DISTRIBUTION STANDARD SYSTEM (DSS)

EQUIPMENT CONTROL SYSTEM (ECS)

OPERATIONAL CONCEPT DESCRIPTION (OCD)
(DI-IPSC-81430)

Revision 5/Change 1

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1.0 SCOPE

1.1 Identification

The specifications of this document refer to the Equipment Control System (ECS) as developed under the Defense Systems Design Center (DSDC) System Change Requests (SCRs).

The requirements/concept address all software resident on PC or workstation-sized computers which will drive the following:

- NISTARS Laser Scanner Controller (NLSC),
- NISTARS Ministacker Controller (NMC),
- Navy STACKMAN Unit Loader,
- Navy and DLA Automated Guided Vehicle (AGV),
- Navy and DLA Carousel controllers,
- Navy and Air Force Ministacker controllers,
- Navy, Air Force and DLA conveyors,
- DLA Tote Conveyors,
- DLA Pallet Conveyors,
- DLA Towline,
- DLA Sorters,
- DLA Allen-Bradley PLC,
- DLA Automated Weigh and Offer Systems (AWOS), and
- communications interface with DSS (Upper Tier) functions.

1.2 System Overview

Currently there exist separate and unique systems for mechanized material handling in the Navy and Air Force-based DLA depots and at the DDRV, DDJC, Sharpe, DDJC Tracy, DDSP-E and DDSP-W IMC depots. Each of these systems runs under a different and unique inventory control system. The following subparagraphs describe these systems and their backgrounds.

In August 1994, the Defense Distribution Systems Center (DDSC) authorized Peat Marwick (KPMG) to study the feasibility of a single equipment control system for use at all Defense Logistics Agency (DLA) depots that utilize computer-controlled mechanization. The recommendations of this study were presented in Report 3 of the KPMG study entitled "Lower Tier Standardization Evaluation". The study team proposed a portable, low-functionality system that would receive a single, Standard Movement Message (SMM) for all movement requests. DSDC proposed ECS as an equipment control system that would meet these ideals. On August 1, 1995, DDSC authorized DSDC to commence work on the development of ECS.

In September of 1994 KPMG Peat Marwick, with the support of MATCOM2, began performing site surveys of all DLA depots. The purpose of these surveys was primarily to determine any obstacles to the implementation of DSS at these sites and to find resolutions to these obstacles. A secondary purpose of the surveys was to evaluate the mechanized sites' current materials handling systems and determine whether it would be more economical to create interfaces between DSS and the legacy systems or create a new standard control system for all sites.

The following represents outline the finding s of the KPMG Peat Marwick and MATCOM2 evaluation and the conclusions that were drawn.

The following are the options that were considered for resolution of the mechanization problem.

- **OPTION 1 - NISTARS BLACKBOX APPROACH**
  DSS will drive the MHE by directly interfacing with the current lower tier, NISTARS. This will require the development of conversion software between DSS and the lower tier.

  To interface to DSS, NISTARS will have to be modified to accept DSS/PCS Interface transactions. A reconciliation process will have to be developed to resolve any data discrepancies because of redundant information on both systems. The new DSS RF and packing functions will be bypassed. All pertinent DSS SCR work completed to date will have to be applied to NISTARS. This option will require supporting two systems that perform virtually the same functions.

- **OPTION 2 - AWS BLACK BOX APPROACH**
  DSS will drive the MHE by directly interfacing with the current lower tier, AWS/ASM. This will require the development of conversion software between DSS and the lower tier.

  To interface to DSS, AWS/ASM will have to be modified to accept DSS/PCS Interface transactions. A reconciliation process will have to be developed to resolve any data discrepancies because of redundant information on both systems. The new DSS RF and packing functions will be bypassed. All pertinent DSS SCR work completed to date will have to be applied to AWS/ASM. This option will also require supporting two systems that perform virtually the same functions.

- **OPTION 3 - ECS APPROACH**
  DSS will drive the MHE by interfacing with a standard lower tier system other than AWS/ASM and or NISTARS.

A standard lower tier system will have to be developed to interface with the current MHE. This system will act as a bridge between the DSS and the resident MHE and contain no functionality.

The KPMG Peat Marwick and MATCOM2 surveys discovered that all Air Force and Navy lower tier systems contained functionality which duplicated current or near term DSS processing. In fact the bulk of the code that made up the lower tiers was dedicated to this duplicate processing. The portion of the legacy systems that performed actual mechanized movement, although embedded in these higher level duplicate functions, reflected easily duplicated, low level, movement messages. The survey also discovered that if the high level functions of the lower tiers were removed that the material movement functions could be performed on a relatively small and inexpensive computer or series of computers

The following tables illustrate the lower tier functions that duplicate DSS functions.

DSS FUNCTIONS	NISTARS FUNCTIONS
Receiving	Induction
Stow Processing	Stow Processing
Picking	Picking
Face Activities	Face Activities
Quantity By Location	Quantity By Location
Audits	Audits
Reporting	Reporting
Document Creation	Document Creation
RF Processing	RF Processing
Packing and Consolidation	Packing and Consolidation
	Navy Site MHE control
DSS/PCS Interface Transaction	

Table 1-1 NISTARS Functional Comparison

DSS FUNCTIONS	AWS FUNCTIONS
Receiving	Induction
Stow Processing	Stow Processing
Picking	Picking
Face Activities	Face Activities
Quantity By Location	Quantity By Location
AWOS	DAWS
Audits	Audits
RF Processing	MC68000 MIRT Processing
	Air Force Site MHE control
DSS/PCS Interface Transaction	

Table 1-2 AWS Functional Comparison

The following Figures compare features of the ECS approach with that of the legacy lower tiers.

ECS APPROACH FEATURES	NISTARS BLACKBOX APPROACH FEATURES
Scalable, small, inexpensive hardware platform	TANDEM platform
Single maintenance shop for entire DLA	Multiple maintenance shops for each legacy lower tier
Standardized for all DLA sites	Applicable to Navy sites only
Simplistic, practical design	Complex, redundant, function-laden design
SCRs for DLA compliance currently completed or scheduled	SCRs for DLA compliance possibly required
Portable (COTS) operating system and language may be selected (WINDOWS NT,C++)	Vendor dependent software

Table 1-3 NISTARS Features

ECS APPROACH FEATURES	AWS BLACKBOX APPROACH FEATURES
Scalable, small inexpensive hardware platform	UNISYS platform
Single maintenance shop for entire DLA	Multiple maintenance shops for each legacy lower tier
SCRs for DLA compliance currently completed or scheduled	SCRs for DLA compliance possibly required
Standardized for all DLA sites	Applicable to Air Force sites only
Simplistic, practical design	Complex, redundant, function laden-design
Portable (COTS) operating system and language may be selected (WINDOWS NT,C++)	Vendor dependent software

Table 1-4 AWS Features

Once DSS RF control and packing are assimilated, all functionality will reside on the Upper Tier. Consequently all inputs and most of the data will also be located on the Upper Tier. These inputs and data are required by the lower tiers to perform its material movement functions.

The KPMG Peat Marwick report concluded that the most cost effective solution would be to create a Standardized Equipment Control System (ECS).

As a result of the KPMG Peat Marwick and MATCOM2 evaluation, the standard ECS concept was selected. The core of the system, Navy and Air Force interfaces, have been developed at this time. This base will be modified to include the DDRV and DDSP-W IMC requirements.

The purpose of ECS is to eliminate the need for the Distribution Standard System (DSS) to be involved in the mechanics of material movement at DLA depots. ECS accepts a request to move material from DSS using an SMM and will accomplish the move with no further input from DSS.

1.3 Document Overview

This document describes the operational concept which will serve as a basis for the DSS ECS software.

Section 2 outlines referenced documents. Each site that requires an ECS will have a separate appendix created. The appendix for each site will include a description of the current system to include any automation, a justification and nature of change required, a description of the concept for a new system to include any related interfaces with existing mechanization and a description of any DSS/ECS hardware required to support the new system concept. The above information will be derived from the site survey conducted for each site or the engineering specification for any new mechanization projects.

2.0 REFERENCED DOCUMENTS

KPMG Peat Marwick LLP report, Lower Tier Standardization Evaluation

Distribution Standard System ECS Software Development Plan

SOFTWARE DEVELOPMENT AND DOCUMENTATION, MIL-STD-498

Defense Management Review Decision (DMRD) 902

Defense Management Review Decision (DMRD) 925

ECS Training Package Handbook

RF/ECS Interface Requirements for the IMC Complex, DDSC-EF, dated 12 Apr 1995

Standard Operating procedure for high rise stow in the Integrated Material Complex (IMC), dated 10/24/89

SOP for Loading of Stow Modules in the IMC, dated 10/24/89

Memo for DSDC-MDL1 through DDRE-T, Cart Flow Information for Standard ECS, dated 6/17/97

APPENDIX A SITE REPORT TEMPLATE

The following is a template that should be utilized in preparing future site reports related to a DSS/ECS subsystem.

1.0 JUSTIFICATION FOR AND NATURE OF CHANGES

This section should include a reference to the Systems Change Request (SCR) number that initiated the project. A short description of the work to be performed should be included. This work description can be derived from the SCR description text. Any assumptions or constraints related to the project should be documented in this section.

2.0 DESCRIPTION OF CURRENT SYSTEM OR SITUATION

This section should document the current system in sufficient detail as to allow for an adequate system design to be accomplished. This section should include as many of the following items as possible:

- A description of any automated processes that are utilized to run the current system.
- A description of all hardware interfaces (i.e. PLC, scanners, scales, etc.) related to the current system.
- Where possible capture buffers related to the message formats utilized by the site mechanization should be included.
- If possible, engineering drawings should be included that depict the Material Handling Equipment (MHE) involved in the project.
- A copy of any system, operational or maintenance manuals that are available.

3.0 CURRENT SITE HARDWARE

This section should include an inventory of all hardware (i.e. PLC, scanners, scales, computer equipment, etc.) used by the current system. The list should include the manufacturer, the model number and the quantity of each hardware item.

4.0 CONCEPT FOR A NEW OR MODIFIED SYSTEM

This section should describe the proposed new system or modifications to an existing system. This description should be in sufficient detail as to allow for the preparation of necessary design documents to support the project. As much as possible the following items should be included in this section;

- A description of any new or modified DSS processes related to the project.
- A description of any new or modified ECS processes related to the project.
- A description of any assumptions or constraints related to the project.
- A description of any DSS/ECS hardware required to support the new or modified system.

APPENDIX B DSS/ECS STANDARD DESIGN CONCEPTS

The following are standard concepts that will be used in the design and development of all new DSS/ECS subsystems:

1.0 ECS/DSS OPERATIONAL SCENARIOS

To allow DSS to become site independent in timing of material movement, SMMs will be sent from DSS to ECS at preset, standardized points in the DSS logic flow. These points are described in *Table I-1* below.

Functional Point	Description
Receipt Induction	A DSS terminal will be located at these workstations. An Ad Hoc Move conversation or a tailored movement conversation will be executed and an SMM will be transmitted to the ECS to move the material to the specific inspection/receiving station(s).
Receiving Completion	Upon completion of the receiving process, DSS will send an SMM to direct the material to either Inspection, PPPM, Storage, staging carousel, or module build, outlying storage, dimension & weigh, shipping packing, or consolidation, frustrated freight, or discrepancy.
Inspection Completion	Upon completion of the inspection process, DSS will send an SMM to direct the material to PPPM, staging carousel, module build, Workstation 21, outlying storage, dimension & weigh, shipping, packing, consolidation, frustrated freight or discrepancy.
PPPM Completion	Upon completion of PPPM, DSS sends an SMM to direct the material to staging carousel Module build, Workstation 21, outlying storage, dimension & weigh, shipping, packing consolidation, frustrated freight, or discrepancy.
Module Build	DDRV: A DSS terminal will be located at these workstations. The RF Stow Prep conversation will be executed. No ECS movement will be initiated at this point. DDSP-W IMC: A DSS terminal will be located at these workstations. Empty modules will automatically be positioned on both stands. DSS will send SMMs to ECS in module built order for releasing totes from the staging carousels. When a module is built it will be staged for storage activity.

Functional Point	Description
Storage	DDRV/DDSP-E: Pick completions will generate SMMs for the sortation device. DDSP-W IMC: When the user logs into the DSS RF terminal he/she will either request an empty module to perform picks or a full module to perform stows. The appropriate SMM will be generated. When a pick cycle is completed, the operator will drop off the module and an SMM will be generated to move the module to packing induction. .
Storage (cont.)	At this time a new empty module or a full module can be requested. An appropriate SMM will be generated. DDSP-E: Generate SMM from RF for miscellaneous utility requests, e.g., request load of empty totes
Stow Initiation	Ministacker only: When the material is to be stowed, DSS will send an SMM to prepare the equipment for the stow if necessary
Stow Completion	DDSP-E: To remove records from the ECS database, DDSP-E requires an SMM for each stow completion.
Location Survey, COSIS, Inventory	No ECS action.
AWOS	ECS will interface with scanners and scales on the current AWOS systems. ECS will transmit a M02 message to DSS containing the control number, weight and dimension information. DSS will send an SMM to ECS to direct the material to up to three downstream offer and shipping stations. ECS will send proper message traffic to whatever controllers exist to move the material to the desired locations.
Pick Initiation	Ministacker only: When a pick is requested from an automated storage location, DSS sends an SMM to move the material to the picker.
Pick Completion	Upon completion of the pick, DSS sends an SMM to direct the material to Packing.

Functional Point	Description
Packing Induction	Carousel only: Material will be removed from modules and inducted into the packing consolidation carousels via a DSS conversation which will generate stow SMMs. Once a shipment unit is complete or if manual intervention is activated, the shipment unit will be directed via SMMs to the appropriate pack lane. DDRV - No carousel movement. (DDRV – The White Carousel is operated manually; no carousel movement is required).
Packing Arrival	DDRV: No ECS action. DDSP-W IMC: No ECS action.
Packing Initiation	Upon arrival at a pack station, DSS sends an SMM to move carousels to the consolidation location.
Packing Completion	Air Force and Navy sites: Upon completion of packing, DSS sends an SMM to direct the material to Shipping. DDRV: The package upon pack completion will be directed via an SMM to the appropriate outgoing tote or pallet conveyor lane. DDSP-W IMC: Upon completion, totes will be routed to shipping or back to consolidation. DDSP-E: DSS sends ECS an SMM to direct totes/pallets to AWOS or shipping. If the destination is AWOS, the Control Number is deleted. If the destination is Shipping, the Control Number is retained.
Small Parcel Costing	DDRV: DSS Sends an SMM to direct the material to the appropriate small parcel carrier.
Dimension and Weigh	DDSP-E: DSS generates the appropriate labels and sends ECS an SMM to direct the material to banding/stretch wrap/bypass station and shipping location.

Functional Point	Description
CCP Address/Label	DDSP-E: DSS generates the appropriate labels and sends ECS an SMM to direct the material to banding/stretch wrap/bypass station and shipping location.
Ad Hod Moves	DSS generates SMM for an operator requested move.
Keypad	DDSP-E: Keypad will provide conversations to move totes and carts to specific inspection/receiving stations.

Table B-1 Standard DSS Interface Points to MHE

1.1 DSS Upper Tier Operational Scenarios

1.1.1 Induction in an ECS Environment

Currently at receipt induction, when material is assigned to an automated facility, a "material movement" transaction is sent to the legacy system's ECS or PCS; the same action occurs when a" rewarehousing pick" is released that is destined for an automated facility.

1.1.2 Packing in an ECS Environment

When material arrives at a pack station, the packer will scan the bar-coded "pick control number". If the material is for a single-line/single-pick shipment unit, the packer will be prompted to pack the material. Otherwise, the shipment unit will be "consolidated" in the carousel. The Upper Tier will send a SMM to ECS to position the carousel. When the last item arrives, the packer will be told to begin packing the shipment unit. DSS will send a move transaction (SMM) to ECS to position the carousel at the pack station. When the carousel delivers the material, DSS will then prompt the packer to remove the item(s) from the carousel location and pack the material. If the slot of the carousel fills before the last item arrives, the packer will have the option to issue a close pack.

1.1.3 MRO Processing

MRO processing consists of the following:

- a batch process,
- Production Planning;
- and an online Emergency MRO process

1.1.3.1 Production Planning and Control (PPC)

Current DSS Production Planning consists of two major areas.

a. Workload Planning manages the" volume" and "type of work" that will be accomplished at the depot during any given work day. If a packing carousel is present, the Workload Planning modules will schedule multi-line picks for the carousel.

b. Cycle Download transfers that plan into actual work in the depot. The Cycle Download will be changed to generate SMMs when the plan is transferred. The Cycle Download currently queues pick data for the RF process and the ECS legacy system or generates transactions for the PCS legacy system, which in turn generates hard copy IRRDs.

c. The queuing process will be enhanced to include the pick data for ministackers and storage carousels. When a ministacker or storage carousel user calls for the pick workload, SMMs will be sent to ECS to retrieve the tray or position the carousel. When the user completes the pick action, an SMM will be sent to ECS to move the material to a packing station and in the case of ministackers return the tray.

1.1.3.2 Emergency MROs

Emergency MROs entered through an online process dynamically assigns the "pick location" and "packing destination". Like PPC, the process generates hard copy IRRDs or queues the pick data.

The online process will be enhanced to generate SMMs and in the case of ministackers and storage carousels, queue the pick data.

Once the data is queued, the ministackers and storage carousels work queues are searched by DSS using the pick location as the key.

If an "aisle work queue" is found, an SMM is placed into the queue and will be the next SMM sent to ECS.

If the pick location does not have an "aisle work queue", a message is sent to a supervisor terminal.

