carcass as soon as it fails. For example, a destroyer in the Indian Ocean may not be able to ship the carcass for weeks. The contractor now has 24 hours from receipt at the HUB to turn the carcass over to the government screeners. The government employees have three days to screen, MRIL process and pack the item. The government employees return the carcass to the contractor who then has 24 hours to consolidate the carcasses efficiently for shipment and release the item to the GTA. The GTA carrier has four working days to deliver the item to the DOP/DSP.

2. Operating Procedures for Total System Carcass Tracking

Total System Carcass Tracking refers to a system which tracks all DLR turn-ins. The system monitors Military Standard Requisitioning and Issue Procedures

(MILSTRIP) requisitioned DLR issues and receipts, plus has the capability of providing carcass follow-ups, notifications of additional billings, and notifications of bill reversals. Finally, it can receive customers' responses to carcass follow-ups. The system is characterized by the following events:

1. Carcass tracking is "turned on" when a Navy activity's requisition with a document identifier code of AO___ is received by the ICP;

2. The returning carcass is shipped and tracked using the requisition document number;

3. A document identifier (D6R) is generated by the Navy activity that is sent by tape or other means each month to the ICP that will turn off carcass tracking for that activity at the ICP. If this D6R is not received, the ICP carcass tracking system will assume no turn-in was made and a BK1 will be sent to the ship asking for the status of the outstanding carcass.

When records established on the ICP's Carcass Tracking Record are not closed out within a specified time frame, the ICP initiates carcass tracking action. These actions are in MILSTRIP format with a Document Identifier Code in the BK___ series.

The first transaction produced in this process is the BK1 Follow-up Inquiry which the ICP sends to the activity when the ICP records indicate that a NRFI DLR exchange turn-in is outstanding. The activity is required to respond to the BK1 inquiry with a BK2 reply indicating the status of the outstanding NRFI carcass. The BK2 response may close out the ICP record (if an acceptable accounting of the NRFI turn-in is made), or it may result in additional billing by the ICP. If the activity does not provide an acceptable reply, the ICP sends a BK3, which is a notification of additional billing for the value of the NRFI carcass to the activity. The receiving activity may respond to the BK3 transaction with a BK2 reply if subsequent proof of the turn-in can be established; if not, the additional charge will stand. The additional billing may be reversed if the ICP subsequently receives information that the NRFI turn-in had been made, in which case the ICP sends a BK4 reversal of the additional billing notification to the activity. When the carcass tracking follow-up inquiry is directed to a trans-shipper, a BK5 is used instead of a BK1 and the transshipper responds with a BK6 transaction instead of a BK2. [Ref. 3:p. 1-33]

These follow-up actions are designed to remind the activity of its responsibility to account for carcass turn-ins and to provide financial motivation for doing so.

There are cases of activities turning in a different carcass than is reflected on their documentation. The mechanized MRIL at the HUB is designed to handle this problem so that the correct TIR can be sent to the ICP and financial records adjusted. The mechanized MRIL has an entry block for both the incorrect and correct NSN. If both blocks are used, an automated Report-of-Discrepancy (AROD) program goes to work. The ARODs are printed by the mainframes at supporting NSCs located nearest the HUB and mailed to the ICPs. A summary listing of the ARODs are also sent to the Type Commanders (TYCOMS) for review and financial action. The TYCOM can use this summary as a report card for an activity's performance.

To complete the process, a TIR is required from the DOP/DSP, including commercial contractors. In the past the ICPs lost visibility of items going to commercial DOPs because these DOPs did not have the ability to send electronic TIRs to the ICPs. To correct this problem, the ICPs placed microcomputers capable of sending TIRs to the ICPs at the commercial activities whose business accounts for 80% of the repair dollar value. Additionally, NAVSUP sponsored the Stock-in-Transit (SIT) program. Under that program if a contractor fails to send a TIR the ICP sends a Transportation Discrepancy Report (TDR) to NAVMTO which initiates tracking of the item.

a. Evaluation of the ICP Information System Contribution to Management Control.

Is the ICP data base effective in facilitating management control and goal attainment? During the past 10 years the number of carcass turn-ins has increased from 78 to 82%, depending upon the ICP, to the current rate of 88 to 92% of the number of total requisitions [Ref. 12]. This increase is the result of two factors. The first is end-use funding. This means that each unit will pay for missing carcasses out of operating funds. The second factor is the addition to the ICP data base of a capability which allows the ICPs to identify individual poor performers and managers to take action. This information is also sent to the TYCOMs for effective use in a management control role.

Although it is difficult to determine if the goal of maximization of turn-ins is achieved, it is clear that there has been improvement. The system has also proven valuable in assisting item managers in repair scheduling and procurements. Given the ICP's goals, the data base appears to be effective.

3. Operating Procedures for the NARDAC ATAC Data Base

The NARDAC ATAC data base is designed to track the carcass through each step of the retrograde pipeline, just as Federal Express tracks their shipments from pick-up through the HUB to delivery. The ATAC tracking process follows the steps described below:

1. The process begins with the arrival of the carcass at the NODE. The MKSI employees enter the document number and NSN from the DD1348-1 on the material into the NARDAC ATAC data base. The actual clock time is not entered. The carcass is then turned over to QUICKTRANS or the GTA for transshipment to the HUB.

2. Upon arrival at the HUB, MKSI employees again will enter the document number and NSN from the DD1348-1 into the NARDAC ATAC data base. This is done so Navy management can extract information to determine if any carcasses failed to make it from the NODE. This information also supports the calculation of transportation times. The MKSI workers then turn the DLR carcasses over to the government screeners.

3. The screeners verify that the carcass that the activity returned and is indicated on their documentation is indeed that item. If there is an error, the item is taken back to MKSI employees and the NARDAC ATAC data base updated. After MRIL processing (to be addressed in Chapter IV) at the HUB, the item is packaged and either turned over to MKSI for shipment consolidation or warehouse workers for storage or movement to disposal. Those items that went into storage or disposal are summarized at the end of each month and sent on tape to NAVMTO to document their removal from the ATAC process so they are not considered missing.

4. After the government employees at the HUB turn the carcass over to MKSI, the NARDAC ATAC data base is updated. This is done to ensure accountability for all items that began processing through the HUB and to provide information for computing the HUB processing time. Additionally, the items are consolidated under one TCN for specific locations and this data is loaded into the NARDAC ATAC data base. This information can be used as a check against the GTA to ensure he sends a POD for each TCN. MKSI then turns the consolidated carcasses over to Pilot for transportation.

5. After delivery to the DOP/DSP, Pilot has 24 hours to update the NARDAC ATAC data base electronically with POD information.

6. At the end of each month, NAVMTO sends a monthly summary of their ATAC data to the appropriate ICP. This information can be used in conjunction with the ICP data from carcass tracking to resolve RODs and other problem items. It is NAVSUP's intention that the ATAC data will be immediately available to the ICPs in the near future.

Appendix C provides a brief description of several projected reports that will be processed from the NARDAC ATAC data base to help look for accountability problems (items which entered the ATAC system but which did not complete the process) and to provide values of the various retrograde time components. These reports are not yet possible because of difficulties at NARDAC Norfolk in report development. As a consequence, the NAVSUP Repairables section is considering turning the report development project over to the Fleet Material Support Office (FMSO) as of 16 November, 1990. [Ref. 13]

a. *Evaluation of NARDAC ATAC Data Base Contribution to Management Control*

Is the NARDAC ATAC data base effective in support of management control? Both the MKSI and the newly developed NARDAC data base provided or will provide specific feedback on the attainment of detailed material processing and movement objectives. The government sponsored data base will provide the data to support further report development to improve carcass accountability within the retrograde pipeline.