ECS will position the carousel or retrieve the tray. When the pick action is complete, a SMM is sent to ECS to move the material to a pack station and in the case of ministackers, return the tray

1.1.4 Inventory Counts in an ECS Environment

The current DSS Inventory Count process schedules stock numbers by location, adding the records to the Inventory Work Load Database tables.

In an ECS environment, when a ministacker user or storage carousel user calls for their workload, SMMs will be queued in an Aisle Work Queue (AWQ), and sent to ECS. ECS will position the tray or carousel at the user workstation. When a ministacker user completes the action, an SMM will be sent to ECS to return the tray.

1.1.5 Location Surveys in an ECS Environment

The current DSS Location Survey process schedules a survey by work aisle on an annual basis. A user requests a survey batch by aisle. The batch contains a block of fifty sequential locations. The user processes the batch by going to each location, and verifying the contents.

In the ECS environment the process will be enhanced to generate SMMs when the user is surveying a ministacker or storage carousel. When the user calls for his batch of work, the SMM will be sent to ECS; ECS will position the tray or carousel at the user workstation. When the user has completed the verification, and in the case of a ministacker, a SMM is generated and sent to ECS to return the tray.

1.1.6 RF

The RF process will be expanded to include the generation of SMMs when pick or pack processes are completed and to act as a backup to the ministacker and storage carousel ECS processes. If RF accesses data (stows, picks, counts, or survey) for a ministacker or storage carousel, a communication outage between the DSS and ECS is assumed. If the data is present in an aisle work queue, the queue will be deleted, a clear queue SMM is sent to ECS, and the SMM is deleted from the General Work Queue (GWQ).

The RF capabilities for ECS at New Cumberland are conceptually similar to RF at other depots using ECS. New Cumberland-specific changes include:

The generation of SMMs for Stowing	-	An SMM is generated for every stow.
The generation of SMMs for Picking	-	An SMM is generated for every pick.
New functionality for Continuous Pack	-	A new application will be developed to replace the functionality of the existing keypad with an RF device. An SMM is generated for every item packed.

New functionality for Ad Hoc Moves	-	A new application will be developed to load totes, pallets, trash, etc onto a cart and move as needed. An SMM is generated for every cart released.
New functionality for Shipping	-	A new application will be developed to release empty carts from the Shipping area. An SMM is generated for every cart released.

1.1.7 Shipment Processing

The ECS AWOS process will send an M02 message containing package control number, weight and if applicable cube information. DSS will return a SMM containing the package control number and up to three downstream offer and shipping destinations.

1.2 Queue Management

1.2.1 Introduction

To optimize the storage carousels and ministackers throughput, the ECS requires the queuing of SMMs. This will allow ECS to position trays or position a carousel for the user.

To support the queuing on ECS, a Queue Management (QM) subsystem and Workload Manager (WM) will be added to DSS. The functional subsystems of DSS create the SMMs and will pass them to the QM process. If the SMM does not affect a storage carousel or ministacker, the QM process will pass the SMM to the transmission program. If SMM affects a storage carousel or ministacker, the QM process will add the SMM to the GWQ.

1.2.2 ECS

DSS will always generate a SMM and pass it to the QM process. If ECS is not operational, the QM will delete the SMM. If ECS is operational, the process places the SMM in the GWQ. If the SMM is a stow, QM passes the SMM to the communication process. If multiple operations are required within a location, the QM process will pass one SMM to ECS, in effect summarizing the SMMs.

1.2.3 Queues

The building of the queues will be based on the aisle ranges in the ECS parameter. If the location is present in the range and a SMM is being processed for that location, a QM process will add the SMM to a GWQ. When a user requests work for their aisle, a workload manager process will copy records from the GWQ and build an Aisle Work Queue (AWQ) appending the workstation ID. The queues will be Database tables and therefore recoverable through Database Management System procedures.

1.2.4 Workload Manager (WM)

The WM, an online process, allows users to control the way an AWQ is built, by combining or segregating types of transactions (stow, picking, and counts) in a processing sequence. The build criteria consists of the following:

- Combine or segregate the workload. A combined workload consists of picks, stows, and counts. Location surveys are always segregated. Stows are always combined.
- Sets the SMM type sequence of the combined workload. The default sequence is picks, stows, and counts.
- Sets the number of SMMs on ECS.
- Sets the number of SMMs in the AWQ.
- Sets the number of workstations associated with an aisle.

If a workload is combined, WM sorts the SMMs by the chosen sequence and places them in the AWQ. If WM finds different types with the same location, WM places like locations together. Therefore as a user accesses a location, all operations against that location will be completed. Setting the number of SMMs on ECS and in the AWQ are a means of leveling the workload processed by the aisle.

1.2.5 Emergency MRO Processing

When an Emergency MRO SMM is passed to QM, a search of the AWQs are made. If a queue is found with the pick location, the SMM is positioned in at the top of the queue, otherwise a message is sent to a designated terminal and/or printer.

1.3 Inquiries

The status of the GWQ and AWQ will be provided with an interactive inquiry process. If an emergency pick is placed in the GWQ with a location that does not have an AWQ, the supervisor will be notified through a message sent to a supervisor terminal. DSS provides inquires and reports through its support function. Additional inquiries and reports may be developed on a required basis.

1.4 Workstation Support

If the number of associated aisle workstations is greater than one, a SMM will be built to allow the function to be passed to ECS.

a. **Menus**
Access to the workstation screens will be provided by the DSS Menu System.

b. **Ministacker Tray Arrival**
If there are multiple workstations assigned to an aisle, the scanning of the tray ID will be required to signal the arrival of a tray at the workstation.

c. **Picks**
The user can select the sequence of picks by:

- Priority
- Location (See "IMC Pick Sequencing" below)
- Shipment Control Number
- Project Number
- Pick type (Priorities, Routine, Rewarehousing, DRO)

If the user chooses to sequence the picks by Shipment Control Number or Project Number, the user enters up to ten entries. WM builds the AWQ in the sequence entered by the user.

d. **IMC Pick Sequencing**
The pick processing at the IMC is accomplished using one of three sequences: High-Rise, Walk and Pick, or Rack and Bin.

1. High-Rise
The "High-Band/Low-Band" policy will be implemented for storage locations starting with V01 through V04.

The picks will be sorted so that the operator will start in section 001 at level 21 and proceed up to level 40; move to section 002 and proceed down to level 21 picking from both sides of the aisle. The operator will proceed in this manner until section 077 is reached, where the operator will not stop at level 21, but proceed to level 01. At this point the operator will move to section 076 and proceed up to level 20, move to section 075 and proceed to level 01. The operator will continue processing picks in this sequence until section 001 level 01 is reached.

2. Walk and Pick
The walk and pick area consists of storage locations W10 and W11. The picks will be ordered by 'warehouse', 'quadrant', 'row', and 'section' in ascending sequence, and 'level' in descending sequence.

3. Rack and Bin
These areas consist of storage location W01 and W02. The picks will be ordered by the 'entire location code' in ascending sequence.

The format of the 'location' for the IMC is: WQQ, RR, SSS, LL, and CC, where:

W	=	Warehouse
QQ	=	Quadrant
RR	=	Row
SSS	=	Section
LL	=	Level
CC	=	Compartment

e. **Stows**
Stows are handled one of two ways, depending upon the available equipment configuration.

1. Stows that are manually directed to the workstation through a keypad. The keypad will be replaced by a 3270 terminal, the operator will wand the putaway control number (PCN), the process will search the GWQ for a match and release the SMM to the AWQ. The stow SMM will be placed into the AWQ and sent to ECS per the options set by the WM.

2. Stows that are staged at the workstation. The user can elect to use a terminal or a RF device. In either case the PCN is scanned and the process outlined in (1) is followed.

If the material cannot be stored in the tray, the user can request a new location.

f. **Inventory Counts**
Counts will be supported through the current DSS system.

g. **Location Surveys**
Surveys will be supported through the current DSS system.

h. **Inquiries**
All inquires will be placed under the support function of the DSS menu system.

i. **Ad-hoc Moves**
The process will allow the user to generate SMM on an as needed basis. The SMM will be queued and sent to ECS immediately.

j. **Queue Management**
The user can bypass an operation, or delete a SMM from his AWQ.

k. **Logoff**
As part of the logoff process the AWQ will be deleted and a clear SMM sent to ECS.

1.5 **Carousel Management**

a. **Inquiries**
Real time inquiries will be provided to allow management visibility. The inquiries will be keyed by conveyance number, national stock number; shipment unit number where applicable, and warehouse aisle where applicable.

b. **Control**
To control the release of items, management will enter two parameters to release a shipment unit or aisle by the number of line items or by the length of time in the carousel. Management will be provided with the capability to manually release a conveyance, a shipment unit, or an aisle.

2.0 SUMMARY OF IMPACTS

The following paragraphs describe the impact of the new system on various entities.

2.1 Operational Impacts

Generally operations and material flow will occur as they currently do at the mechanized sites. The major impacts will occur in the adoption and utilization of the DSS Upper Tier. Some Lower Tier training will be required to familiarize the operators with the new user interface.

2.2 Organizational Impacts

Generally the organizations at the mechanized sites will remain as they are today with the current lower tier maintenance personnel, operators, and analysts being retrained on the new system.

2.3 Impacts During Development

Headquarters (DDSC), region and site operations personnel will be required to support functional and environmental testing and the IOC. DDSC and region representatives will be required to support the Systems Requirements Review, the Preliminary Design Review, and Critical Design Review.

APPENDIX C DSS-ECS CURRENT NAVY SITE REPORT

1.0 DESCRIPTION OF CURRENT SYSTEM OR SITUATION

The following is a description of the current Lower Tier legacy systems at the Navy and Air Force - based DLA depots and the DDRV, DDJC Sharpe, DDJC Tracy, DDSP-E, and DDSP-W IMC depots.

1.1 Navy - NISTARS

The Naval Integrated Storage Tracking and Retrieval System (NISTARS) is the computer-controlled material handling system used by the former Navy depots. The NISTARS system contains induction, quantity by location, packing, picking, storage, inventory control, data query, production control, report generation, document generation, material tracking, RF and material movement functionality. The main functional and control portions of the system, the NISTARS Central Controller (NCC), resides on a TANDEM computer. Automated material movement on NISTARS can be classified by three main subsystems:

a. **Intelligent Remote Terminals (IRT)**
The IRT subsystem, resident on PCs, performs tasks as remote terminals to the host. The IRTs execute screen conversations with users and interface with the NCC, sizing equipment, carousels, and DDNV ministackers. The IRT subsystem receives highly functional messages from the NCC, presents the information to the screen interface and formats the information for low-level material movement.

b. **NISTARS Laser Scanner Controller (NLSC)**
The NLSC subsystem, resident on a Model NL-1000 processor, receives and processes NCC messages to control the laser scanner and diverter devices. The NLSCs, through these scanners and diverters, control sortation devices, tote conveyors and pallet conveyors. All messages sent to the NLSC are of a low-level material movement nature.

c. **NISTARS Ministacker Controller (NMC)**
The NMC subsystem, resident on PCs, receives low level material movement messages from the NCC and formats them to control the DDDC ministacker. This subsystem provides scheduling, routing, and workstation control.

There are two exceptions to the automated material movement being controlled by the major subsystems mentioned above. The DDDC Automated Guided Vehicle (AGV) controllers are directly connected to the NCC TANDEM. The DDDC automated storage and retrieval system "STACKMAN" is directly connected to the UADPS TANDEM. Both systems receive low-level material movement messages from a TANDEM.

In addition a number of MHE systems are controlled by operator intervention from NISTARS screen displayed data

Operators, analysts, and technical personnel at each DLA Navy-based depot utilize or support NISTARS in one form or another. The following is a site list: DDNV, DDJF, DDDC, DDCS, DDCN, DDPW, DDPF, and DDOC.

The NISTARS software is maintained by a combination of government and contractor personnel. The Harris Corporation provided software maintenance support while the Fleet Material Support Office (FMSO) provided implementation support.

2.0 JUSTIFICATION FOR AND NATURE OF CHANGES

DMRD 902 assigned the DLA responsibility for all CONUS DOD distribution depots. DMRD 925 guided the DLA to select a standard distribution system. The Army's Area Oriented Depot/Modernization (AOD/MOD) was selected as the Distribution Standard System (DSS). Upon completion of the Peat Marwick report it was directed that a standard Equipment Control System be developed for implementation at all mechanized DLA depots. The core of the system, DLA, Navy and Air Force interfaces, have been developed at this time. This base will be modified to include the DDNV, DDJC SHARPE, DDJC TRACY, DDSP-E and DDSP-W IMC AWOS requirements. At this time the site specific AWOS requirements for DDNV, DDJC SHARPE, DDJC TRACY, DDSP-E and DDSP-W IMC must be included in the standard system.

2.1 Description of Needed Changes

- A system must be created that will drive the existing automated MHE at the Navy and Air Force sites and at the DDJC SHARPE, DDJC TRACY, DDSP-E, DDSP-W IMC and DDRV sites when DSS is implemented at those sites.
- The system must control the NLSC, NMC, Norfolk Ministackers, Hill Ministackers, San Diego STACKMAN, Navy Carousels, and Navy AGVs.
- The system must control the AGV and HP controlled devices at DDSP-W IMC, the Allen-Bradley controlled devices at DDRV and DDSP-E, and the PC controlled sortation devices at DDSP-E.
- The system must control all current AWOS and AWOS type systems and hardware.
- All current flows and throughput rates at the intended sites will be accommodated.
- The system will contain a user friendly interface.
- The system must be able to receive a Standard Movement Message (SMM) from the Upper Tier and initiate MHE action based upon that message.
- The system will be standard at all DLA sites.
- The system must be created in an open environment to allow scalable hardware utilization.
- The system will contain logging, recovery, and buffering capability.

- The system will be as portable as possible. In achieving this goal the system must minimally be table driven and be built from reusable software modules.

2.2 Assumptions and Constraints

- When practical, DSS would support the continued use of existing MHE.
- Radio Frequency (RF) technology will be incorporated into the DSS Upper Tier prior to deployment to the Navy and Air Force-based depots.
- Lower tier functionality duplicating DSS functionality is considered redundant and should be removed upon DSS implementation.
- To the greatest extent possible, all changes required to support existing MHE will be made in the lower tier portion of DSS.
- The system will support current system throughput rates.

3.0 CONCEPT FOR A NEW OR MODIFIED SYSTEM

This section describes the concept for the new Equipment Control System (ECS).

3.1 Background, Objectives, and Scope

Early in the evaluation process it was realized that the only viable solutions to the DSS mechanized implementation problem were to either modify the current legacy lower tier systems and the DSS Upper Tier to work together or to build a new standard lower tier. The ECS was the most cost effective solution as defined by the KPMG Peat Marwick LLP report. The following subparagraphs describe the concept of the ECS.

3.2 Operational Policies and Constraints

- All functionality will be performed by the DSS Upper Tier.
- The lower tier will handle all movement processing.

3.3 Description of the New or Modified System

The general concept of the ECS is based upon a Standard Movement Message (SMM) being received from the DSS Upper Tier by an inexpensive, scalable warehouse server computer. This message would then be formatted into the proper message traffic required to institute a piece of material handling equipment activity. The only complexity for the Navy and Air Force sites would be the scheduling of material out of the ministacker or carousel storage areas. This problem could be easily resolved by creating an array with the scheduled work in it. Refer to *Figure C-2*. The only complexity for the DDRV, DDJC SHARPE, DDJC TRACY, DDSP-E and DDSP-W IMC sites would be the scheduling of material out of the staging carousel areas and scheduling of AGV modules. These problems can be easily resolved by creating specific modules to handle the processing and incorporating a database. Refer to *Figure C-3*.

A user interface will be developed to allow operations personnel to start and stop the equipment, view status, perform fault recovery, track material, access logs, and perform any equipment specific actions.

Logging will be performed at each level of the system and can be turned on or off by operations. Messages will be buffered at each level of the system for easy fault recovery.

The following is a list of current Navy site processes matched against possible DSS ECS processes.

Current NISTARS Activity	DSS ECS Processes
Induction activity	DSS receiving will be performed. Sizing information will be received by an existing PC interface and relayed to the DSS screen. A SMM will be received by ECS and formatted for controller use when required. The ECS will handle all MHE status and start/stop requirements.
Pick, Stow, Storage activity	DSS pick, stow and face processing will be performed. A SMM will be received by the ECS and formatted for controller use. The ECS will handle all MHE status and start/stop requirements.
Sortation activity	Upon the pick verification on the DSS a SMM will be received by the ECS and formatted for controller use. The lower ECS will handle all MHE status and start/stop requirements.
Packing activity	DSS packing processing will be performed. A SMM will be received by the ECS to control the consolidation carousels.
RF activity	These functions will be controlled by the current DSS to RF plan.

Current NISTARS Activity	DSS ECS Processes
Conveyor movement	All DSS activity resulting in material movement will be performed. A SMM will be received by ECS and formatted for controller use when required. The ECS will handle all MHE status and start/stop requirements.
DDDC Stackman activity	This control would be identical to the storage activity outlined above.

The server computer supporting any ministackers or carousels would have to contain a message buffer in order to schedule stacker trans coming into the workstation. This buffer would contain any work for a specific aisle. Emergency work arriving at the computer would preclude any work in the buffer. The work would alternate between left side, right side if applicable. Refer to *Figure C-1*.