The authors are concerned with respect to lack of management control but it is a result of planning at the NAVSUP level, not feedback from the ATAC data base. During ATAC's development, goals of reducing pipeline inventory dollar value, dollar savings in transportation and labor were stated. However specific values for these goals were not established. Therefore the thesis authors are concerned about the ability to institute adequate control mechanisms. For example, the retrograde pipeline time has yet to be incorporated into replenishment formulas, making it impossible to conduct cost/benefit studies to understand the real dollar savings impact of reducing the pipeline time. Until these goals can be measured and feedback mechanisms established, management control of ATAC will not be complete.

b. Results of Naval Audit on the ATAC Program

One method to evaluate ATAC effectiveness is the audit. One very detailed audit was performed on ATAC by the Naval Audit Service. The audit was conducted in two phases;

Phase 1 Between 9 February 1987 and 16 July 1987, to evaluate transportation economy. [Ref. 2:Section A; p. 2].

Phase 2 Between 1 December 1987 and 4 April 1989, to evaluate accountability and control [Ref. 2:Section A; p. 2].

The summary of major audit discrepancies released on 28 February 1990 were as follows:

1. As a result of NAVSUP not preparing an economic analysis, the ATAC Program did not have performance measures, and NAVSUP was unaware of the ATAC Program's actual performance. The audit showed that the Navy will potentially lose

visibility over about 15% or $660 million in repairable shipments in FY90, and pipeline inventory costs will be about $648 million greater than the level desired. [Ref. 2:Section B; p. 6]

The loss of visibility of $660 million in repairables was calculated in the following manner. A stratified sample was used by the Navy auditors. They traced a sample of 648 ATAC Program shipments valued at $32.5 million through the repairables pipeline and were unable to determine the disposition of 99 shipments valued at $4.8 million. This is a loss of visibility of 15%. On an annual basis 15% of the annual dollar value flow through the ATAC Program is $660 million.

The increase in inventory pipeline costs of $648 million were calculated using the following logic. Once again using the stratified sample above, auditors estimated, with 90% confidence, that pipeline time for ATAC Program shipments averaged 40.4 days, plus or minus 6.4 days. This was 30 days greater than the Navy's performance goal of 10 days according to the auditors. Therefore, the pipeline inventory costs will be about $648 million ($21.6 million in daily pipeline receipts x 30 days) greater than the level desired by the Navy.

2. As a result of the lack of monitoring freight agent performance, the ATAC Program freight agent was taking an average of 6.3 days longer for delivery to and from the ATAC Program processing facilities than allowed by the services agreement. The uncorrected delays in shipping result in (1) reduced repairables available to meet demands from the fleet and (2) increased inventory costs of $136 million for the additional days worth of repairables needed to compensate for the shipping delays. [Ref. 2:Section B; p. 11]

The increased inventory costs of $136 million were estimated using shipping data for 648 sample items which the freight agent provided the auditors. The auditors determined from the stratified sample that the total average freight agent handling and shipping time was 10.3 days rather than the required 4 days, a difference of 6.3 days. Analysis of total repairable transactions for the ATAC Program's East and West cost processing facilities for a 6-month period showed that the average value of repairables received daily was about $21.6 million. Therefore, if the freight agent achieved the 4-day delivery time as required, in-transit time would be reduced by 6.3 days (6.3 x $21.6) and would save the Navy about $136 million in pipeline inventory according to the authors.

NAVSUP's responses to Finding Number 1 include,

> However, we do not agree with the finding that no program justification (economic analysis) was conducted. Planning and cost justification data were provided to the Audit Service as noted in our audit abstract comments (Appendix 1). NAVSUP will task the Aviation Supply Office and the Ships Parts Control Center with investigation of lost repairables. Tasking will be to trace assets which have proof of receipt into the ATAC Program without proof of delivery at final destination (ATAC Data Base Extract) and which have a D7K (transshipment) Transaction Item Report received by the ICP without a corresponding D6K (Receipt Transaction Item Report) from the destination. [Ref. 2:Section B; p. 9]

At this point the thesis authors believe several comments are in order. The authors have seen from several previous studies that ATAC did reduce the retrograde pipeline time. The Navy auditors were made aware of the previous study by Bruner and Honeycutt and the study by Stapleton but would not accept the findings because they considered that NAVSUP had sponsored the studies. Most importantly, the authors established earlier the irrelevance of costing out the retrograde pipeline figures because retrograde time is not used in Navy ICP replenishment models. The problem of long retrograde times occurs when carcasses are in short supply, back orders accumulate and readiness is reduced due to systems being down longer than they need to be. Quantification of those "costs" would be extremely difficult.

NAVSUP responded to Finding Number 2 in the following manner:

> The potential $136 million in monetary savings was incorrectly calculated and in fact does not exist. Weekends and holidays were included by the Naval Audit Service as workdays in deriving average time of possession from the sample for depot level repairables handled by the freight agent. The NAVMTO service agreement with Morrison-Knudsen Services, Inc. specifically excluded non-business days. The audit applied freight agent handling standards cited in the service agreement to audit sample results that were derived from data fields that included NAVMTO coordinated transportation services, thereby significantly overstating freight agent possession of depot level repairables. What is correct in this audit summary is NAVMTO's failure to monitor comprehensively the performance of the agent. This is now being conducted with the help of the new ATAC data base and the fact the service agreement is now a contract which gives NAVMTO more leverage with respect to monetary punishment of the agent. [Ref. 2:Section B; p. 15]

4. Conclusion

ATAC has contributed significantly to the accountable and expeditious processing of DLR carcasses. Yet, ATAC performance can be improved upon. Perhaps the most important point to take from this chapter is that several of ATAC's initial goals were not quantified and thus adequate management controls could not be established early in ATAC's life. The following goals were not quantified:

1. Reduce customer response time;
2. Reduce system loss;
3. Enhance inventory accuracy;
4. Reduce inventory in the retrograde pipeline; (e.g., imcorporate actual retrograde time into replenishment and provisioning models)
5. Reduce resource requirements. This includes savings in transportation and labor costs.

As of November 1990 there is still no effort to quantify these goals or to develop tools to measure deviance from the goals. However the thesis authors do believe that objectives for material movement and processing have been specified and that proper controls are in place or under development to manage to those numerical objectives.

IV. CARCASS DISPOSITION DECISION PROCESS

This chapter examines the movement and positioning of carcasses under the ATAC Program from their original turn-in by the user activity to the processing HUB and finally to the appropriate DOP/DSP for repair or storage. Following an examination of the ICP carcass disposition decision process, the carcass positioning implications of DMRD 901 from both processing/transportation costs and queuing aspects are discussed.

Implementation of the ATAC Program has simplified and streamlined the entire retrograde process; from initial turn-in and shipment of the NRFI item by the customer, interim consolidation and shipment by the ATAC NODE, processing at the HUB, and finally arrival at the DOP/DSP for repair or F condition storage. As is the case with the physical processing of each item at the HUB site (see Appendix A), the entire sequence of retrograde turn-in, shipment, and disposition is accomplished with each carcass receiving equal priority treatment on a first-in, first-out basis. NAVSUPINST 4421.20 provides all Navy and Marine Corps ashore and afloat activities proper ATAC Program procedures and guidance. Comprehensive procedures governing the requisitioning, turn-in, and carcass tracking aspects of DLR management are detailed in NAVSUP Publication 545.

A. FLEET/SHORE ACTIVITY TURN-IN PROCEDURES

1. Manual MRIL Activities

Non-mechanized activities, including ships and shore stations without mechanized MRIL capabilities, use the microfiche MRIL as the primary source of information regarding disposition of NRFI carcass. Part I of the MRIL, listed in National Item Identification Number (NIIN) sequence, provides pertinent data such as Security Classification, Material Control Code, Movement Priority Designator, Shipping Code and special shipping/handling requirements. The Shipping Code is either a six position code specifying a Navy, commercial, or other service repair facility; or is a two position alphabetic code indicating the *item is to be sent to disposal* (WW *or* YY), shipped to the closest Industrial Air Station/NSC (XX), or that shipping instructions are to be requested from the appropriate ICP (ZZ) [Ref. 3:p. 1-13]. Part II of the microfiche MRIL consists of the shipping addresses for the Shipping Codes contained in Part I.