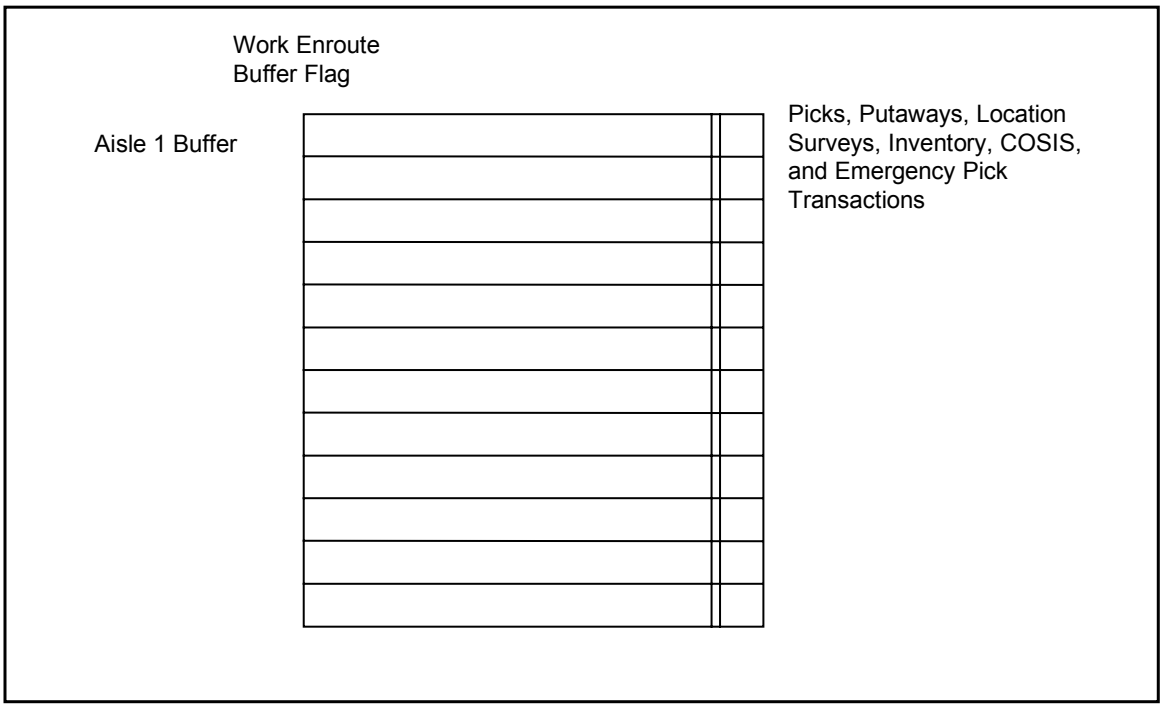

Figure C-1 Proposed ECS Scheduling Array

3.4 Users/Affected Personnel

The current analysts, operators and technical support personnel at each site will be able to utilize the material handling equipment as they are being used today. Lower Tier functions will be replaced by the DSS Upper Tier.

3.5 Support Concept

Software support for ECS will be provided by DSDC. Site Technical personnel and local vendors will provide hardware support. The current on site analysts will provide analyst support.

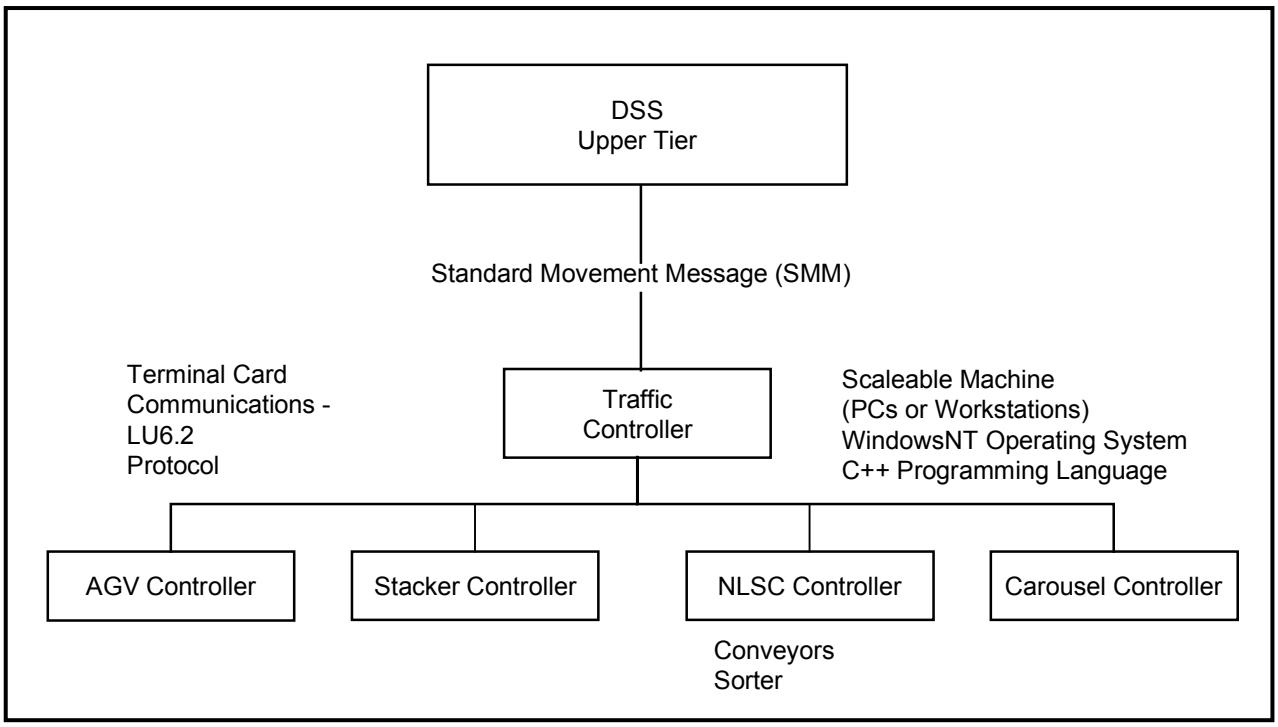

Figure C-2 Proposed ECS Configuration for Navy and Air Force Sites

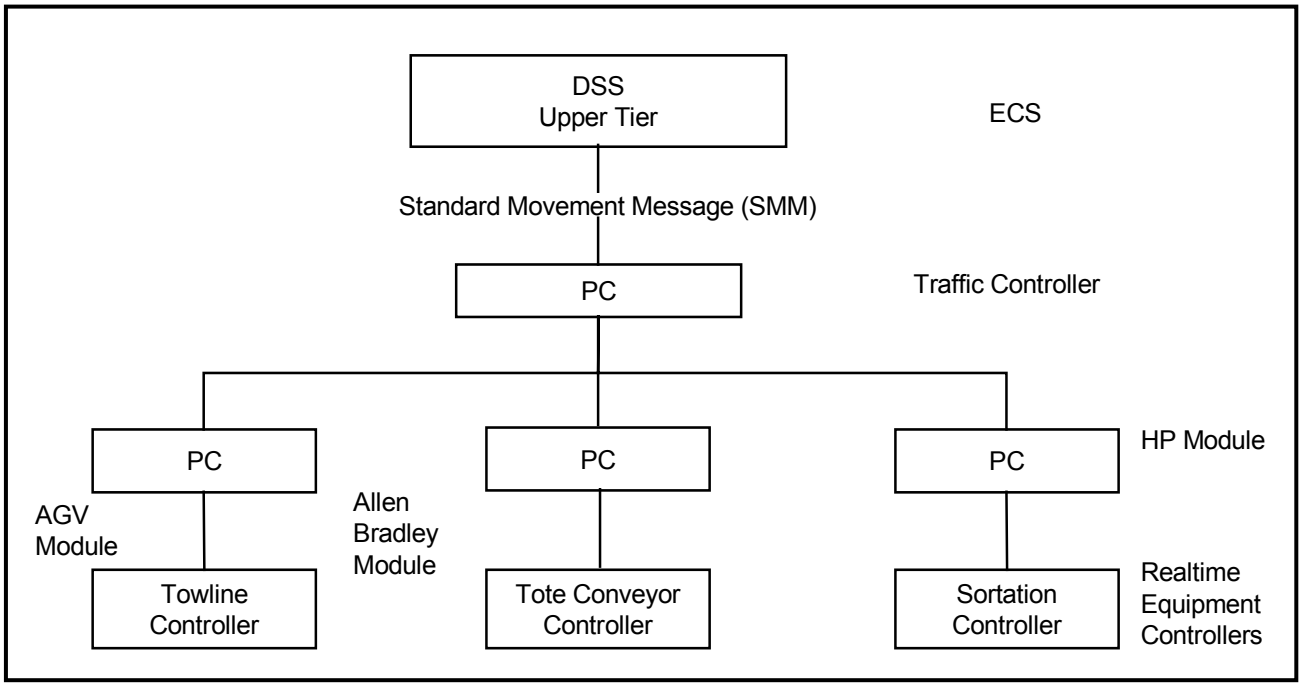

Figure C-3 Possible ECS Hardware Configuration for Navy and Air Force Sites

4.0 CURRENT NAVY SITE HARDWARE

4.1 NISTARS Central Controller (NCC) Equipment List

Example Suite

8	TANDEM TXP Processors (8 Meg) Guardian 90 Operating System
12	TANDEM T16/4134 Disc Drives (415 Meg)
4	TANDEM T16/5103 Tape Drives

4.2 NISTARS Intelligent Remote Terminal (IRT) Equipment List

Example Workstation

1	386 PC: 8 Meg Memory, 40 Meg Disc Floppy Drive, AST 4 port card, and GMM Sync Controller Card
1	VGA Monitor
1	XT Compatible Keyboard
1	Welch Allen SCANTEAM 2380 Scanner Wand
1	KYOCERA F1000/FS1500A Laser Printer
1	PANASONIC KX1123 Dot Matrix Printer

4.3 NISTARS Laser Scanner Controller (NLSC)

Example Suite

6	Laser Beam Scan Heads (Model 55)
4	Model 5055/5255 Decoder Logic Units
4	Sperry Model S-1000 Sortation Controller
2	Sperry Model NL-1000 Controllers
5	Tach Encoders (Pulse Position Indicators)
X	Photoeyes

4.4 NISTARS Ministacker Controller NMC

Example Suite

2	486 PC SCO UNIX Operating System
1	Modbus+ Communications Network

SITE	EQUIPMENT VENDOR	EQUIPMENT NAME	CONTROL TYPE
DDNV	ACCU-SORT Systems Inc.	Model 55 Scanning Heads Model 5055/5255 Decoders	NLSC
	Trak Systems	Model 7001 Dimension Device	IRT
	Supreme Equipment & Systems Corporation	Ministacker	IRT
	Logan Company	Tilt Tray Sorter	NLSC
	Webb Stiles Company	Pallet Conveyor	NLSC
DDJF	NCI	Model 5785H Scale	IRT
	Trak Systems	Model 7001 Dimension Device	IRT
	White Storage and Retrieval Systems Inc.	Rotating Box Carousels	IRT
		Rotating Cage Carousels	IRT
DDDC	ACCU-SORT Systems Inc.	Model 30 Scanning Heads Model 9000 Decoders	NLSC
	Trak Systems	Model 7001 Dimension Device	IRT
	Supreme Equipment & Systems Corporation	Ministacker	r_NMC
	Munck Autech	Automated Storage and Retrieval System	TANDEM (UADPS)
	The Raymond Corporation	Automated Wire Guided Vehicles	TANDEM (NISTARS)
	White Storage & Retrieval Systems Inc.	Cage Rotating Carousels	IRT
	Bushman Equipment Inc.	Tote Conveyors	NLSC
	Logan Company	Tilt Tray Sorter	NLSC
	Webb Stiles Company	Pallet Conveyor	NLSC

Table C-1 NISTARS Direct Control MHE

SITE	EQUIPMENT VENDOR	EQUIPMENT NAME	CONTROL TYPE
DDNV	Bushman Equipment Inc.	Tote Conveyor	Manual
	Logan Company	Tilt Tray Sorter	Manual
DDJF	Multivendor	Sorter	Manual

Table C-2 NISTARS Indirect Control MHE Table

APPENDIX D DSS-ECS CURRENT AIR FORCE SITE REPORT

1.0 DESCRIPTION OF CURRENT SYSTEM OR SITUATION

1.1 Air Force - AWS

The Air Force Automated Warehouse System (AWS) is the computer- controlled material handling system used at the former Air Force Depots. The AWS system contains induction, quantity by location, picking, storage, inventory control, data query, production control, material tracking and material movement functionality. The main functional and control portions of the system reside on a UNISYS computer. Material movement on AWS can be classified into the following three major categories:

a. **Intelligent Remote Terminals (IRT) - Mobile and Static**
The IRT subsystem is resident on Motorola MC68000 processors which perform tasks as remote terminals to the host. The IRTs conduct screen conversations with users and interface with the UNISYS Computer. As a result of mobile IRT transactions, Automated Wire Guided Storage and Retrieval Vehicles (SRV) are moved via wire transmitted messages from the UNISYS Computer.

b. **Laser Scanner Control**
Currently a series of Accusort and Allen-Bradley laser scanners are used as diverter controls on the DDWG conveyor systems. Preprinted labels are attached to the material as it passes through the system. Each label identifies a discrete destination on the conveyor system. When one of these labels is scanned, a specific divert is tripped for the package. This is currently independent of any lower tier control.

c. **Automated Storage Module (ASM)**
The ASM subsystem is resident on PDP11-70s and controls the ministacker system at DDHU. The system interfaces with the AWS and possesses its own quantity by location. The message requirements to support ASM are very similar to those required to drive AWS.

Keypad pedestals manually controlled the remaining conveyor and sortation systems at the surveyed Air Force sites.

1.1.1 **AWS**

Operators, analysts, and technical personnel at each DLA Air Force-based depot utilize or support AWS. The following is a list: DDMC, DDWG, DDST, DDOO, and DDHU.

A government programming and implementation team based at DDWG, DSDC-HAE, maintains the AWS software.

2.0 JUSTIFICATION FOR AND NATURE OF CHANGES

DMRD 902 assigned the DLA responsibility for all CONUS DOD distribution depots. DMRD 925 guided the DLA to select a standard distribution system. The Army's Area Oriented Depot/Modernization (AOD/MOD) was selected as the Distribution Standard System (DSS). Upon completion of the Peat Marwick report it was directed that a standard Equipment Control System be developed for implementation at all mechanized DLA depots. The core of the system, DLA, Navy and Air Force interfaces, have been developed at this time. This base will be modified to include the DDNV, DDJC SHARPE, DDJC TRACY, DDSP-E and DDSP-W IMC AWOS requirements. At this time the site specific AWOS requirements for DDNV, DDJC SHARPE, DDJC TRACY, DDSP-E and DDSP-W IMC must be included in the standard system.

2.1 Description of Needed Changes

- A system must be created that will drive the existing automated MHE at the Navy and Air Force sites and at the DDJC SHARPE, DDJC TRACY, DDSP-E, DDSP-W IMC and DDRV sites when DSS is implemented at those sites.
- The system must control the NLSC, NMC, Norfolk Ministackers, Hill Ministackers, San Diego STACKMAN, Navy Carousels, and Navy AGVs.
- The system must control the AGV and HP controlled devices at DDSP-W IMC, the Allen-Bradley controlled devices at DDRV and DDSP-E, and the PC controlled sortation devices at DDSP-E.
- The system must control all current AWOS and AWOS type systems and hardware.
- All current flows and throughput rates at the intended sites will be accommodated.
- The system will contain a user friendly interface.
- The system must be able to receive a Standard Movement Message (SMM) from the Upper Tier and initiate MHE action based upon that message.
- The system will be standard at all DLA sites.
- The system must be created in an open environment to allow scalable hardware utilization.
- The system will contain logging, recovery, and buffering capability.

- The system will be as portable as possible. In achieving this goal the system must minimally be table driven and be built from reusable software modules.

2.2 Assumptions and Constraints

- When practical, DSS would support the continued use of existing MHE.
- Radio Frequency (RF) technology will be incorporated into the DSS Upper Tier prior to deployment to the Navy and Air Force-based depots.
- Lower tier functionality duplicating DSS functionality is considered redundant and should be removed upon DSS implementation.
- To the greatest extent possible, all changes required to support existing MHE will be made in the lower tier portion of DSS.
- The system will support current system throughput rates.

3.0 CONCEPT FOR A NEW OR MODIFIED SYSTEM

This section describes the concept for the new Equipment Control System (ECS).

3.1 Background, Objectives, and Scope

Early in the evaluation process it was realized that the only viable solutions to the DSS mechanized implementation problem were to either modify the current legacy lower tier systems and the DSS Upper Tier to work together or to build a new standard lower tier. The ECS was the most cost effective solution as defined by the KPMG Peat Marwick LLP report. The following subparagraphs describe the concept of the ECS.

3.2 Operational Policies and Constraints

- All functionality will be performed by the DSS Upper Tier.
- The lower tier will handle all movement processing.

3.3 Description of the New or Modified System

The general concept of the ECS is based upon a Standard Movement Message (SMM) being received from the DSS Upper Tier by an inexpensive, scalable warehouse server computer. This message would then be formatted into the proper message traffic required to institute a piece of material handling equipment activity. The only complexity for the Navy and Air Force sites would be the scheduling of material out of the ministacker or carousel storage areas. This problem could be easily resolved by creating an array with the scheduled work in it. Refer to *Figure D-1*. The only complexity for the DDRV, DDJC SHARPE, DDJC TRACY, DDSP-E and DDSP-W IMC sites would be the scheduling of material out of the staging carousel areas and scheduling of AGV modules. These problems can be easily resolved by creating specific modules to handle the processing and incorporating a database. Refer to *Figure D-2*.

A user interface will be developed to allow operations personnel to start and stop the equipment, view status, perform fault recovery, track material, access logs, and perform any equipment specific actions.

Logging will be performed at each level of the system and can be turned on or off by operations. Messages will be buffered at each level of the system for easy fault recovery.

The following is a list of current Air Force site processes matched against possible DSS ECS processes.

Current AWS Process	DSS ECS Process
Induction activity	DSS receiving activity.
Pick, Stow, Storage activity	DSS pick, stow and face activity. A SMM is received by the ECS and formatted for controller use when required. The ECS will handle all MHE status and start/stop requirements.
M68000 activity	DSS RF activity.
DAWS	DSS AWOS. A M02 message will be sent to DSS once the package is scanned, dimensioned and weighed by ECS. DSS will transmit a SMM to ECS to direct the material to up to three possible downstream offer and shipping stations.

3.4 Users/Affected Personnel

The current analysts, operators and technical support personnel at each site will be able to utilize the material handling equipment as they are being used today. The DSS Upper Tier will replace Lower Tier functions.

3.5 Support Concept

Software support for ECS will be provided by DSDC. Site Technical personnel and local vendors will provide hardware support. The current on site analysts will provide analyst support.

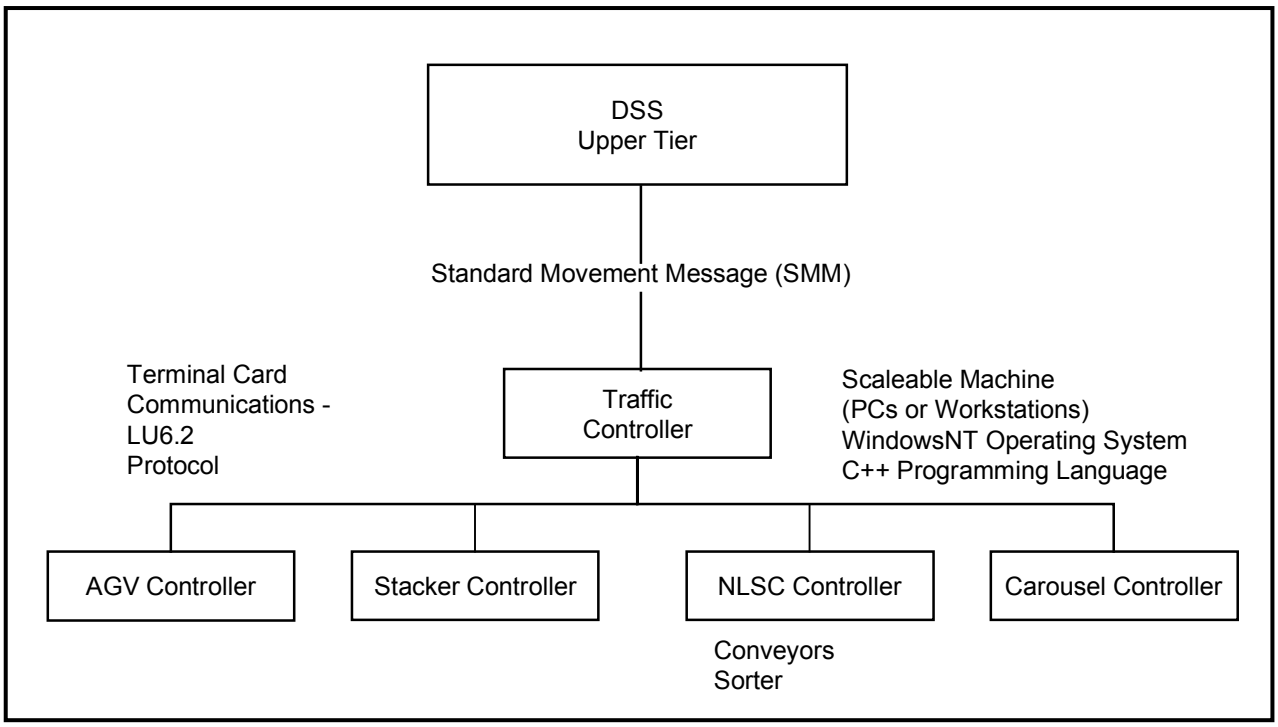

Figure D-1 Proposed ECS Configuration for Navy and Air Force Sites

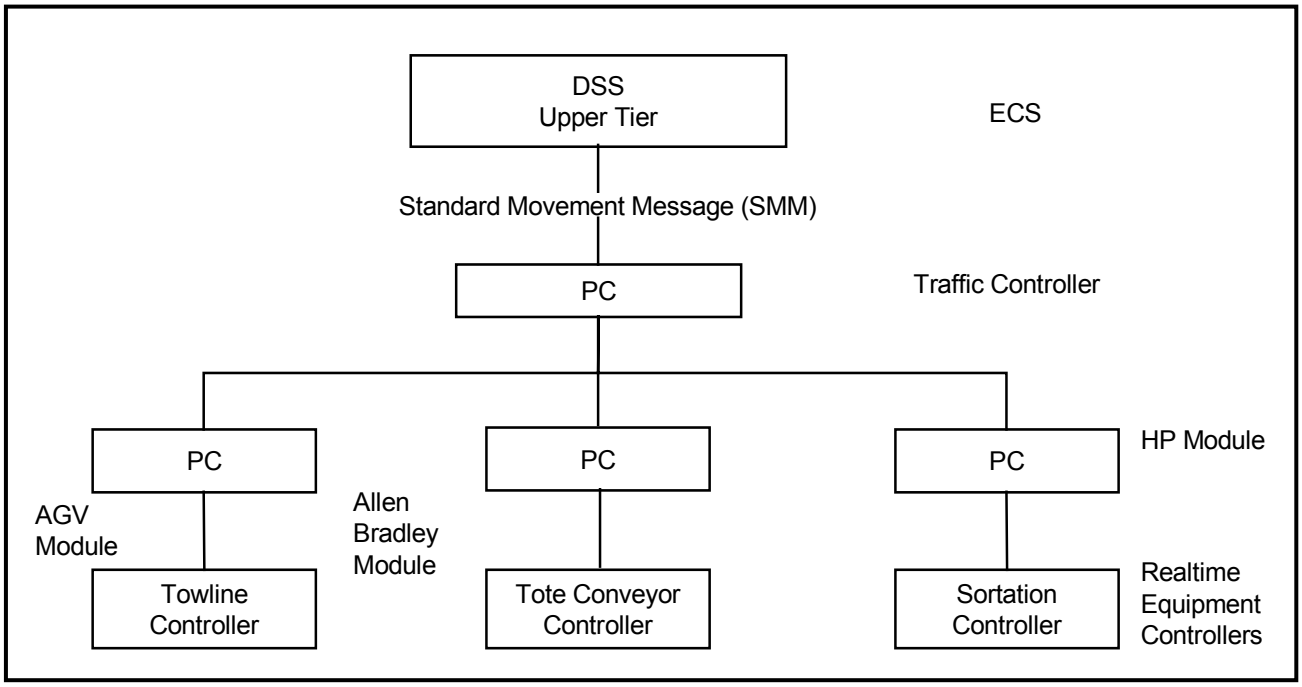

Figure D-2 Possible ECS Hardware Configuration for Navy and Air Force Sites

4.0 CURRENT AIR FORCE SITE HARDWARE

4.1 AWS Process Controller

Example Suite

1 UNISYS U1100/72 Model H2 Computer OS1100 Operating System
1 Model 5042 Tape Controller with four U34 Tape Drives
2 Dual Disk Controllers Model 5056 with four 8480 and one 8470 Drive

4.2 AWS Storage and Retrieval Vehicle

X MC68000 based microprocessor devices

4.3 ASM Process Controller

1 Digital PDP11 Computer

SITE	EQUIPMENT VENDOR	EQUIPMENT NAME	CONTROL TYPE
Warner Robins	ACCU-SORT Systems Inc.	Model 55 Scanning Heads Model 5055/5255 Decoders	Laser Scanner Controlled
	Allen Bradley	Laser Scanners	Laser Scanner Controlled
	The Raymond Corporation	Automated Wire Guided Stock Selection Vehicle	AWS
Hill	The Raymond Corporation	Automated Wire Guided Storage & Retrieval Vehicle	AWS
	Eaton Kenway	Stacker	ASM

Table D-1 AWS/ASM Direct Control MHE Table

SITE	EQUIPMENT VENDOR	EQUIPMENT NAME	CONTROL TYPE
All Sites	Rapistan Conveyors	Tote Conveyor	Manual
	Multivendor	Sorter	Manual

Table D-2 AWS Indirect Control MHE Table

4.4 DAWS Controllers

SITE	EQUIPMENT VENDOR	EQUIPMENT NAME	CONTROL TYPE
All Sites	Fairbanks	Weight and Scale Controllers	Automated

Table D-3 DAWS Control MHE Table

APPENDIX E DSS - ECS CURRENT DDSP-W IMC SITE REPORT

1.0 DESCRIPTION OF CURRENT SYSTEM OR SITUATION

1.1 Mechanicsburg

The Legacy Equipment Control System (ECS) is the computer-controlled material handling system used by the DDSP-W IMC depot. The system contains induction, module build/load, picking, storage, data query, report generation, document generation, material tracking, module tracking, tote tracking, packing consolidation, Inventory, Location Survey, COSIS, Item Data, RF, Receiving tote update, Packing tote update, and material movement functionality. The main functional and control portions of the system reside on a TANDEM computer.

1.1.1 Mechanicsburg - IMC

Function	Description	Screens
Receiving	Material arrives at the Small Parcel Receiving area by conveyor. The material is separated into totes and routed to specific designated workstations (see Figure E-1).	
- Tote Load Process	Receipt Types: • New Procurement (P) • Customer Return (C) • Rewarehousing (W) • Replenishment (L) • Other (O)	Tote Load (tote & PCN Bar Codes entered) Tote Load Multitote
- Outload	Marks tote ID as empty.	Clear tote ID (tote) bar code entered
PPP&M	Moves material from 'research area' to other specified areas within the IMC.	
- Request Module Delivery	RF "Handheld Terminal" function delivers (by AGV) a module.	Module Build Menu - Module Build - Module Movement

Function	Description	Screens
- Module Load	Used to load material into modules for 'stowing' in the IMC.	- Load Menu - Wand Tote Bar Code - Wand Putaway Control Number - Assign Empty Module - Filled Module Takeaway
Pack Tote Load (Consolidation) - Pack Tote Load	Material with PCNs are sent to the 'Consolidation Area' and inducted into the 'carousel storage area' and are held until all components of the Shipment Unit have been picked and received. The Shipment Unit Components are then released to the 'packing area' for packing and shipping. Enables an operator to assign 'picked material' to a tote, release the tote(s) from the 'consolidation station' to the pack chutes via the carousel or directly to pack station.	- Pick Bar Code Entry - Tote Bar Code Entry - Module Bar Code Entry - Split Tote
High-Rise and Pallet Areas RF Truck Terminals	See Figure E-2 for AGV material movement.	
- STOW	Material (in a module) is received from the 'receiving area' or PPP&M research via an AGV. Load module on vehicle.	TEKLOGIX Stow and Module Load functions
- PICK (issue)	Material is selected to issue (pick) and put on an AGV Stand.	TEKLOGIX Issue process
- EMERGENCY PICK (same as pick)	Material Movement Doc. printed.	TEKLOGIX Emergency Pick process
- COSIS	Records results of an inspection of in-storage material	TEKLOGIX COSIS process

Function	Description	Screens
- REWAREHOUSE	Rewarehouses material in High-rise & Pallet areas.	TEKLOGIX Rewarehouse process
- INVENTORY	Inventory Counts, QBL verification.	TEKLOGIX Inventory process
- LOCATION SURVEY	Verifies record accuracy & reports discrepancies in Bulk & High-Rise areas.	TEKLOGIX Location Survey process
Module Management - Update Module Status	Directs flow of material via module/pallet in high-rise and pallet areas.	TEKLOGIX module management process
Management Processes - Warehouse		
- Set Inspection Workstation Functions	Specifies 'type of receipt' that a specific workstation can process.	WKSTPPRQ
- Receiving Tote Tracking	Displays receiving area tote or CN information.	RCVTUPRQ
- Pack Tote Tracking	Displays status of 'single tote', 'IMC pick bar code', 'shipment unit number', or PCN.	FMTOTPRQ
- Receiving		
- Audit Tracking	Displays tote(s) assigned to a CN.	
- Pack Audit Tracking	Displays Tote Number, PCN or IMC Pick Bar Code data.	
- PTL Split Tote Research	Displays all completed PTL splits.	
- Stow Inquiry	Displays all stows assigned to an individual module or the module to which an individual stow is assigned.	FIRCVPRQ

Function	Description	Screens
File Maintenance		
- Operator ID	Adds employee to access file	FMMENPRQ
- Terminal Data Update	Changes 'Vehicle Type'	FMTRMPRQ
- Workstation Status	Displays W/S IDs for 'Receiving' & 'Packing' functions & turns W/S 'ON' or 'OFF'.	FMT02PRQ
- Management Function Authorization	Authorizes an operator to perform specific functions.	FMMGRPRQ
System Operations Status		
- AGV Status	Displays current status of every AGV in the IMC	
- AGV Messages	Displays problems with AGV	SOLOGPRQ
- Conveyor Carousel Equipment Status	Displays current status of Receiving and Pack Carousels	
- Tote Label Replacement Process	Prints new labels for totes.	
- Module Status by Functional Area	Displays status of every module in the IMC.	
- Module Status by Quad/Bay	Displays status of all stands and modules/pallets in the IMC.	
- Terminal/ Workstation Status	Displays status of Terminals & Workstations in the IMC.	SOTIDPRQ
- AGV/Stand Information	Displays status & location of stands in Receiving, Staging, High-Rise, Pallet Storage & CON/PACK/SHIP	TAGVSPRQ
- Consolidation Carousel Management	Displays all shipment units that are in the carousel w/5 or more lines	SOCCMPRQ