Upon receipt of a carcass, the non-mechanized shore or fleet activity's supply department will screen the properly identified NSN against the list of ATAC exclusion items to determine if the carcass is to be shipped to the ATAC HUB or excluded from the ATAC system. If not identified as an ATAC exclusion item, the material will be packaged for shipment to the appropriate HUB (or via a NODE for consolidation and trans-shipment to the HUB). The initiating activity will consult Part I of the microfiche MRIL for guidelines pertaining to security classification and special shipping and handling instructions. However, since all ATAC designated items will be shipped directly to the HUB, or to the HUB via a NODE, the turn-in activity does not need to utilize Part II of the MRIL to locate shipping addresses.

2. Mechanized MRIL Activities

Shore activities with mechanized MRIL processing have the same disposition and shipping information as their manual counterparts. Updated monthly by FMSO, the mechanized MRIL is maintained on three computer files; one file equivalent to Part I of the microfiche MRIL containing the basic MRIL data base, and the other two files containing the shipping addresses (one file in Shipping Code sequence and the other file in Activity Sequence Code sequence–a four position numeric code used in the mechanized processing to determine the closest DOP/DSP).

After ensuring the retrograde unit is not an ATAC exclusion item, the activity processes the turn-in transaction through the mechanized MRIL to produce a DD Form 1348-1 document addressed to the ATAC HUB. As is the case with the microfiche MRIL activities, shipping addresses of the various DOP/DSPs are not needed. Since the implementation of the ATAC Program, mechanized MRIL activities have been provided software parameter changes that automatically address the DD Form 1348-1 turn-in documents to the nearest HUB.

3. Transportation to HUBS

Shipment of carcasses from the fleet/shore activity to the appropriate processing HUB is generally accomplished by one of the following methods:

1. The customer activity turns in the material directly to the processing HUB, either by hand delivering the material to the HUB or shipping the item by certified mail, small parcel carrier, or other traceable transportation means (such as QUICKTRANS).

2. The customer activity turns the material into the contractor operated NODE (again either by hand delivery or traceable transportation means) who in turn consolidates and ships the carcass to the processing HUB.

3. The customer turns in the material to a Navy operated NODE who will ship the material to the processing HUB. Navy operated NODES are "low volume sites from which retrograde assets free flow into a HUB." [Ref. 14:p. 26]

4. Fleet units can off load carcasses at any Navy facility which provides transshipment services to the HUB/NODE.

Regardless of the transportation method used to get the material to the appropriate processing HUB, the originating activity retains proof of custody transfer (signed copy of DD Form 1348-1 or locally prepared manifest).

All Continental United States (CONUS) ATAC retrograde shipments are to use Transportation Priority I (TP1) for material movement while XCONUS retrograde shipments are to use TP4 or surface lift. In November 1988 the Secretary of the Navy directed that XCONUS repairables under the ATAC Program move via TP4 or surface vice TP1 or TP2 in order to save Servicewide Transportation (SWT) funds [Ref. 15].

B. CONTRACTOR NODES/FREIGHT AGENT SERVICES

In addition to performing receiving and shipping functions at the HUB sites, the ATAC Program freight agent (MKSI) is a key participant in the pipeline of retrograde movement from the originating fleet/shore activity to the processing HUB. The freight agent's involvement in getting the material to the HUBs is primarily through the operation of 10 contractor operated NODE sites (contractor NODES are listed in Appendix B).

The contractor NODE is defined as "a location which provides DLR consolidation and transshipment" [Ref. 14 p. 10]. Established at a number of high volume sites (as determined by NAVSUP) which include NSCs, Supply Depots and Air Stations, contractor NODE responsibilities as specified in the ATAC Program freight agent transportation services Solicitation Statement of Work generally include:

1. Pier side, terminal, or on-site pickup receipt.
2. Initial review of asset documentation (1348-1 or 348-1A) to verify that the asset is an acceptable DLR and reject unqualified assets to the customer or return to Navy custody if customer is not available.
3. Visually screen all cargo to detect hazardous material not identified as such by the customer. Material which shows external signs as being hazardous will be rejected to the customer or turned over to the collocated Navy activity if customer is not available.
4. Provide signature custody receipt for the asset. In the event assets are delivered to the site by transportation other than the customer, a signed copy of the receipt will be mailed to the customer.
5. Inspect and quality control hazardous material packaging and documentation.
6. Prepare and apply bar code labels to the asset/package/documentation. This procedure will vary by site.
7. Provide recooperage or repack to prevent ongoing in transit damage to the assets.
8. Consolidate individual assets, except hazardous cargo, into shipment units and prepare consolidated unit bar code.

9. Prepare consolidated manifest to destination.

10. Transship shipment unit to nearest HUB location via the transportation channel identified by NAVMTO. Assets must be transshipped within one work day of receipt.

11. Input informational data elements into the ATAC data base within one full work day of receipt. [Ref. 14:p. 16-18]

C. MECHANIZED MRIL PROCESSING AT HUBS

All DLR carcasses (except ATAC exclusion items and a few other exceptions, such as WESTPAC repairable items) are turned in by the originating fleet/shore activity, shipped to the nearest HUB (or shipped to the HUB via a NODE or other transshipper), and processed at the HUB in a like manner. In other words, each carcass turned in anywhere in the world, ship or shore, CONUS or XCONUS, is treated exactly the same in terms of the means and priority in which it is handled, shipped and processed (except current XCONUS transportation priorities). It is not until the individual carcass is processed by the mechanized MRIL program at the HUB that the ATAC system makes a distinction between the items by routing them to various DOP/DSPs or stowing the material locally in F condition (the HUB MRIL processing procedure is discussed in Appendix A).

The MRIL, updated monthly by FMSO, is the mechanism by which the ICPs (ASO and SPCC) implement the disposition decision for each item. Retrograde management controls for the two ICPs are discussed below. The discussion on SPCC managed items is a summary of relevant portions of the September 1989 SPCC Induction Review Group (IRG) Report Documenting various repairables management processes and problems.

1. SPCC Managed Items

The primary method by which SPCC controls the positioning of F condition retrograde units is through the use of Maintenance Overhaul Designator (MOD) codes. MOD codes are "used to determine whether retrograde material will be shipped directly to the depot, or held at the applicable DSP to be directed into repair by SPCC as needed." [Ref. 16:p. 13] SPCC assigns MOD code 1 for those items that are to be shipped directly from the HUB to a DOP and MOD code 3 for those items shipped from the HUB to the DSP. MOD codes are incorporated into the mechanized MRIL through the UADPS Application/Operation UH-23 with monthly adds, changes and deletes provided by FMSO.

Determination of the appropriate code depends on whether the item is organically or commercially repaired. For organically repaired items, MOD code 1 is assigned to all workload forecasted NSNs (the depot will not induct more than the quantity specified on SPCC's project orders) and MOD code 3 is assigned for non-workload forecasted items. For commercially repaired items, SPCC uses the following formulas to determine the appropriate MOD code to ensure that excess units above repair requirements are not likely to be sent to the commercial depot:

1. If the Annual Repair Requirement is greater than or equal to the NRFI on hand plus the Carcass Return Forecast (CRF) use MOD code 1.
2. If the Annual Repair Requirement is less than the NRFI plus CRF:
   a. If NRFI is less than one half the Annual Repair Requirement use MOD 1.
   b. If NRFI is greater than one half the Annual Repair Requirement use MOD 3. [Ref. 16:p. 13]

SPCC's experience has been that although only a small percentage of NSNs are coded MOD 1 (14% in October 1989), a large percentage of units actually turned in are MOD 1 items (over 50% in October 1989).