Table E-1 Mechanicsburg - IMC

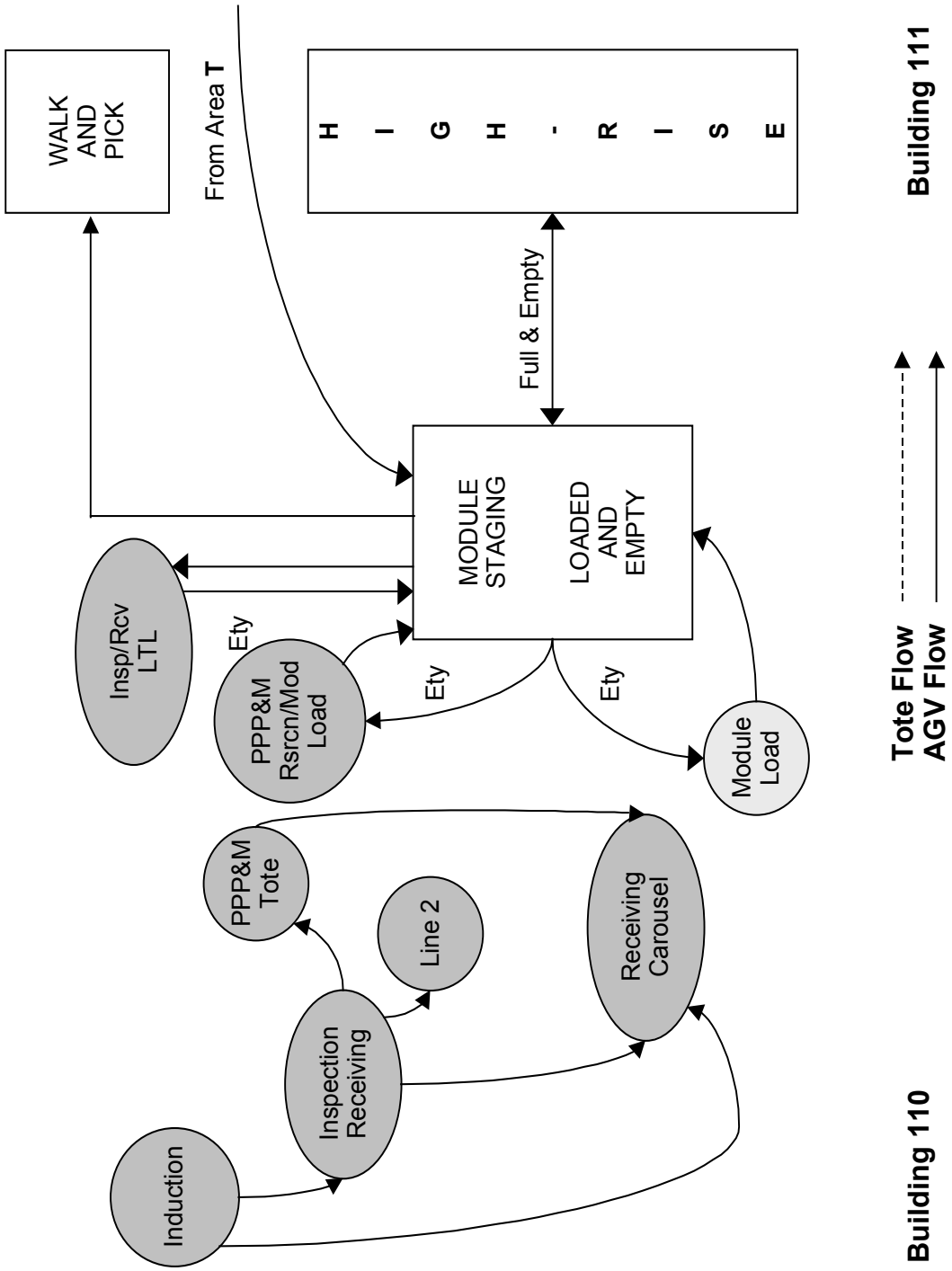

Figure E-1 Receiving to Storage flow, IMC Mechanicsburg

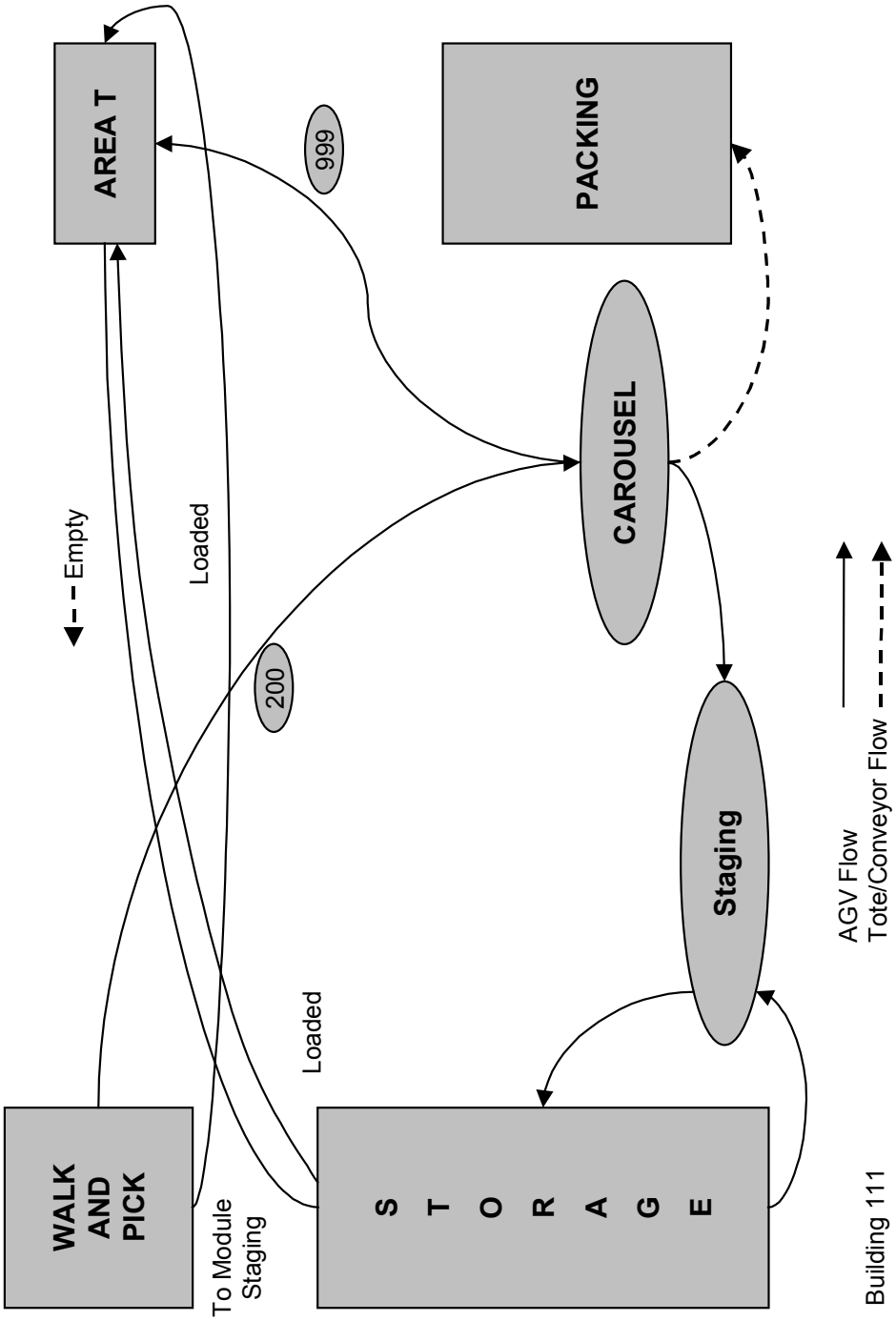

Figure E-2 AGV/Module Flow Storage to Shipping, IMC Mechanicsburg

1.1.1.1 **Legacy ECS**

Operators, analysts, and technical personnel at DDSP-W IMC utilize or support Legacy ECS in one form or another. Contractor personnel at the DDRV site, maintain the Legacy ECS software.

DSS FUNCTIONS	ECS FUNCTIONS
Receiving	
Stow Processing	
Picking	
Face Activities	
Quantity By Location	
Audits	
Reporting	
Document Creation	
RF Processing	
Packing Consolidation	
	Site MHE Control
DSS/ECS Interface Transaction	

Table E-2 DDSP-W/DDRV ECS Functional Comparison

2.0 JUSTIFICATION FOR AND NATURE OF CHANGES

DMRD 902 assigned the DLA responsibility for all CONUS DOD distribution depots. DMRD 925 guided the DLA to select a standard distribution system. The Army's Area Oriented Depot/Modernization (AOD/MOD) was selected as the Distribution Standard System (DSS). Upon completion of the Peat Marwick report it was directed that a standard Equipment Control System be developed for implementation at all mechanized DLA depots. The core of the system, DLA, Navy and Air Force interfaces, have been developed at this time. This base will be modified to include the DDNV, DDJC SHARPE, DDJC TRACY, DDSP-E and DDSP-W IMC AWOS requirements. At this time the site specific AWOS requirements for DDNV, DDJC SHARPE, DDJC TRACY, DDSP-E and DDSP-W IMC must be included in the standard system.

2.1 Description of Needed Changes

- A system must be created that will drive the existing automated MHE at the Navy and Air Force sites and at the DDJC SHARPE, DDJC TRACY, DDSP-E, DDSP-W IMC and DDRV sites when DSS is implemented at those sites.
- The system must control the NLSC, NMC, Norfolk Ministackers, Hill Ministackers, San Diego STACKMAN, Navy Carousels, and Navy AGVs.
- The system must control the AGV and HP controlled devices at DDSP-W IMC, the Allen-Bradley controlled devices at DDRV and DDSP-E, and the PC controlled sortation devices at DDSP-E.
- The system must control all current AWOS and AWOS type systems and hardware.
- All current flows and throughput rates at the intended sites will be accommodated.
- The system will contain a user friendly interface.
- The system must be able to receive a Standard Movement Message (SMM) from the Upper Tier and initiate MHE action based upon that message.
- The system will be standard at all DLA sites.
- The system must be created in an open environment to allow scalable hardware utilization.
- The system will contain logging, recovery, and buffering capability.

- The system will be as portable as possible. In achieving this goal the system must minimally be table driven and be built from reusable software modules.

2.2 Assumptions and Constraints

- When practical, DSS would support the continued use of existing MHE.
- Radio Frequency (RF) technology will be incorporated into the DSS Upper Tier prior to deployment to the Navy and Air Force-based depots.
- Lower tier functionality duplicating DSS functionality is considered redundant and should be removed upon DSS implementation.
- To the greatest extent possible, all changes required to support existing MHE will be made in the lower tier portion of DSS.
- The system will support current system throughput rates.

3.0 CONCEPT FOR A NEW OR MODIFIED SYSTEM

This section describes the concept for the new Equipment Control System (ECS).

3.1 Background, Objectives, and Scope

Early in the evaluation process it was realized that the only viable solutions to the DSS mechanized implementation problem were to either modify the current legacy lower tier systems and the DSS Upper Tier to work together or to build a new standard lower tier. The ECS was the most cost effective solution as defined by the KPMG Peat Marwick LLP report. The following subparagraphs describe the concept of the ECS.

3.2 Operational Policies and Constraints

- All functionality will be performed by the DSS Upper Tier.
- The lower tier will handle all movement processing.

3.3 Description of the New or Modified System

The general concept of the ECS is based upon a Standard Movement Message (SMM) being received from the DSS Upper Tier by an inexpensive, scalable warehouse server computer. This message would then be formatted into the proper message traffic required to institute a piece of material handling equipment activity. The only complexity for the Navy and Air Force sites would be the scheduling of material out of the ministacker or carousel storage areas. This problem could be easily resolved by creating an array with the scheduled work in it. Refer to *Figure E-3*. The only complexity for the DDRV, DDJC SHARPE, DDJC TRACY, DDSP-E and DDSP-W IMC sites would be the scheduling of material out of the staging carousel areas and scheduling of AGV modules. These problems can be easily resolved by creating specific modules to handle the processing and incorporating a database. Refer to *Figure E-4*.

A user interface will be developed to allow operations personnel to start and stop the equipment, view status, perform fault recovery, track material, access logs, and perform any equipment specific actions.

Logging will be performed at each level of the system and can be turned on or off by operations. Messages will be buffered at each level of the system for easy fault recovery.

The following subparagraphs describe new processing required to support the DSS ECS plan.

DSS Upper Tier Changes	Receipt Induction Screens will have to be developed and associated logic. Module Build and Management Screens will have to be developed and associated logic. RF Module Request and Movement Screens will have to be developed and associated logic. Packing Induction and Management Screens will have to be developed and associated logic. Close pack logic will be changed for Mechanicsburg to generate SMMs, to allow material to be sent to shipping or have empty totes returned to the Packing Carousel Induction.

3.4 Users/Affected Personnel

The current analysts, operators and technical support personnel at each site will be able to utilize the material handling equipment as they are being used today. The DSS Upper Tier will replace Lower Tier functions.

3.5 Support Concept

Software support for ECS will be provided by DSDC. Site Technical personnel and local vendors will provide hardware support. The current on site analysts will provide analyst support.

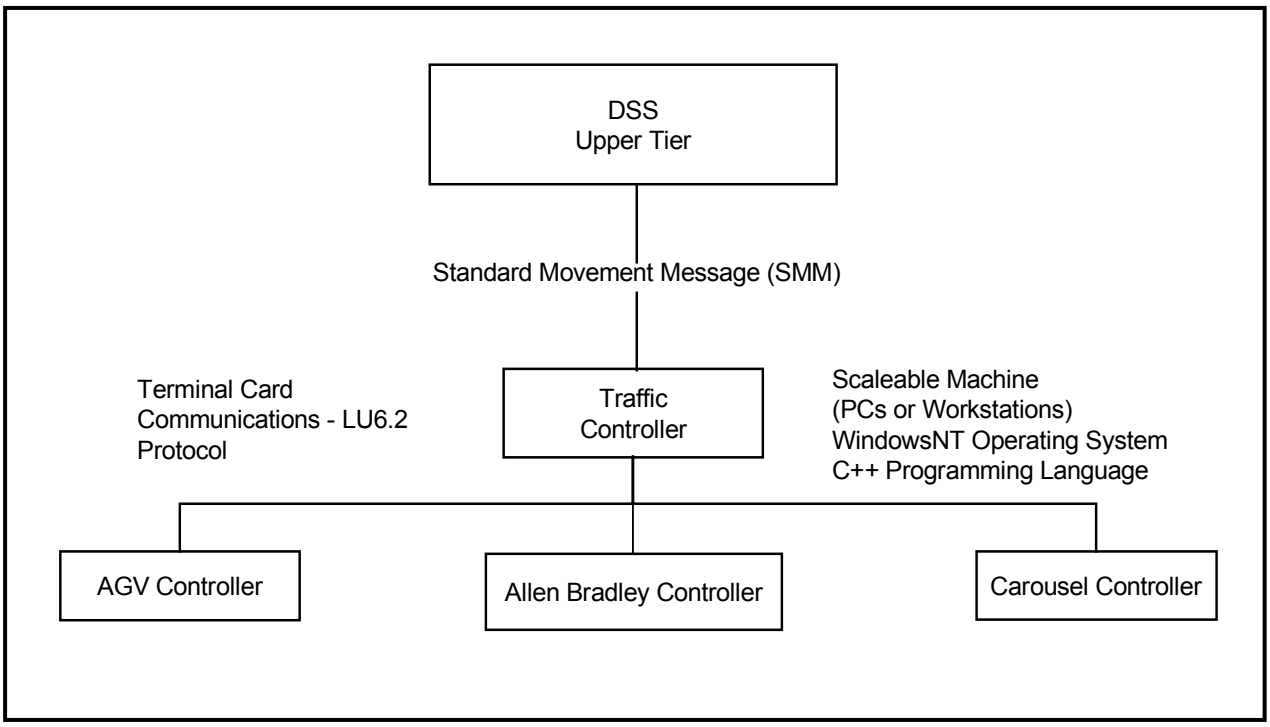

Figure E-3 Proposed ECS Configuration for DDRV and DDSP-W IMC

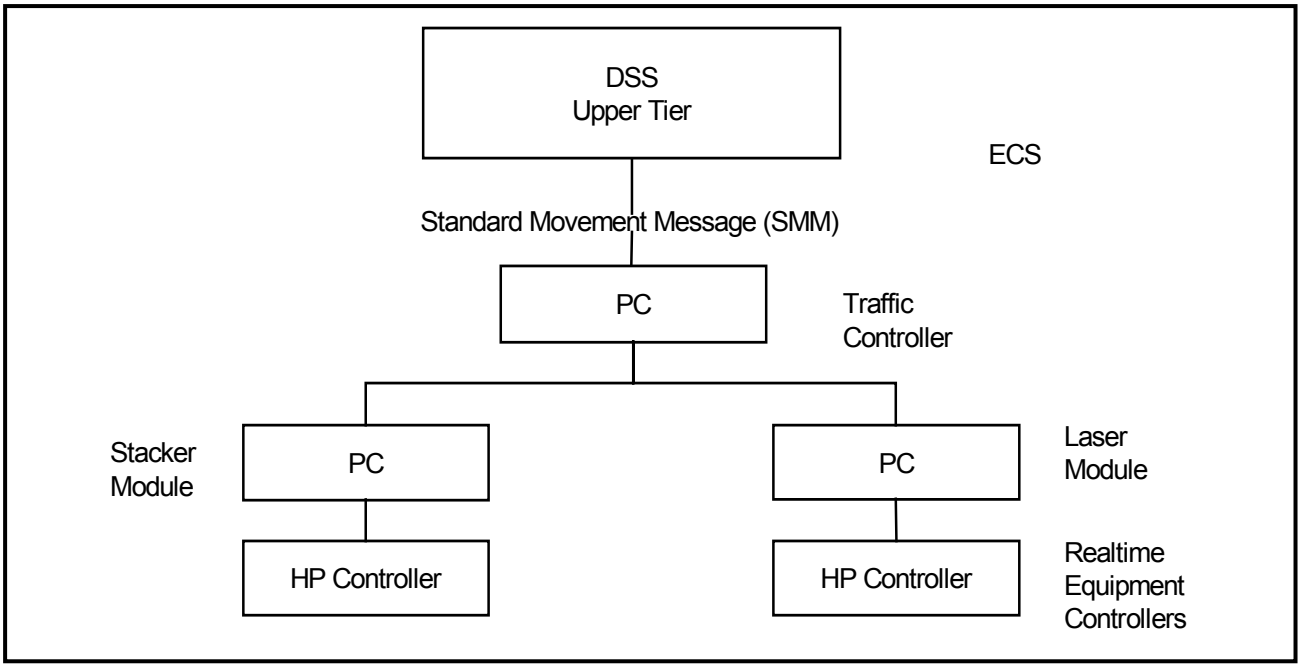

Figure E-4 Possible ECS Hardware Configuration for DDRV and DDSP-W IMC

4.0 CURRENT DDSP-W IMC SITE HARDWARE

4.1 Current equipment list for DDSP-W IMC, Mechanicsburg, PA

2	HP 1000 Controllers
2	Allen-Bradley PLC 5/15s
1	Allen-Bradley PLC 5/25
5	Allen-Bradley PLC 5/40s
11	Consolidation Carousels with Controllers
	Pallet Conveyor
	Tote Conveyor
2	WHS Robotics Controllers
41	WHS Robotics AGVs

4.2 AWOS Controllers

SITE	EQUIPMENT VENDOR	EQUIPMENT NAME	CONTROL TYPE
DDSP-W			

Table E-3 DDSP-W IMC AWOS Controllers

APPENDIX F DSS - ECS CURRENT DDRV SITE REPORT

1.0 DESCRIPTION OF CURRENT SYSTEM OR SITUATION

1.1 Richmond

The Legacy Equipment Control System (ECS) is the computer-controlled material handling system used by the DDSP-W IMC depot. The system contains induction, module build/load, picking, storage, data query, report generation, document generation, material tracking, module tracking, tote tracking, packing consolidation, Inventory, Location Survey, COSIS, Item Data, RF, Receiving tote update, Packing tote update, and material movement functionality. The main functional and control portions of the system reside on a TANDEM computer

The Connector Building (Bldg. 54) mechanization consists of:

- Conveyor for material movement.
- Sortation system to sort items into the pack area.
- Carousel for consolidation of small items (P picks) prior to pack.
- Packing

Wooden pallets flowing through the LTL packing area are barcoded. This allows the conveyor PLC to provide more accurate movement based on actual pallet identity rather than sequencing.

From the packing area, items can move on conveyor to multiple area, including shipping. The pack close process includes Offer Freight and Offer/Confirm small parcel.

1.1.1 Legacy ECS

Operators, analysts, and technical personnel at DDSP-W IMC utilize or support Legacy ECS in one form or another. Contractor personnel at the DDRV site maintain the Legacy ECS software.

DSS FUNCTIONS	NISTARS FUNCTIONS
Receiving	
Stow Processing	
Picking	
Face Activities	
Quantity By Location	
Audits	
Reporting	
Document Creation	
RF Processing	
Packing and Consolidation	
	Site MHE control
DSS/PCS Interface Transaction	

Table F-1 DDSP-W/DDRV ECS Functional Comparison

2.0 JUSTIFICATION FOR AND NATURE OF CHANGES

DMRD 902 assigned the DLA responsibility for all CONUS DOD distribution depots. DMRD 925 guided the DLA to select a standard distribution system. The Army's Area Oriented Depot/Modernization (AOD/MOD) was selected as the Distribution Standard System (DSS). Upon completion of the Peat Marwick report it was directed that a standard Equipment Control System be developed for implementation at all mechanized DLA depots. The core of the system, DLA, Navy and Air Force interfaces, have been developed at this time. This base will be modified to include the DDNV, DDJC SHARPE, DDJC TRACY, DDSP-E and DDSP-W IMC AWOS requirements. At this time the site specific AWOS requirements for DDNV, DDJC SHARPE, DDJC TRACY, DDSP-E and DDSP-W IMC must be included in the standard system.

2.1 Description of Needed Changes

- A system must be created that will drive the existing automated MHE at the Navy and Air Force sites and at the DDJC SHARPE, DDJC TRACY, DDSP-E, DDSP-W IMC and DDRV sites when DSS is implemented at those sites.
- The system must control the NLSC, NMC, Norfolk Ministackers, Hill Ministackers, San Diego STACKMAN, Navy Carousels, and Navy AGVs.
- The system must control the AGV and HP controlled devices at DDSP-W IMC, the Allen-Bradley controlled devices at DDRV and DDSP-E, and the PC controlled sortation devices at DDSP-E.
- The system must control all current AWOS and AWOS type systems and hardware.
- All current flows and throughput rates at the intended sites will be accommodated.
- The system will contain a user friendly interface.
- The system must be able to receive a Standard Movement Message (SMM) from the Upper Tier and initiate MHE action based upon that message.
- The system will be standard at all DLA sites.
- The system must be created in an open environment to allow scalable hardware utilization.
- The system will contain logging, recovery, and buffering capability.

- The system will be as portable as possible. In achieving this goal the system must minimally be table driven and be built from reusable software modules.

2.2 Assumptions and Constraints

- When practical, DSS would support the continued use of existing MHE.
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A user interface will be developed to allow operations personnel to start and stop the equipment, view status, perform fault recovery, track material, access logs, and perform any equipment specific actions.

Logging will be performed at each level of the system and can be turned on or off by operations. Messages will be buffered at each level of the system for easy fault recovery.

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The current analysts, operators and technical support personnel at each site will be able to utilize the material handling equipment as they are being used today. The DSS Upper Tier will replace Lower Tier functions.

3.5 Support Concept

Software support for ECS will be provided by DSDC. Site Technical personnel and local vendors will provide hardware support. The current on site analysts will provide analyst support.

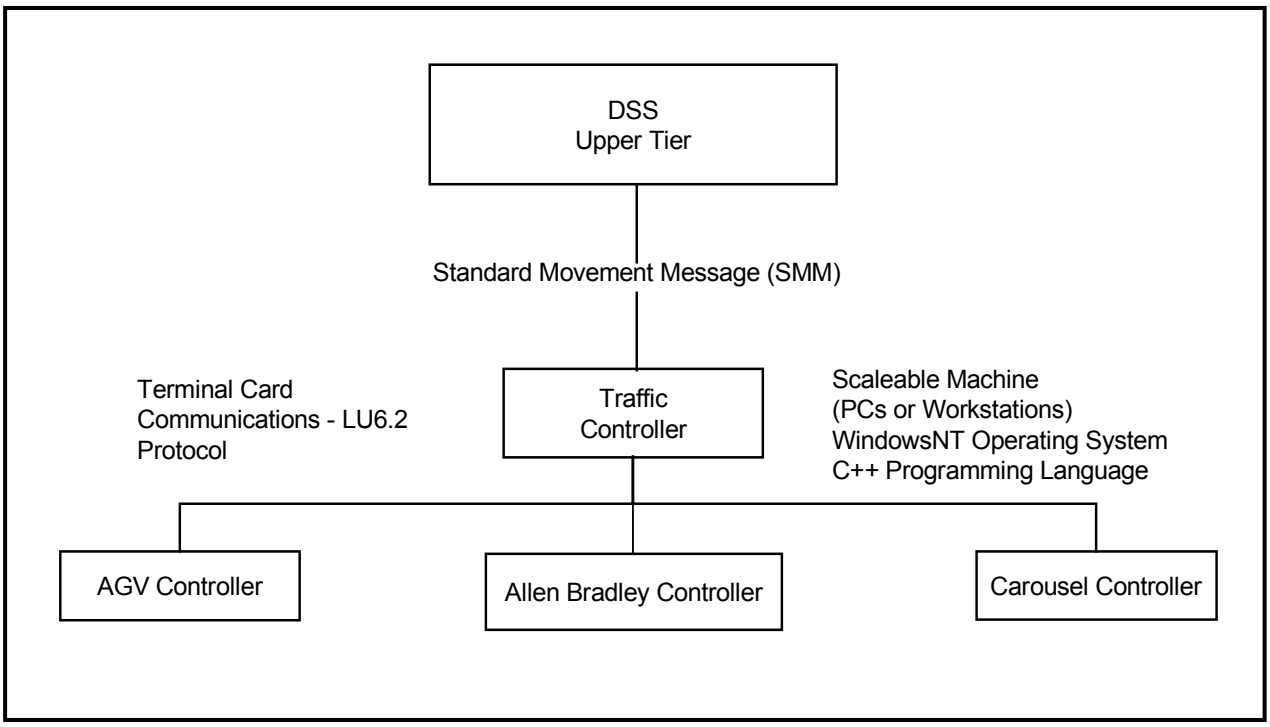

Figure F-1 Proposed ECS Configuration for DDRV and DDSP-W IMC

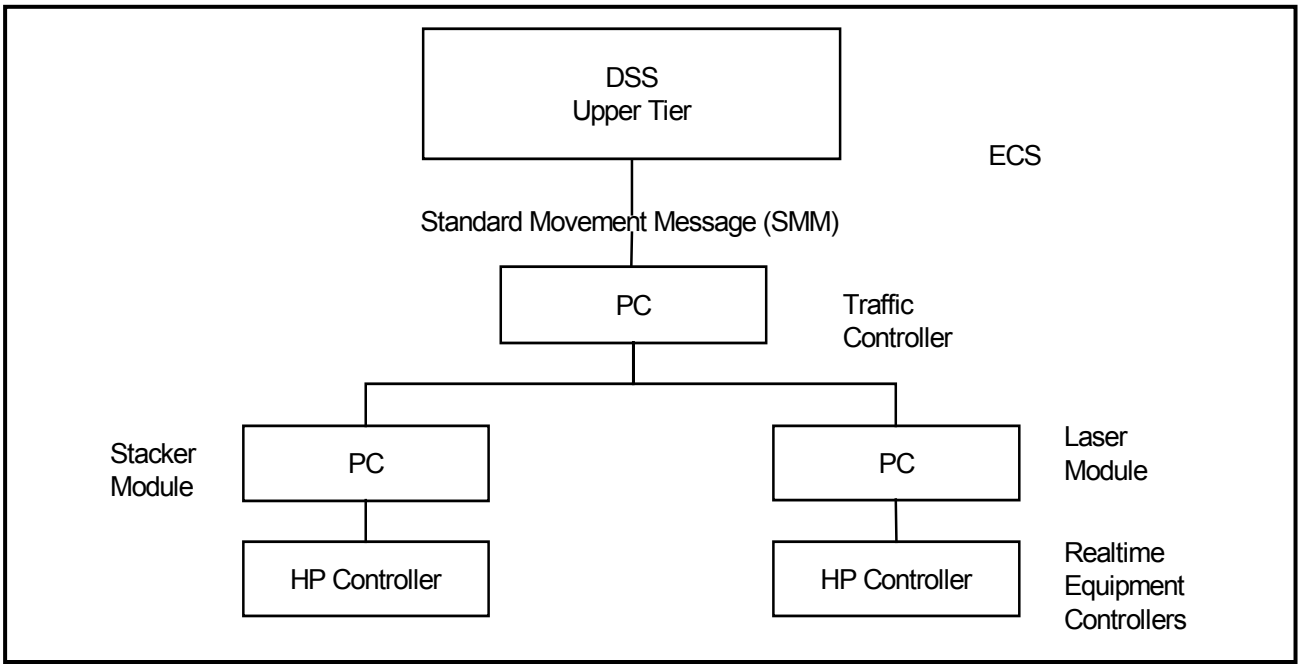

Figure F-2 Possible ECS Hardware Configuration for DDRV and DDSP-W IMC

4.0 CURRENT DDSP-W IMC SITE HARDWARE

4.1 Current equipment list for DDRV,Richmond, VA

	Southern Systems Inc. Sorter
	Southern Systems Inc. Carousels
	Southern Systems Inc. Tote Conveyor
	Southern Systems Inc. Pallet Conveyor
5	Allen-Bradley Model 5/40 PLCs

4.2 AWOS Controllers

TBD

APPENDIX G DSS - ECS CURRENT DDSP-E SITE REPORT

1.0 DESCRIPTION OF CURRENT SYSTEM OR SITUATION

1.1 New Cumberland - Overview Of The Eastern Distribution Center (EDC)

1.1.1 Scope

This section briefly describes the mission and major functions of the EDC and its major components (computer systems, storage systems, workstation areas, workstation computer hardware, and material handling equipment). It also provides a brief overview of how these components integrate to carry out inventory management, material movement and material processing operations at the EDC.

1.1.2 Primary Mission of the EDC

The primary mission of the EDC is to distribute general supplies, repair parts and secondary items to support the U.S. Military in Europe, Panama, Puerto Rico, twenty-two Eastern and Mid-Western states, and the District of Colombia and to provide Foreign Military Sales (FMS) to designated areas.

1.1.3 Major Functions of the EDC

The EDC has the following major material processing functions:

- The EDC receives, stores, cleans and preserves, packs, and ships mission material to its assigned global customers. Mission material includes general supplies, Defense Logistics Agency (DLA) material, General Services Administration (GSA) material, and material for the Army, Navy, Air Force and Marines.

- The EDC operates as a Consolidation/Containerization Point (CCP) facility. This means that it receives and consolidates material from other depots, contractors or vendors into full Air Line of Communications (ALOC) loads for shipment to points of embarkation.

- The EDC functions as a Total Package Fielding Point (TPF) facility. It accumulates all the items for Prescribed Load List (PLL) or Authorized Stockage List (ASL) packages. These packages consist of all the parts needed to support a major item or weapon system in the field.

1.1.4 Major Components of the EDC

In order to fulfill its mission, the EDC requires that material be accurately, reliably and efficiently processed and tracked from the time it is received until it is shipped. The EDC uses computer systems and barcode technology to control the inventory, records, material processing operations, and material handling equipment needed to support its supply distribution activities. The EDC system consists of the following five major components:

- Computer Systems
- Storage Systems
- Workstation Areas
- Process Control System (PCS) Workstation Computer Hardware
- Material Handling Equipment (MHE)

1.1.4.1 Computer Software Systems and Devices

There are major computer systems which control the inventory, information/data, workstation activities, and MHE used to process material at the EDC. These computer systems are:

- Distribution Standard System (DSS)
- Process Control System (PCS)

In addition, there are a variety of devices that supply information to the software systems.

1.1.4.2 DSS

The DSS passes request for supplies as Material Release Orders (MROs), plans and controls the daily operations at the EDC. It takes the MROs and schedules the work. It then release the work to the PCS with all the information needed to process and move the material. In addition, the DSS maintains inventory records, assigns storage locations, and schedules surveys and inspections of storage areas.

1.1.4.3 PCS

Based on directions received from the DSS, the PCS directs the movement of MHE within the EDC and directs operator activities for moving, storing, picking, packing, inspecting, and surveying material. The PCS also responds to requests for information on the status of equipment and material. See Appendix F for EDC Current Flow

1.1.5 Devices

A variety of devices such as scales, barcode readers, and sizing stations are used to provide the DSS and the PCS with data needed to process and move material. These devices supply information such as weight, height, control numbers, tote IDs, etc.

1.1.5.1 Computer Capabilities

Together, the computer systems provide the EDC with the following capabilities:

1. Schedule and balance the daily workload based on manpower and equipment availability.
2. Pace the work flow to workstations.
3. Direct material processing and material movement activities at workstations.
4. Respond to requests for information on the status of material, equipment, workstations, shipments, etc.
5. Track, control and route material by conveyors, sorters, towline, fork trucks, and hybrid vehicles.
6. Maintain records on all material moving within the EDC by control number and last known location.
7. Assign storage locations based on the size, weight and turnover rates of material.
8. Consolidate incoming material with material already in storage under the same National Stock Number (NSN).
9. Establish primary storage locations for an NSN and automatically replenish these when the quantity in the location falls below a predetermined minimum.
10. Maintain detailed inventory records on material in storage.
11. Schedule shipments.
12. Group orders into shipments by destination or DODAAC.
13. Schedule picks for shipments by pick cycle.
14. Assign picks to pack area by priority, workload, destination, and total weight.
15. Assign all picks for same shipment to the same pack workstation.
16. Analyze inventory and production records to project future needs and to plan production schedules.
17. Compile reports on daily activities.

1.1.6 Storage Systems

There are four major storage areas within the EDC including two high-rise storage racks/bins, active item storage areas, and temporary consolidation areas.

Storage locations within the EDC for mission material are determined by the DSS at receipt entry based on the National Stock Number (NSN), size, weight, and activity of the material. The DSS always attempts to consolidate incoming material with existing material and to store the maximum quantity of the NSN in the fewest possible locations. A primary storage location for an NSN is established and the DSS automatically issues a transaction to replenish the material in the location when the quantity goes below a predetermined minimum. The DSS also maintains inventory records on all material in storage.

a. **Bin Storage**

Bin Storage is a high-rise storage system for units of issue weighing less than 45 lbs. that will fit in a metal bin. The bins are 24 in. wide x 47.5 in. long and 12, 24 or 27 in. high. A bin can be subdivided in up to eight individual segments. Each bin can accommodate a maximum payload of 700 lbs.

The Bin Storage rack is 64 ft. high and has three opening heights to accommodate the three bin heights. Bin Storage is 32 aisles wide, 32 tiers high, and 48 bays deep and provides 242,688 storage locations, and is serviced by pallet conveyor, tote conveyor and hybrid vehicles.

b. **Rack Storage**

Rack Storage is a high-rise storage system for pallet-size material weighing up to 2,000 lbs. The storage rack is 64 ft. high and accommodates pallets with three load heights: 42, 48 or 72 in. Rack Storage is 22 aisles wide, 14 tiers high, and 68 bays deep and provides 41,888 storage locations, and is serviced by towline, tote conveyor and hybrid vehicles.

c. **Active Item Storage**

Active Item Storage provides storage for items that have a high turnover rate. It is subdivided into three different areas: Active Item Tote Storage, Active Item Pallet Storage and Active Item Floor Storage.

Active Item Tote Storage provides storage for units of issue weighing less than 45 lbs. that are in packages or totes. It consists of nine tiers of gravity flow-through racks accessed by three working walkways. Each lane in the rack can accommodate either two cartons weighing up to 45 lbs. each or four toteboxes weighing up to 100 lbs. each. It provides a total of 4,032 storage locations. Active Item Tote Storage is serviced by takeaway package conveyor and by order pickers and fork trucks equipped with Mobile Data Terminals (MDT).

Active Item Pallet Storage provides storage for palletized units of issue weighing less than 45 lbs. It has four tiers of two-pallet deep gravity-flow-through lanes accessed by two working walkways. It provides 400 storage locations. Active Item Pallet Storage is serviced by takeaway package conveyor and by order pickers and fork trucks equipped with MDTs.

Active Item Floor Storage provides floor storage for units of issue weighing more than 45 lbs. and for material whose shape or size prevent storage in Active Item Tote or Active Item Pallet Storage. It is serviced by fork trucks equipped with MDTs.

d. **Temporary Storage**
In the sortation/consolidation and packing and shipping areas of the EDC, there are various rack and floor areas used to accumulate items for shipments.

1.1.7 Workstation Areas

Computer control enables work to be assigned to workstations at the EDC based on manpower and equipment availability. There are 169 different types of functional workstations and offices at the EDC. Each type performs a unique material processing function (detail receiving, process planning, consolidation, etc.) and handles a unique size, weight and issue type of material (mission oversize, CCP non-conveyable, etc.). There are five major workstation areas where material is processed at the EDC:

- Receiving
- Storage
- Preservation & Packaging (P&P)
- Sortation/Consolidation and Packing
- Shipping

a. **Receiving Workstations**
In the Receiving area, computer-controlled identification and tracking of all material begins. Incoming material arrives by commercial trucks, UPS, USPS, air freight, railcars, trailer, or intradepot transporter. The material is unloaded and checked to determine to which workstation it should be sent. If it is multipack, frustrated freight or security material it is sent to a special mission or CCP workstation dedicated to processing that type of material.

All other material is assigned to workstations in the Receiving area based on two characteristics: (1) the size and weight of the material (package, pallet or oversize) and (2) issue type of material (mission or CCP). For example, there are receiving workstations such as Mission Security, Mission Detail Receiving-Package, CCP Oversize Receiving and Receipt Entry-Pallet, etc.

CCP material usually goes directly from unloading to a receipt entry workstation whereas mission material is usually detail received and inspected first. At receipt entry, most material is sized and weighed with scales and measuring posts. The size and weight data is then passed to the DSS along with material identification information so that a storage location for the material can be assigned and the receipt recorded in the inventory files. In addition, a control number is assigned to the material and a material identification label is printed. These are used to identify and track the material as it travels to a storage or consolidation area.

b. **Storage Workstations**

Material is stored in different areas depending on the weight and turnover rate. Operators store and pick material in the EDC under the direction of the WCS with locations assigned by the DSS. There are two high-rise storage systems and three active item storage areas. Barcodes are used to identify the material and storage location. As each item is processed, the PCS verifies that the correct item is being processed and that the location is correct.

c. **Preservation and Packaging (P&P) Workstations**

The Preservation & Packaging (P&P) workstations package picks from storage to prevent damage during shipment based on the physical characteristics of the material, destination and anticipated mode of transportation. P&P also handles the Care of Supplies in Storage (COSIS) program which upgrades the packaging or preservatives of material already in storage as needed to prevent deterioration and to extend the shelf life.