SPCC has also noted the fact that F condition assets have been accumulating at the NSC (DSPs) at the rate of 139,000 units per year (FY88 and FY89). SPCC has attributed this growing F condition asset accumulation to an excess RFI asset posture, largely caused by the large number of RFI units being returned from fleet/shore activities. A secondary factor cited by SPCC was the lack of an effective disposal policy which kept excess F condition assets in storage. [Ref. 16]

Although a systematic analysis has not been conducted to determine the exact reasons for the very large number of RFI units (about 45,000 in FY88 and FY89) being returned to the supply system, SPCC believes that many carcasses are being repaired locally (i.e., at a Ship's Intermediate Repair Activity) and then turned-in in exchange for an RFI requisition. For example, maintenance requirements for some items specify that a broken part cannot be removed until an RFI replacement is received and on hand for immediate change-out. These Remain-In-Place (RIP) carcasses are then repaired locally if possible prior to their return to the supply system. [Ref. 17]

2. ASO Managed Items

ASO uses a simple approach to determine the positioning of F condition carcasses upon completion of processing by the HUB. Unlike the SPCC method which looks at forecasted carcass returns and forecasted carcass repair requirements, ASO pushes all F condition items directly to the DOP or specified collection point (i.e., the collocated DSP for organically repaired items) regardless of the asset posture of that particular item. In other words, every item that is matched to a specified DOP or DSP by ASO is sent directly to that location from the HUB. Those relatively few items for which ASO has not identified a DOP/DSP are coded XX in the MRIL and are placed in F condition storage at the processing HUB.

D. HOLD OR SHIP DECISION

DMRD 901 states that savings in transportation dollars can be expected if all repairable carcasses returned from the fleet customers are received and stored at the first turn-in point and then the ICP's decide what units should be repaired and ship only those to the DSP/DOPs.

The key assumption of the DMRD is that some of the returning carcasses need not be repaired. The question must then be raised as to why the carcasses were turned in. If the answer is that the customer requisitioned an RFI repairable and returned the equivalent carcass, then the repairable item in question is currently an active item which should be repaired and returned to stock as soon as possible to fill the "hole" created by the RFI unit just issued to the fleet. If the answer is that the customer returned the carcass but ordered a better version of the repairable (for example, the head of the family), then the carcass should be sent to disposal or possibly upgraded at a depot to be equivalent to the family head. If the carcass is really not a carcass but is an RFI unit returned from the fleet, then it need not be sent on to a depot. A returned RFI unit may reflect a phase-out and should perhaps be sent to disposal.

The bottom line is that each carcass has been returned because it failed and was replaced by an RFI unit. To get more RFI units to insure replacements for future failed carcasses are available requires repairing the carcasses or procuring RFI units from a manufacturer. Repair is definitely preferred for items designated as repairables.

The argument of holding carcasses at a NODE until the need for repair is determined was that savings in transportation costs could be obtained for those carcasses which will not need to be repaired. Applying this reasoning to all carcasses is not least cost. In fact, for ATAC processed carcasses, it is easy to show that the DMRD policy would be more expensive then immediate transshipment through the HUB if a carcass needs to be repaired.

Let the sum of the HUB processing costs per unit and the "guaranteed traffic" rate for shipping now per unit be denoted as C_N and the sum of processing and shipping costs per unit for shipping later as C_L. Discussions with NAVSUP indicate the processing costs average $35 and $60 per unit, respectively [Ref. 18]. In addition, the guaranteed shipping rate under ATAC will be less than under conventional shipping. Therefore,

$$C_N < C_L .$$

The average costs to ship returned carcasses for an average quarterly demand of D units are then $C_N D$ and $C_L D$, respectively, for the two alternatives. Obviously,

$$C_N D < C_L D$$

so it does not pay to wait until later to ship a carcass even when D is very small; say, 0.1 units per quarter. Notice that when $D = 0.1$, we have an average demand of only once every 10 quarters so we might argue that we should wait until some time near to 10 quarters from now to ship the carcass we just received. Our reasoning might be that perhaps the carcass will never need to be repaired so we should "wait and see." However, it is clear that if $D = 0.1$ the only savings we would have would be that we would not have to incur C_N now and maybe we would not have to incur C_L during the remainder of this year so this year's expense may be less. Unfortunately, because the carcass will need to be repaired eventually, C_L will be incurred at that future time.

Suppose next that D is 0.05 units per quarter. In that case, the average time between demand will be 20 quarters or 5 years. If D is not expected to change over the next 5 years then the carcasses received now should be shipped immediately. If the weapon system needing the repaired carcass is expected to be removed from all of the Navy's combatants within 5 years then it is questionable whether the carcass will need to be repaired. In cases where phase-out or equipment upgrading is planned, the weapon system manager should know about it and could determine which items had forecasted D values small enough to result in an average time between replacements longer than the remaining time until phase-out. Those items so identified may not need to have carcasses repaired and seem logical candidates for holding at a NODE until a repair requirement develops.

Another disadvantage of the Defense Management Review (DMR) 901 decision is that delaying shipment also may delay the start of repair since the carcass will not be at the depot or its DSP when it needs to be inducted but must be shipped, usually using time standards which are larger than ATAC provides. In the extreme case where no RFI units are kept in inventory because of very infrequent demand, then we would expect to expedite carcass movement, incurring even larger transportation costs to the depot so it could repair and return the unit to the customer.

E. CARCASS QUEUING

We need to next examine the problem of what seems to be large queues of carcasses occurring at HUBs and DSP/DOPs. The ICPs forecast demand for items and carcass return rates. The latter are forecasted as a fraction of the demand forecast. Thus, even if all the carcasses which are returned are successfully repaired (which is not usually true) the total number of RFI units in the supply system becomes less and less over time and must be replenished by procurements of new units. Quick repair of carcasses reduces the number of new units needed.

Let us assume that demand occurs according to the Poisson distribution, a distribution which is quite reasonable for repairables, with a quarterly mean of D and the assumption that a repairable carcass is turned in with each demand. Let us also assume that the depot which repairs these units does so at a constant quarterly rate R (which is a good assumption for work-loaded items). The behavior of a system of Poisson carcass arrivals and a constant service rate from a depot can be described by a well-known queuing theory model if we assume the population of installed repairable units is quite large and R is greater than D. The average number of carcasses waiting to be repaired is

$$N = \frac{D^2}{2R(R-D)} \text{ [Ref. 19]}.$$

These N carcasses can be anywhere in the retrograde supply pipeline between a NODE and the DOP. The probability P_b that the depot is busy (i.e., repairing a carcass) is

$$P_b = D/R.$$

From the equation for P_b we realize that if $P_b \leq 1$ then $R \geq D$. The equation for N tells us that R should be strictly greater than D or the average queue length will become infinite. In the real world this would take some time to occur but it explains also why we see storage problems occurring at a DSP or DOP when repair rates are too slow for even a brief period of time. The ICPs need to insure that the DOPs workloaded rate substantially exceeds the rate at which carcasses are returned if inventories are to be kept to a reasonable size.

We can also apply the queuing model results to the HUB. For most items we expect that the time spent at the HUB is relatively constant for each carcass of a given item. Thus, if R is the quarterly processing rate through the HUB then the formula for N given above also represents the average number of carcasses waiting to be processed. In addition, the average time that a given carcass waits in the HUB queue can be described by

$$T = \frac{D}{2R(R-D)},$$

and the average total time in the HUB will be $T_t = T + 1/R$, where $1/R$ represents the average HUB processing time for a carcass of a given repairable. Obviously, to reduce T and T_t requires faster processing through a HUB.

Next, suppose that we have decided to phase out a repairable. Usually then it makes sense to reduce R at the depot. However, if D doesn't change, the queue of carcasses will grow. In fact, if $R < D$ we will have a serious problem since theoretically the queue will become infinite in size.

If we decide to repair only at a rate $R < D$ then the number of units we should ship to the depot will be some number less than D. Let us assume that number is D_1. We then quickly realize that $R > D_1$ is needed or an infinite queue will eventually build up at the depot. We should therefore select D_1 to give a comfortable value of N.

The remainder of the carcasses arriving must be shipped to disposal and disposal must process them at a rate of

$$R_d > D - D_1$$

or we have another very large queue at the disposal site.