P&P has separate workstations for package and pallet-size material. When material arrives at P&P, it is unpacked and a work order is drawn up listing what processes and packaging it is to receive. The necessary packing material is then accumulated and the material is sent through the appropriate cleaning, packaging, and preservative operations. Before being outchecked, it is inspected to make sure it has been processed and packaged correctly. Material for picks are then routed to a pack workstation. COSIS material is returned to storage.

d. **Sortation/Consolidation and Packing Workstations**

The Sortation/Consolidation and Packing workstations sort, consolidate and pack material for shipment. There are separate pack workstations based on three characteristics of the material: issue type, destination and weight. For example, there are workstations such as Light Pack, CCP/DT Non-Conveyable, Medium/Heavy Pack, etc. The shipping container and each item to be packed is identified with a barcoded control number. As each item is packed, the PCS verifies that the correct item is being packed into the correct container. When all items have been packed, shipping documents are printed and attached to the material.

e. **Shipping Workstations**
The Shipping area consolidates and stages material scheduled to be outloaded on trucks, trailers, or ALOC pallets. Items are accumulated in rack or floor storage by DODAAC, project code, or carrier. When all the items for a vehicle load order have arrived, the vehicle is scheduled. The loads are retrieved from the storage racks by fork trucks equipped with MDTs and staged in front of the appropriate shipping door. When the vehicle arrives, the loads are transferred to the truck.

1.1.8 PCS Workstation Computer Hardware

Various computer hardware devices are used at the EDC workstations to communicate with the PCS. Data entry devices such as terminals, MDTs, and keypads are used to run PCS conversations which dispatch instructions for putaways, picks, surveys, inspections, packs, and moves, and permit inquiries on material and equipment. Printers located at the workstations produce various barcoded labels and documents which identify and track all material.

a. **PCS Workstation Terminals**
Various workstations and offices are equipped with HDS3200 terminals or Lee Data 1222 terminals. The terminals run conversations which direct operator activities for processing and moving material and respond to inquiries on the status of EDC-CNs, conveyances, shipment units, etc.

b. **Intelligent Terminals (ITs)**
The receipt entry and packing dimension and weigh workstations are equipped with Lee Data 84 ITs. The ITs are connected to scales and sizing stations. The ITs collect size and weight data from these devices and transmit it to the DSS so that storage or shipping information can be determined. This data is also used to print the required putaway labels or shipping documents.

c. **Mobile Data Terminals (MDTs)**
The hybrid vehicles, order pickers and fork trucks are equipped with Motorola KDT 480C MDTs. The MDTs provide two-way interactive communications between the driver and the PCS via an FM two-way radio. The MDTs are used to run conversations which direct operator activities for processing material and respond to inquiries on the status of material and locations.

d. **Keypads**
Most workstations are equipped with Computerwise Transterm 5 keypads with barcode wands. The keypads are used to run conversations for packing and for towline and tote moves.

e. **Barcode Wands**
The terminals and keypads are equipped with Welch Allyn SRD 3192G000 barcode wands. Barcode wands are hand-held scanners which read barcoded data via a glass-ball light tip. The barcode wands are used because they provide a fast and accurate method of data entry. At the EDC, the wands are used to input barcoded EDC-CNs, tote IDs, cart Ids, location IDs, PAKCCNs, etc.

f. **Laser Scanners**
The MDTs are equipped with Symbol Technologies LS 8125II laser scanners. Laser scanners are non-contact scanners which read barcoded data using a laser system. At the EDC, the scanners are used to input barcoded EDC-CNs, NSNs, tote IDs, cart IDs, and location IDs.

g. **Printers**
Various EDC workstations and offices have Infoscribe 8400 printers. These printers are used to print out material identification labels and various shipping documents containing both man-readable and barcoded data.

1.1.9 Material Handling Equipment (MHE)

There is various computer-controlled MHE used to move material within the EDC including a towline system and carts, tote conveyor, pallet conveyors, two package sorters, fork trucks, and hybrid vehicles. The equipment used to transport an item is determined by the size, shape, weight, and destination of the material.

1.1.9.1 Classification of Material for Purposes of Transportation

For purposes of transportation within the EDC, material is divided into four types on the basis of size, shape and weight:

- Conveyables
- Non-Conveyables
- Pallet-Size Material
- Oversize Material

a. **Conveyables**
Conveyables are handling units of no more than 45 lbs. which will ride safely in a 27.5 in. long x 15.75 in. wide x 9-3/8 in. high plastic totebox. Conveyables are transported by tote conveyor and sorters.

b. **Non-conveyables**
Non-conveyables are handling units of odd-shaped items larger than a totebox but weighing less than 45 lbs. Non-conveyables are transported by towline and pallet conveyor.

c. **Pallet-Size Material**
Pallet-size material is any item or set of items whose cumulative size when stacked on a 40 x 48 in. military pallet does not exceed 44 in. wide x 52 in. long x 67 in. high and whose weight does not exceed 2,000 lbs. Pallet-size material is transported by hybrid vehicle, fork truck, pallet conveyor, and towline.

d. **Oversize Material**
Oversize material is any item exceeding the size or weight of pallet-size material or whose physical shape precludes safe handling by towline or pallet conveyor. Oversize material also includes material that exceeds the guidelines for safe handling by an unassisted operator. That is, items which weigh less than 5,000 lbs. Oversize material is transported by fork truck.

1.1.9.2 Towline System and Carts

The towline is used to move pallet-size loads of up to 2,000 lbs. on four-wheeled platform carts from one area of the EDC to another. The towline system operates at 1 m.p.h. and consists of 5.3 miles of in-floor track and 1,120 carts. Carts are automatically delivered to workstation spurs on a workload-balancing basis. Some spurs are equipped with automatic pallet loaders and unloaders. The towline at the receipt entry workstations is equipped with in-line scales and measuring posts which are used to determine load height and weight so that the DSS can assign storage locations.

1.1.9.3 Tote Conveyor

The tote conveyor consists of several continuous miles of powered roller, gravity and belt conveyors. It transports conveyable handling units weighing less than 45 lbs. which will fit in a plastic totebox. These toteboxes are 27.5 in. long x 15.75 in. wide x 9-3/8 in. high and can hold a maximum payload of 100 lbs.

The tote conveyor system sends totes to workstation lanes on a workload-balancing basis. The tote conveyor at the receipt entry and rate and weigh workstations is equipped with in-line scales used to determine load weight so that the DSS can assign storage locations or determine weight for shipping documents.

1.1.9.4 Pallet Conveyor

There are various discrete sections of pallet conveyor in the EDC which are used to transport palletized material weighing less than 2,000 lbs. The pallet conveyors interface with automatic cart loaders and unloaders and with intradepot transporters.

Some pallet conveyor in the packing areas is equipped with strapping and stretch wrap machines. The pallet conveyor at the packing dimension and weigh workstations has in-line scales and sizing stations which are used to determine load length, width and height for shipping documents.

1.1.9.5 CCP Sorter

The CCP Sorter is an automated system used to sort and deliver conveyable packages weighing less than 45 lbs. to packing workstations. The CCP Sorter operates at a speed of 1 m.p.h. and sorts 1,900 packages/hour. It consists of a closed loop of elevated track and package carriers. The carriers discharge the packages into 249 chutes. Each chute is dedicated to a specific DODAAC or depot customer. The chute assignment for the package is determined at the time the package is inducted based on information read by an overhead barcode scanner from the barcoded package label.

1.1.9.6 Mission Sorter

The Mission Sorter is an automated system used to sort and deliver conveyable packages weighing less than 45 lbs. to various workstations. The Mission Sorter operates at a speed of 2 m.p.h. and sorts at a rate of 3,600 packages/hour. It consists of a closed loop of elevated track and package carriers. The carriers discharge packages into 222 paired chutes. The chute assignment is determined at the time the package is inducted based on information read by an overhead barcode scanner from the barcoded package label.

1.1.9.7 Fork Trucks

There are fork trucks equipped with MDTs that are used to transport oversize material and also to transport pallet-size material to areas in the EDC not serviced by the towline or conveyors. The MDTs on the fork trucks run conversations for putaways, picks and moves.

1.1.9.8 Hybrid Vehicles

The hybrid vehicles are man-aboard, electric-powered, order-picking vehicles used in the Bin and Rack Storage aisles. They are powered by bus bars and guided by floor and top mounted guide tracks within an aisle and move at a maximum speed of 5 m.p.h. They have a lift/lower speed of 45 feet per minute. The hybrid vehicles are equipped with MDTs that run conversations which direct operator processing activities.

1.1.9.9 **AWOS**

Automated Weigh and Offer Systems (AWOS) exist in several different forms throughout the DLA. The basic mission of an AWOS system is to scan a barcode on a package, dimension and weigh the package, transmit the information to DSS, receive direction from DSS and route the material to up to three downstream offer and shipping destinations based upon DSS direction.

DSS FUNCTIONS	NISTARS FUNCTIONS
Receiving	
Stow Processing	
Picking	
Face Activities	
Quantity By Location	
Audits	
Reporting	
Document Creation	
RF Processing	
Packing and Consolidation	
	Site MHE control
DSS/PCS Interface Transaction	

Table G-1 DDSP-E ECS Functional Comparison

1.1.10 Current Lower Tier Conversations

Function	Description	Screens
PCS Towline System (VDT)	DISPLAY TOWLINE LOOP WORKLOAD	LACDWL
	RELEASE FROM INTRADEPOT QUEUE	LACRIQ
	RELEASE FROM MEDIUM/HEAVY PACK QUEUE	LACRPQ
	UNLOCK TOWLINE WORKSTATION	LACULK
	UPDATE MEDIUM/HEAVY PACK SPUR PRIORITY	LACUSP
	UPDATE TOWLINE SPUR STATUS	LACUSS
	UPDATE TOWLINE INSPECTION TYPE	LACUST
	UPDATE DROP POINT WAREHOUSE	LACUSW
	EMPTY CART MANAGEMENT MODE SELECTION	LACLIM
	ABORT TOWLINE CHAIN	LACATC
	START TOWLINE	SYC100
	STOP TOWLINE	SYC105
PCS Towline System (Keypad)	CREATE SINGLE CART MOVE	LKDCSC
	CREATE CHAINED CART MOVE	LKDCCC
	INITIATE SINGLE CART MOVE	LKDISC
	INITIATE CHAINED CART MOVE	LKDICC
	DETERMINE MATERIAL DESTINATION	LKDDMD
	QUEUE EMPTY REQUEST	LKDQER
	QUEUE EMPTY CART	LKDQEC
	UPDATE CART TYPE	LKDUCT
	REMOVE/REINTRODUCE CART	LKDRCM
	RECREATE CART MOVE	LKDRIC
PCS Conveyor System (VDT)	DISPLAY CONVEYOR LANE STATUS	CACDSS
	DISPLAY CONVEYOR WORKLOAD	CACDWS
	UNLOCK CONVEYOR WORKSTATION	CACULK
	ABORT TOTE CONVEYOR CHAIN	CACACC
	UPDATE CONVEYOR LANE STATUS	CACUSS
	START PALLET CONVEYOR	SYC 110
	STOP PALLET CONVEYOR	SYC 115
	START TOTE CONVEYOR	SYC 200
	STOP TOTE CONVEYOR	SYC 205
PCS Tote Conveyor System (Keypad)	CREATE SINGLE TOTE MOVE	CKDCST
	CREATE CHAINED TOTE MOVE	CKDCCT
	INITIATE SINGLE TOTE MOVE	CKDIST
	PROCESS TOTE ARRIVAL	CKDTAR
	PROCESS CCP/DT TOTE ARRIVAL	CKDCDA
	ENTER SORT DATA	SACESD
	DISPLAY MISSION SORTER WORKLOAD	SACMPK

Function	Description	Screens
PCS Sorter System (VDT)	DISPLAY CCP SORTER WORKLOAD SORTER REJECT CHUTE SORTER MANUAL ARRIVAL START CCP SORTER STOP CCP SORTER START MISSION SORTER STOP MISSION SORTER	SACCCP SACRJC SACMAR SYC210 SYC215 SYC300 SYC305
PCS Utilities (VDT)	PLC STATUSES INQUIRY CONVEYANCE INQUIRY WORKSTATION INQUIRY EDC-CN INQUIRY REQUEST MOVE REPORT A MOVED EDC-CN	TACDS2 TACDCI TACDWS TACECN TACRMV TACAMC
PCS Utilities (Keypad)	DISPLAY DATABASE RECORD DISPLAY CART ROUTING SET CART LOCATION	UTLDDR UTLRTE UTLSCL
PCS Fault Handling (VDT)	FAULT HANDLING CART ARRIVAL FAULT HANDLING CART AT WORKSTATION FAULT HANDLING INTRADEPOT RECEIVING QUEUES FAULT HANDLING MEDIUM/HEAVY PACK QUEUES FAULT HANDLING MEDIUM/HEAVY LANE COUNTS	FACCAR FACCAW FACIDQ FACMHQ FACMHC

Table G-2 Current Lower Tier Conversations

1.2 EDC CURRENT FLOW

1.2.1 CCP NORTH RECEIVING

Incoming material arrives at CCP Receiving docks via trucks, tractor-trailers, flatbeds or vans. The material is off loaded and repalletized as necessary for conveyance within the EDC. If one NSN is delivered on one standard sized pallet (40X48), the pallet is placed on a towline cart at one of the take away spurs (Spurs 12 through 15). The cart is then routed to CCP Receipt Entry (Spurs 166 through 171). These stations are furnished with the necessary equipment to weigh and measure the dimensions of pallet size material. The material is checked against its documentation and processed through Receipt Entry to record its receipt and also determine its next destination (i.e. CCP Pack, ALOC or CCP Outloading Spurs). If the CCP receipt has more than one pallet the material is processed and receipted in at CCP Oversize Receiving and Receipt Entry. Within this area the material is verified, processed through receipt entry to record its receipt and determine its next destination (i.e. ALOC or Outloading Spurs). The material is delivered via tugger with trailers to the next destination within EDC. Small packages (conveyable) that are received floor loaded in a truck are processed at the extender conveyor. Up to three (3) items are placed in a totepan and routed to CCP Receipt Entry located on the mezzanine. Small packages that have been palletized or shipped in multipack cartons are sent to the CCP MultiPack Breakdown area at Spurs 164 and 165. Multipack containers in this area are broken down into individual packs. If the material is conveyable it is placed into a totepan and routed to its next destination of CCP Receipt Entry. If the material is non-conveyable the material is placed on a towline cart and released to its next destination at CCP Receipt Entry. At the CCP Receipt Entry Station on the mezzanine the material in processed, receipted and given a destination by the system. The totepan is then released to the CCP Sorter, where the next destination is determined.