F. CONCLUSIONS

As a primary integrating management element of the ATAC system, the MRIL is an effective means for facilitating the retrograde movement of DLRs. The fleet/field user who consults the microfiche MRIL for security classification and special shipping and handling instructions, the HUB that processes the carcass to the DOP/DSP, and the ICP that uses the mechanized MRIL to implement the disposition decision for that item are all using the same tool to move the carcass to its final destination. Ultimately, of course, the effectiveness of the MRIL as a means of getting a carcass to the location where it is most needed for storage or repair is the responsibility of ASO and SPCC.

DMRD 901, which proposes saving money through storing carcasses at their first turn-in point, creates at least two notable problems:

1. "Active" carcasses are delayed at the first turn-in point as opposed to the current ATAC system which moves the material quickly to the depot or the DSP.

2. Storing the carcass at the first turn-in point (i.e., the NODE) would increase the costs both of processing and shipping.

The best that can be said about DMRD 901 is that it may be cost effective for rapid program phase-out items or for systems experiencing numerous upgrades which cause carcasses to become obsolete.

And finally, application of queuing theory results can help prevent increasing build up of stockpiles of carcasses at HUBs and DSP/DOPs.

V. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This final chapter summarizes and describes conclusions drawn from the results of the previous chapters and Appendix A. The conclusions are presented in the order of the research questions stated in the Methodology section of Chapter I (Chapter I, Section D). Finally, recommendations both to improve the ATAC Program as well as recommendations for further research are presented.

A. SUMMARY

This thesis began in Chapter II with a detailed description of the background of ATAC. First, the pre-ATAC environment was discussed with a summary of procedures used at that time to effect disposition of carcass turn-ins. Total System Carcass Tracking was then introduced followed by an outline of the reasons motivating the development of ATAC.

Chapter III provided a detailed analysis of the current ATAC Program in place today. Beginning with a description of the ATAC concept test and fleet-wide implementation of the program in FY86, the operating procedures of the ATAC Program along with a history of service agreements and contractor relationships were presented. Previous ATAC studies were introduced to document what results others had reached in terms of evaluating the effectiveness of various aspects of ATAC. Next, carcass processing goals were discussed, followed by an introduction to the management information systems with descriptions of both the ICP and NARDAC ATAC data bases. The effectiveness of the NARDAC ATAC data base in supporting the objectives of ATAC were then presented. Finally, a summary of a comprehensive evaluation of the entire ATAC Program by the Naval Audit Service was presented.

Chapter IV looked at how carcasses move from the turn-in activity to their destination at the depot or DSP. The role of the MRIL in the entire process of carcass turn-in, shipment, processing and disposition was highlight. And lastly, the implications of the DMR 901 decision was examined from cost and queuing viewpoints.

Appendix A described in detail the operation of the ATAC HUB at NSC San Diego through observations made during several site visits. The entire processing sequence, including receipt of carcasses by the contractor, screening, MRIL processing, packing, and consolidation and shipping was documented. Problem areas and observed shortcomings were noted.

B. CONCLUSIONS

Why was ATAC developed and what were the original goals and objectives?

The ATAC Program was initiated to provide a means to reduce carcass tracking follow-up, shorten processing times (i.e. from end user turn-in to repair at the DOP and back to the supply system in RFI condition), and improve repairable accountability.

After successfully implementing Total System Carcass Tracking in the early 1980's (a means to monitor and enforce activity carcass turn-in performance), NAVSUP saw a need to further improve carcass management efforts in order to improve asset visibility and speed up retrograde movement. Other incentives to improve the carcass management system included results from various studies (such as the 1985 inspection of Naval Air Systems Command (NAVAIR) by the Naval Inspector General) and fleet-wide concern that retrograde time frames for DLR's were too slow. Consequently, after successfully testing the new program in April of 1985, NAVSUP implemented the ATAC system fleet-wide in FY86.

Specific NAVSUP goals for ATAC included reducing the dollar value of inventory in the retrograde pipeline, realizing savings in transportation through consolidation of shipments, realizing savings in personnel costs through economies of scale, providing improved inventory visibility and accountability, and improving redistribution and reutilization of spares.

What are the detailed operating procedures for the ATAC system? Are they effective and what are the problems?

A detailed study of the various elements of the ATAC Program and the previous studies indicate that the ATAC Program is indeed meeting to a measurable extent its defined objectives. As evidenced from the result of two previous theses, the ATAC system has significantly reduced retrograde processing timeframes. The other major benefit resulting from ATAC implementation has been improved visibility and accountability of carcasses due to the centralized HUB processing and reporting of retrograde. This thesis did not attempt to examine possible cost benefits realized through transportation savings and personnel reductions.

One significant area where the current ATAC Program has problems meeting its stated goals is the attainment of reduced pipeline inventory costs. While it is clear that ATAC has significantly reduced retrograde pipeline timeframe, ICP inventory replenishment models have not yet translated that time savings into inventory investment savings.

Besides the absence of measuring and using the benefits of ATAC's shortened retrograde pipeline time frames (retrograde time) to reduce inventory investment, other measurable, quantifiable indicators to track progress or success in meeting the specific objects of the ATAC Program have not been developed yet. Detailed performance measures to monitor and evaluate performance and cost effectiveness need to be implemented (such as monitoring the cost effectiveness of the dedicated GTA carrier or tracking labor savings resulting from centralized HUB processing).

Also, the ICP and NARDAC ATAC data bases appear to be less than ideal in their ability to provide "perfect" carcass tracking and in their use as management information systems. First, the two data bases are somewhat redundant (i.e., they both track the carcass through the HUB); second, they are incompatible and cannot "talk" to each other; and third, the newly developed and implement NARDAC ATAC data base is not yet readily accessible to those who need the information, such as the ICP item manager.

Given the data from questions (1) and (2), can we develop a model that will answer the "ship or hold" question?

Since average costs for processing and shipping later are always greater than the sum of the processing costs per unit and the "guaranteed traffic" rate for shipping per unit today, it is evident that it is always more cost effective to ship a unit now to the DOP rather than later if, in fact, the unit will ever need to be repaired, no matter how far off into the future. Only for those items where phase-out or equipment upgrading is planned and the average time between replacements is longer than the remaining time until phase-out, does it make sense for an item to be held at the first turn-in point instead of being immediately shipped to the depot (or collocated DSP).

Additionally, queuing theory explains why stockpiles of carcasses can quickly build up at depots, DSPs and HUBs. An understanding of the relationship between arrival rates and service rates can be applied to management decisions such as workload rates at depots.

C. RECOMMENDATIONS

The following recommendations should improve the current ATAC system:

1. The ATAC HUB's performance goals should be measured and quantified in all aspects, including the development of time standards for each step in carcass processing. For example, since the HUB processing standard is three days to process each unit,

there should be a time standard established to determine how long a screener or a packer should spend on each unit. Then, after projecting an average carcass arrival rate, management could determine manning levels needed at the HUB to ensure that the three day carcass standard is maintained. The current "Total Quality Management (TQM) philosophy" at the HUBs offer little in the way of process control to ensure that scarce personnel resources are used most effectively.

2. An alternative to the Freight All Kinds (FAK) treatment of carcasses outbound from the HUBs should be examined by NAVSUP. Currently, the GTA carrier (Pilot) delivers all carcasses to the DOP/DSP within four days regardless of an individual item's asset posture (i.e., is there an immediate requirement to repair the carcass?). It seems logical that dollars could be saved on a portion of outbound items from the HUB being shipped via a lower cost, slower mode of transportation. In other words, outbound carcasses could be stratified based on the urgency of their repair requirements.

3. Because of the redundancy and incompatibility between the ICP and NARDAC ATAC data bases, further study should be conducted to determine the feasibility of combining the two data bases into one. Since both data bases track the movement of each carcass through much of the retrograde pipeline to the depot or DSP, it would seem desirable to consolidate the capabilities of both systems into a single, more manageable cost effective alternative.

4. Since the ATAC Program has in fact reduced retrograde time for carcasses returned to the depot for repair, the ICPs should incorporate the reduced time savings into their inventory replenishment models in order to eventually realize savings in inventory investment.

APPENDIX A

NSC SAN DIEGO HUB SITE VISIT

A. OVERVIEW OF CURRENT PROCEDURES

On-site visits were made to the ATAC HUB, NSC San Diego to observe the processing of repairable components. The entire processing sequence, from receipt of material by the contractor, processing by HUB personnel, and return to contractors for shipment to the DOP/DSP was observed with a view towards documenting each step in the processing sequence as well as identifying potential areas for improvement.

In general, the HUB operates in an assembly line manner. Incoming carcasses are received by the ATAC Program freight agent (MKSI); turned over to Navy HUB personnel for screening, MRIL processing, and packing; given back to MKSI for consolidation; and finally shipped to the appropriate DOP/DSP by Pilot Air Freight, the designated GTA carrier.

The carcasses are handled by the contractors and the Navy HUB personnel strictly on a first-come, first-serve basis. The material is separated according to size with out-sized items (material too large or too heavy to fit on a standard pallet or requiring special handling by other than a standard forklift) remaining outside the HUB warehouse building. The paperwork accompanying these items is brought inside the warehouse for processing while the material is left outside for screening. Those items brought into the warehouse for processing are routed onto two conveyor systems, one for small items such as circuit cards that will fit into a tote pan, and the other for pallet sized material. After MKSI receives and processes the item, a carcass makes its way through HUB processing in assembly line fashion culminating in consolidation and shipment (see Figure 4).

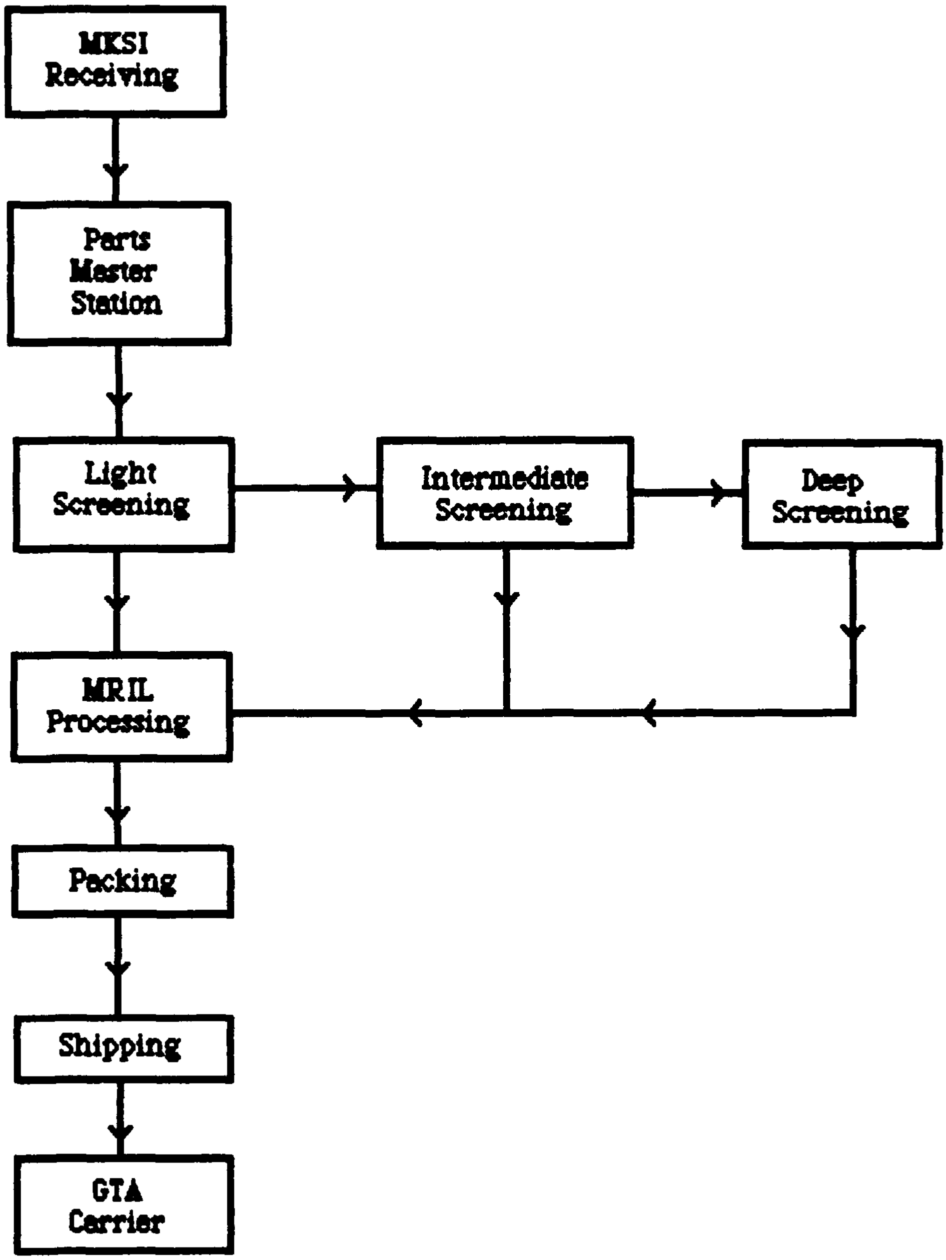

Figure 4. HUB Processing Flow

During the visits to the HUB (May through September 1990), there was only a single day shift working; and, during lunch hour and morning and afternoon breaks, there was no HUB carcass processing accomplished because all employees took their breaks at the same time. There were no daily goals or production quotas assigned to the workers. When asked how much output was required in a day, each worker questioned responded that the HUB was operated on a Total Quality Management (TQM) basis, and hence he or she was not tasked with a specific number of carcasses to process. Management's response to the question of daily worker production goals was that the HUB supervisors know through experience how many units a worker should be able to process in a day. In general, for example, a light screener should process an average of 100 carcasses a day, a MRIL operator should process 250 carcasses, and a light packer should pack 80 carcasses each day [Ref. 20].

The following sections detail the procedures of each step in carcass processing at the HUB, NSC San Diego, and identify problems/shortcomings observed.

B. RECEIVING

The following are MKSI's receiving responsibilities as specified in the ATAC Program freight agent transportation services Solicitation Statement of Work:

1. Receives shipment units from NODES or directly from the customer.
2. Visually screens all cargo to detect hazardous material not identified as such by the customer. Material which shows external signs as being hazardous will be rejected to the customer or to the appropriate packaging activity.
3. Reviews documentation for exclusion or exception processing.
4. Unpacks shipping cartons, retains reusable containers with assets, verifies documentation against consolidated manifest and prepares a TDR if required and forwards to NAVMTO.
5. Applies four identical bar code labels and applies to the assets received without bar codes.

6. Prepares pallet manifest for custody release of the assets to the Navy. This manifest may be manual or electronic. Release pallet/assets to the Navy by signature control.

7. Enter required data elements into the ATAC data base prior to turning over to the Navy.

8. All non-excluded DLRs received by the Agent shall be processed to NSC within one (1) work day of tailgate date.

9. Incoming freight not off-loaded prior to close of business is to be protected from the elements. [Ref. 14:p. 18-19]

The Navy contract with MKSI also defines certain categories of materials as exclusion items that, for reasons based on economics, safety, and security, are not appropriate for movement within the ATAC system. The following items designated as exclusion items are, if received by the contractor, to be turned over to Navy representatives at the HUB:

1. Aircraft engines
2. Marine Gas Turbine Engines (Shipboard Propulsion Units)
3. Fleet Ballistic Missile Components
4. Classified Items (Security)
5. All Material Destined for Disposal (DOC ID BGJ)
6. Redistributed Assets (DOC ID A2__)
7. Nuclear Reactor Plant Material (SMIC X1-X5)
8. RADIAC Material (Radioactive Assets, FSC 6665)
9. Class A, B, and C explosives
10. Small Arms, Ammunition and Night Vision Devices
11. Uncertified and improperly prepared hazardous material
12. Helicopter Gear Boxes (over 8000 lbs.)
13. Oversized items which cannot be loaded into a closed 40 foot van by a single equipment operator with an 8000 lb. forklift. [Ref. 14:p. 29-30]

MKSI is thus responsible for receiving all incoming carcasses from all sources (including material received and shipped by MKSI from the various NODES); screening the material to detect hazardous items not so identified by the customer, or for material requiring exclusion or exception processing (items requiring special attention due to accountability, control or traceability considerations); entering appropriate data elements into the NARDAC ATAC data base; applying bar code labels to the items (indicating customer turn-in document number and NSN); and finally, turning over of the material to the Navy for HUB processing within one (1) work day of tailgate date (MKSI tailgate date is the date that MKSI receives the incoming retrograde unit at the NSC San Diego HUB facility).

In general, there appear to be few problems in this area of the HUB operation with the contractor routinely able to meet the one day processing requirement. The most significant problems seem to stem from shortcomings in the new NARDAC ATAC data base. For example, since data on incoming DLRs is entered by MKSI receipt processing personnel on stand alone microcomputers without a shared data base, duplicate document numbers from the customer can be accepted by the NARDAC ATAC data base which will later on cause rejection by UADPS during MRIL processing. An unrelated problem discovered is that MKSI does not (although required to in the contract) prepare TDRs when packaging or shipping discrepancies are noted [Ref. 21].

C. PARTS MASTER STATION

The first stop for an item being processed by the Navy at the HUB is the Parts Master Station. Here a single operator scans the bar code label previously attached to the part by MKSI into an automated data base called Parts Master. Parts Master is a commercially produced data base updated monthly that contains Management List-Navy (ML-N) type information on repairable components. At the Parts Master Station, the NIIN is merely scanned off the bar code label by a hand held laser gun and a single data sheet is produced and printed out. This data sheet lists the full NSN, item name, Commercial Activity or Government Entity (CAGE), manufacturer's part number, security code, and other management information. The Parts Master Station operator attaches the Parts Master printout with the material and passes the item along to screening. Items that cannot be matched to a Parts Master record are also passed on to screening with a printout.

Errors in this step of the operation consist mainly of unreadable bar code labels which cause the Parts Master Station operator to request MKSI personnel to re-bar code the item. Another area which causes problems is the currency of the Parts Master data base. Although updated monthly, Parts Master is frequently superseded by the automated MRIL (such as when the Federal Supply Class changes on an item), which often means that an item will have to be returned to MKSI for re-bar coding much later in HUB processing (to ensure the bar code label accompanying the item as well as the NARDAC ATAC data base are changed to reflect the correctly identified NSN).

D. SCREENING

After an item is processed at the Parts Master Station, it then moves to the screening area where it will be processed by up to three levels of screeners.

1. Light Screening: Here the part itself is examined for the first time. The screener matches the part number on the Parts Master printout with the part number inscribed on the physical part. If the part numbers match, then the screening process is over and the part is routed forward to MRIL processing. If the part number on the part does not match the Parts Master printout, the light screener will attempt to generate a new Parts Master printout citing the correct physical part number and, if successful, will change the accompanying DD Form 1348-1 turn-in document to reflect

the correct NSN and part number. The light screener will then send the documentation back to MKSI for re-bar coding. If a quick search of the Parts Master data base fails to locate the applicable NSN for the item, it is then passed on to intermediate screening. The light screeners, who complete 80-85% of HUB screening, generally re-identify about 15-16% of all items processed. During March 1990, re-identifications accomplished by the light screeners consisted of 784 Federal Supply Class changes and 907 mismatched items (turn-in documentation didn't match the physical part) representing 14.82% of the total 11,411 items processed [Ref. 22].

2. Intermediate Screening: Items not successfully identified at light screening are passed on for further research by an intermediate screener. The intermediate screener maintains a full set of microfiche to identify items and cross-reference part numbers to appropriate NSNs. Additionally, the screener has access to paper publications such as aircraft Illustrated Parts Breakdowns (IPBs).

About 80% of the items not identified by the light screeners are identified at the intermediate level, approximately half of which are items misidentified from the customer. Most items received from the customer activity in which the turn-in documentation doesn't match the physical part are simply cases of family group discrepancies (i.e., the same DD Form 1348-1 turn-in document cites the family head, but a member other than the head is the part actually turned-in). Much of the remaining work consists of identifying items that have no part numbers on the physical part (particularly 7H cog) or parts that are not listed on the Parts Master data base, or solving various miscellaneous problems such as unit of issue discrepancies or cannibalization situations (i.e., incomplete carcasses). [Ref. 21]

3. Deep Screening: The deep screeners process the remaining items that are unresolved from light and intermediate screening. Additionally, the deep screener handles

those items returned NRFI from a contractor DOP, usually for reasons such as an expired repair contract or specification of an incorrect DOP by the automated MRIL.

Two types of RODs are generated by the screening process. Items misidentified by the customer but which can be matched to an NSN cause the creation of an AROD. The AROD is generated through mechanized MRIL input when the MRIL operator enters both the incorrect, customer provided NSN of the item along with the correctly identified NSN. The ARODs are mailed to the ICPs with summary listings provided to the TYCOMs to review performance of fleet units. Originators of the misidentified items also receive notice of the ARODs and are given an opportunity to respond or challenge the re-identification. Items misidentified by the customer but not relatable to an NSN cause the creation of a manual ROD. Manual RODs are mailed to the originator of the misidentified carcass to inform the activity of the actual material received at the HUB and to advise that local records (of the originator) should be adjusted accordingly.

E. MRIL PROCESSING

After the screeners positively identify the item and ensure that the information on the turn-in document corresponds with the material actually turned in, the carcass is sent on to the MRIL station to determine disposition of the item and generation of the appropriate stowage or shipment document. Additionally, during MRIL processing, a TIR is transmitted to the appropriate ICP indicating that the carcass turned in under the given document number was processed by the HUB and shipped or stowed as specified by the automated MRIL.

The MRIL operator reads the appropriate data fields from the turn-in document, including NSN and document number, into the MRIL computer terminal screen. The

MRIL program will generate one of the following output documents from separate printers located at each MRIL station:

1. Transshipment (DOCID BC2): The transshipment document is the basic shipping document to transfer a carcass to the various DOPs/DSPs (except transfers to activities participating in the advanced shipping program). Transshipment documents are generated for both commercial and DOD destinations.

2. Advanced Shipment: Several of the major DSPs, including NSCs San Diego, Norfolk, Pensacola, Jacksonville, and MCAS Cherry Point, are participants in the Advanced Shipping program. For carcasses being sent to these activities and destined for F condition storage, the MRIL program generates a transshipment document specifying the actual warehouse location for each individual item.

3. Local Stowage (DOCID MMD): Items for which the MRIL specifies NSC San Diego as the destination generate a material movement document for local F condition stowage.

Problems in the MRIL processing segment of the HUB consist mostly of duplicate turn-in document numbers (an activity erroneously uses the same turn-in document number on two different carcasses) that the NARDAC ATAC data base bails to detect during bar coding by MKSI; or incorrect NSNs (generally the FSC) that are generated by the Parts Master data base. In both cases, the material is returned to screening and the documentation is returned to MKSI for correction and re-bar coding.

F. PACKING

After MRIL processing, the item moves to packing for shipment preparation or storage. Upon completion of packing, the items are separated according to their destination: local stowage, disposal, or transshipment to a DOP/DSP. Most difficulties in this area relate to ensuring the material is packed into the proper container. Frequently, the customer activity does not ship the item in the specified required container, forcing the HUB to either obtain or construct a suitable container.

G. SHIPPING

After packing as been completed, transshipment items are turned back over to MKSI for consolidation and preparation for shipment to the appropriate DOP/DSP. MKSI performs the following functions:

1. Receives the individually packed and ready to ship NRFI assets from Navy personnel with accompanying DD Form 1348-1 documentation.
2. Provides the Navy with an electronic or manual signature indicating transfer of custody of the material from the Navy to MKSI has occurred.
3. Consolidates on a daily basis all items (except hazardous) according to specific destination and building number.
4. Produces a bar code label contain the lead TCN, number of pieces, weight, and destination Unit Identification Code (UIC) and attaches the label to the outside of the consolidated container.
5. Enters the appropriate data elements into the NARDAC ATAC data base.

MKSI must accomplish the above steps for each NRFI item and then physically turn the material over to the GTA Carrier (Pilot Air Freight) by close of business of the day following the day that MKSI received the item from packing.

Transfer of material custody is one aspect of the Navy/MKSI interface that appears to leave room for potential loss of control and accountability of the carcasses as they pass from Navy custody (packing) back to MKSI for shipping. Material is transferred from the Navy to MKSI by having Navy packers place the packed units on pallets, after which MKSI personnel at their discretion (i.e., sometime after they notice a full pallet) begin processing the material by producing electronic signatures (listing) for all items on the pallet. The problem with this current arrangement is that MKSI, not the Navy, is responsible for ensuring that each carcass is included in the electronic signature transfer of custody process. If an item is missed when MKSI prepares the electronic signatures, then the NARDAC ATAC data base will reflect that the unit is still somewhere in HUB processing, and, later on, if the material never arrives at the DOP or DSP, proof of shipment/delivery will be difficult to trace.

H. GTA CARRIER

All outbound carcasses that have been processed by the NSC San Diego HUB and are destined for a DOP/DSP are shipped via the GTA carrier, Pilot Air Freight. All items are shipped under a FAK classification, meaning that every item is treated alike without distinction based on urgency of material requirements, cost, or any other criteria.

Pilot Air Freight is required to deliver each item to its destination within four days after receipt of the material from MKSI. Since each item processed is classified on a FAK basis subject to the same four-day delivery requirement, the Navy is not concerned what transportation mode (i.e., truck or air) is used for shipping a particular item to the DOP/DSP. The Navy is billed on an aggregate weight basis according to which one of the three geographical regions an item is delivered to:

> Carrier agrees that aggregated weight of all shipments to the consignee with the same UIC tendered on the same day will be adjusted and billed at the applicable rate for total weight of these shipments. [Ref. 23: item 42]

Further, each delivery within the same UIC but to a different building will generate an additional billing of $15 [Ref. 7].

Occasionally, an item is refused at the delivery location due to an expired repair contact, incorrect DOP designation by the automated MRIL, or other reasons. In those cases, Pilot Air Freight will contact MKSI for disposition instructions. MKSI in turn will contact Navy HUB personnel (deep screening). The deep screening technician will research the item, generally checking the item against the MRIL and often consulting by telephone with the item manager at the ICP. When the item is returned to the HUB for storage or further research, or if the HUB directs the material to be transshipped to another location, Pilot Air Freight will charge the tendered rate for the additional movement. Neither the NSC San Diego HUB or the Navy Material Transportation Office (NAVMTO) maintain cost dat of how many dollars are spent to correct refused or undeliverable shipments.

APPENDIX B

LIST OF ATAC HUBS AND CONTRACTOR NODES

HUBS

Naval Supply Depot Subic Bay, Phillipines

Naval Industrial Facility Cherry Point, North Carolina

Naval Supply Center Norfolk, Virginia

Naval Supply Center San Diego, California

HUB: A Navy DLR processing facility which provides technical inspection, electronic transaction item reporting to the ICP and repacking for transshipment to a DOP or DSP [Ref. 14].

NODES

Naval Supply Center Charleston, South Carolina

Naval Air Station Corpus Christi

Naval Supply Center Jacksonville, Florida

Naval Supply Center Pensacola, Florida

Naval Air Station Sigonella, Italy

Naval Supply Center Detachment Long Beach, California

Naval Supply Center Oakland, California

Naval Supply Center Pearl Harbor, Hawaii

Naval Supply Center Puget Sound, Washington

Naval Supply Depot Yokosuka, Japan

NODE: A location which provides DLR consolidation and transshipment. The contractor provides data entry into the ATAC data base, prepares a bar code and attaches the label to the retrograde asset [Ref. 14].

APPENDIX C

NARDAC ATAC DATA BASE AUTOMATED MANAGEMENT CONTROL AIDS

Application description:

1. Transit time outbound from HUBs › 4 days: The GTA calls for carcasses to be delivered to the DOP/DSP in 4 days from the HUB. NAVMTO managers can review this report periodically to exam where Pilot is failing to meet GTA requirements. Actions can be initiated to improve Pilot's performance.

2. 30 to 59 day no proof of delivery: Receipt of proof of delivery from Pilot signifies successful completion of accountable carcass movement through the process. This report will aid in identifying failures of Pilot to provide PODs and enable NAVMTO to take action to ensure process accountability.

3. DLRs remaining in screen: It is important that carcasses can be accounted for in each stage of the ATAC process. This report is designed to help the manager identify potential accountability problems (e.g., carcasses that enter screening but don't move to the next step in the process).

4. NSC time in screen: The goal is 3 days to complete carcass processing time in the screening/NSC section. This report will identify failures to meet that goal so management can take action.

5. Excessive agent handling time: Appendix A speaks to specific handling goals (e.g., 24 hours to process receipt at HUB and turn over to screening). This report will aid the NAVMTO managers in identifying failures of the contractor to meet goals. NAVMTO can potentially use these reports to penalize the contractor for poor performance.

APPENDIX D

GLOSSARY OF ACRONYMS AND ABBREVIATIONS

AROD	Automated Report of Discrepancy
ASO	Aviation Supply Office
ATAC	Advanced Traceability and Control
AVDLR	Aviation Depot Level Repairable
CINCLANT	Commander in Chief, Atlantic Fleet
CINCPAC	Commander in Chief, Pacific Fleet
CONUS	Continental United States
CRF	Carcass Return Forecast
CTRF	Carcass Tracking Record File
CTR	Carcass Tracking Record
DLR	Depot Level Repairable
DMRD	Defense Management Review Decision
DMR	Defense Management Review
DOCID	Document Identifier
DOP	Designated Overhaul Point
DSP	Designated Support Point
DTO	Direct Turn Over
EDI	Electronic Data Update
FAK	Freight All Kinds
FMSO	Fleet Material Support Office
GBL	Government Bill of Lading
GTA	Guaranteed Traffic Award

ICP	Inventory Control Point
IPB	Illustrated Parts Breakdown
MAC	Military Airlift Command
MCAS	Marine Corps Air Station
MILSTRIP	Military Standard Requisitioning and Issue Procedures
MKSI	Morrison-Knudsen Services Incorporated
ML-N	Management List - Navy
MOD	Maintenance Overhaul Designator
MRIL	Master Repairable Item List
MTMC	Military Traffic Management Command
NARDAC	Navy Regional Data Automation Center
NAVAIR	Naval Air Systems Command
NAVMTO	Navy Material Transportation Office
NAVSUP	Naval Supply Systems Command
NIIN	National Item Identification Number
NRFI	Not-Ready-For-Issue
NSC	Naval Supply Center
NSD	Naval Supply Depot
NSN	National Stock Number
POD	Proof of Delivery
RFI	Ready-For-Issue
RIP	Remain-in-Place
ROD	Report of Discrepancy
RTAT	Repair Turn-Around Time
SIT	Stock in Transit

SPCC	Ships Parts Control Center
TCN	Transportation Control Number
TDR	Transportation Discrepancy Report
TIR	Transaction Item Report
TQM	Total Quality Management
TYCOMS	Type Commanders
UADPS	Uniform Automated Data Processing System
UIC	Unit Identification Code
XCONUS	Outside the Continental United States

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