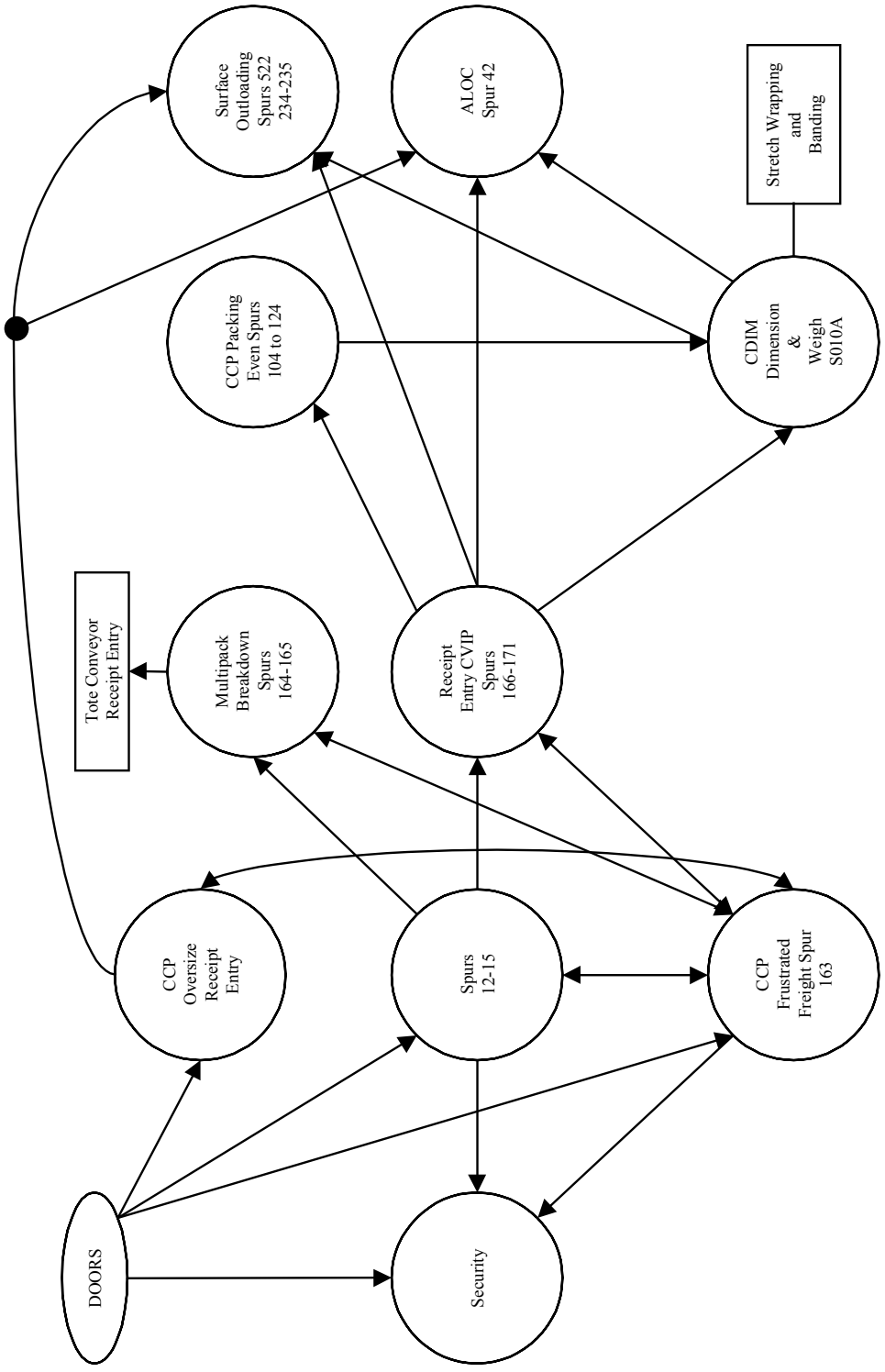

Figure G-1 North Receiving CCP Towline Flow

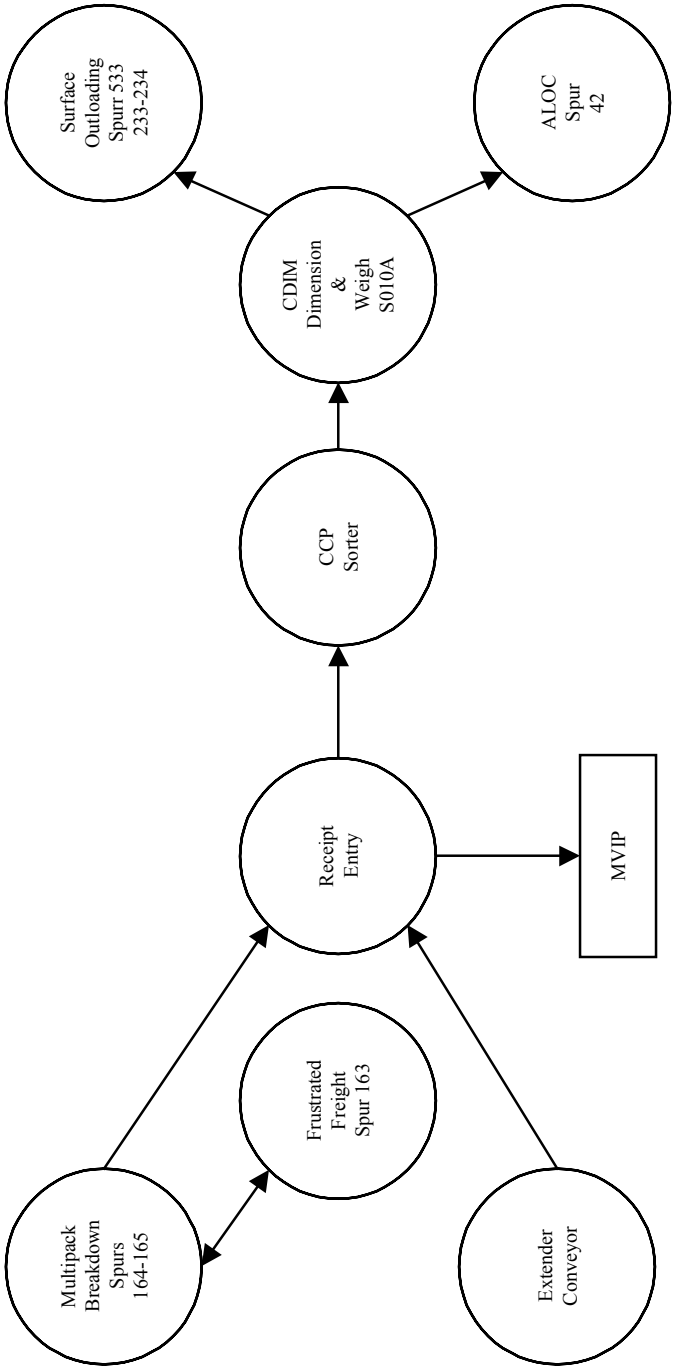

Figure G-2 North Receiving CCP Conveyor Flow

1.2.2 RECEIVING (SOUTH)

Incoming material arrives at South Receiving docks via trucks, tractor-trailers, flatbeds or vans. The material is off loaded and repalletized as necessary for conveyance within the EDC and Outlying Warehouses. If one NSN is delivered on one pallet or after repalletization equates to one pallet, the pallet is placed on a towline cart at one of the take away spurs (Spurs 16 to 19 or Spurs 153 and 154). The cart is then routed to Mission Detail Receiving (Spurs 157 through 162). As queuing capacity becomes available at Mission Inspection or Mission Receipt Entry he material and towline cart are manually released. Mission Inspection (Spurs 172 through 176) is used for processing material that requires Preservation and Packaging (P&P). After P&P is completed the cart is then released to one of the inspectors at Mission Inspection (Spurs 179 through 181) or Mission Receipt Entry (Spurs 183 through 187). Operators at these workstations are performing the inspection and receipt entry. Spurs 177 and 178 are used for staging carts for P&P, Mission Inspection or Mission Receipt Entry. After the material is processed at Mission Inspection (Spurs 179 through 181) the towline cart is routed through the Through Put Spur to its next destination (i.e. Racks, Bins, or Intradepot Queues). Once the material is processed at the Mission Receipt Entry (Spurs 183 through 187 the towline cart is routed to its next destination (i.e. Racks, Bins or Intradepot Queues).

Operators have had negative experiences with chaining carts, therefore if the NSN has more than one pallet the material is processed and receipted in at one of the Oversize workstations located at Spur 16, 18 or 19.

Small packages (conveyable) that are received floor loaded in a truck are processed at the extender conveyor. One item is placed in a totepan and routed to Package MVIP or Package Inspection. Small packages that are palletized or shipped in multipack cartons are sent to the Mission Multipack Breakdown area. Multipack in this area is broken down into individual packs. If the material is conveyable it is placed into a totepan and routed to its next destination of Package MVIP or Package Inspection. If the material is non-conveyable it is placed on a towline cart and release to its next destination (Mission Detail Receiving). Inspection, P&P and receipt entry is now being performed at Package MVIP, Package Inspection and Mission Multipack Breakdown (Adjacent to Spur 153). Once the inspection, P&P and receipt entry of the material is completed the totepan is routed to its next destination within the bins or RPKP for the racks or outlying warehouses.

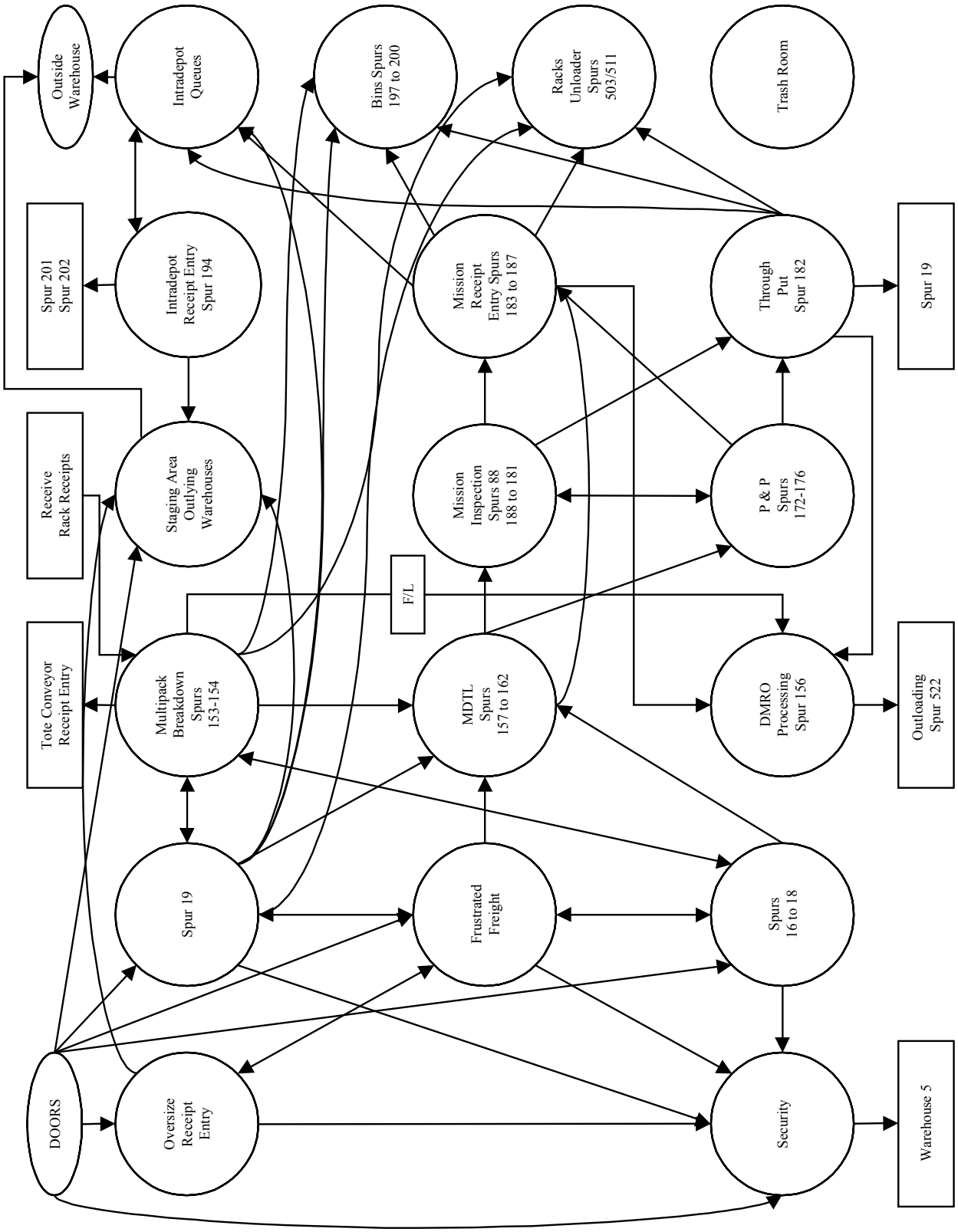

Figure G-3 South Receiving Mission Towline

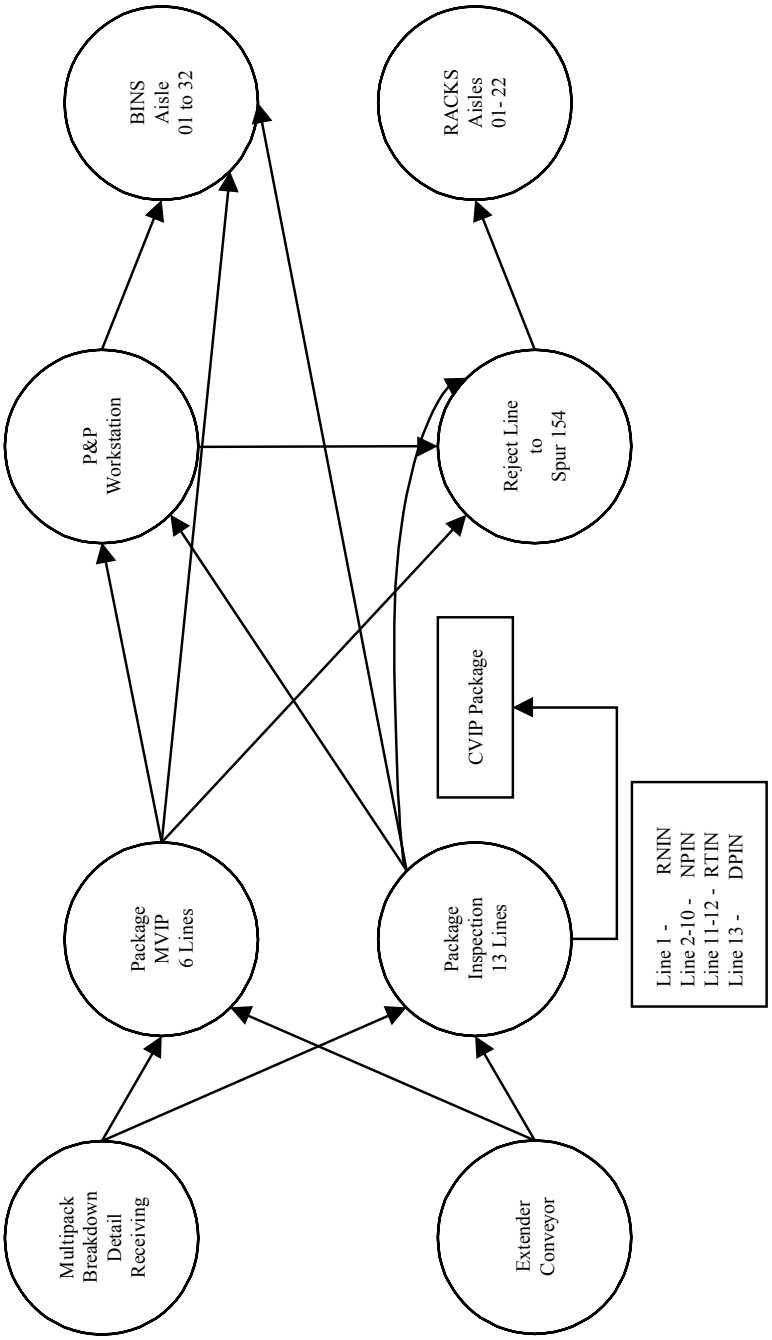

Figure G-4 South Receiving Mission Conveyor Flow

1.2.3 **ACTIVE ITEM**

1.2.3.1 **SPUR 204**

Items picked from the pallet and tote flow racks are consolidated into totes. Those items designated for DCWN P&P In check station are placed on a towline cart and routed accordingly. All other totes are placed on the conveyor going to the Mission or CCP Sorter. Items destined for Non Conveyable (DCCN), Medium/Heavy (DCCM), Dedicated Truck (DCCD) and Consolidated Control Point (CCP) will also be placed on a towline cart and routed accordingly.

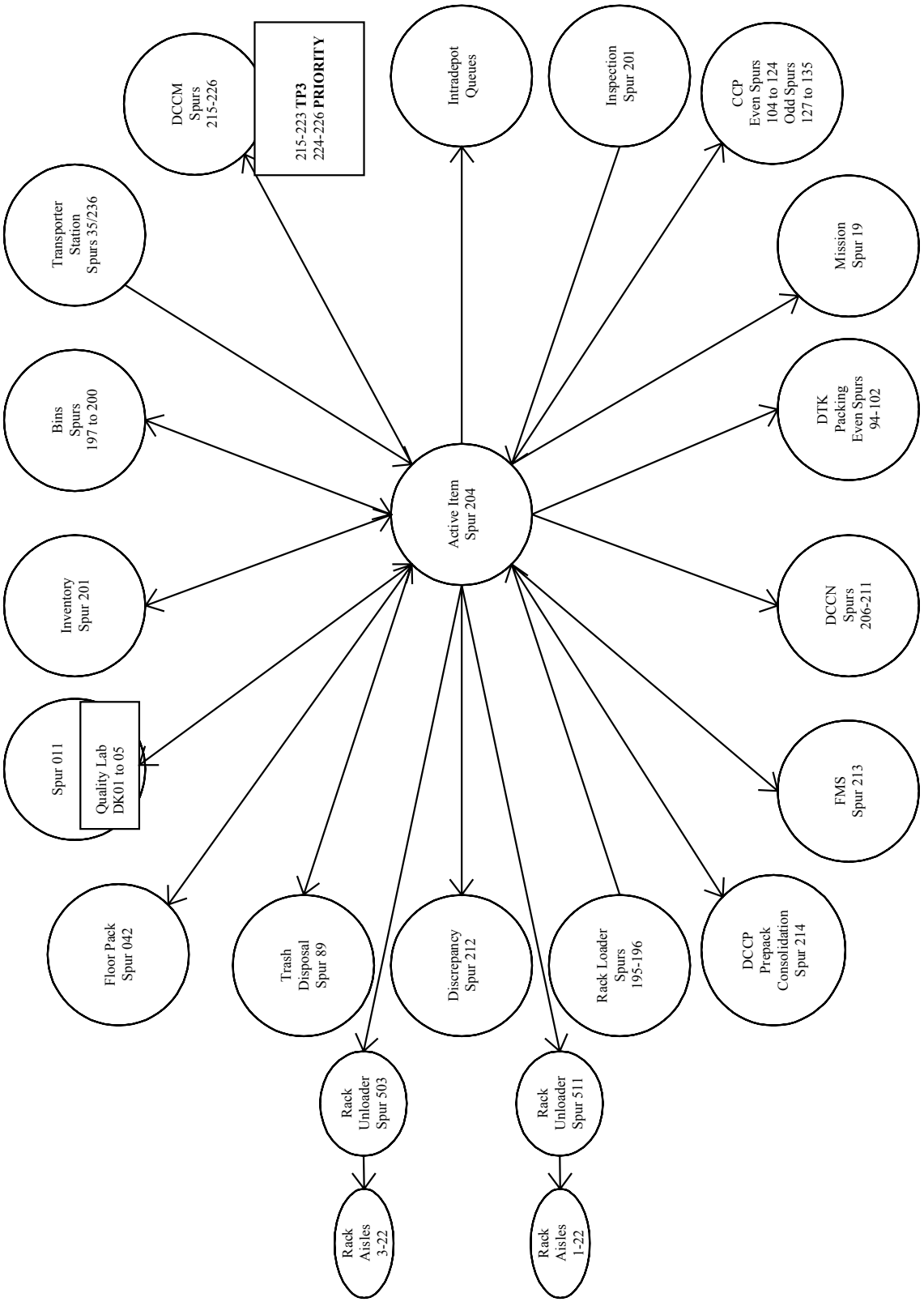

Figure G-5 Storage Active Items Towline Flow

1.2.4 RACK STORAGE

The Unloaders (inbound) at rack storage (Spurs 503 and 511) transfers material from the towline cart onto the conveyor system, which routes the material to the appropriate aisle. As the cart enters the unloader area the pallet of material is automatically transferred from the towline cart to the conveyor system. PCS transfers pallet storage location record from the Towline System Controller to the Conveyor System Controller. The pallet of material then moves on the conveyor to the sizing alignment station. If the load shifted, it is diverted to the Repalletize Rack workstation where it can be restacked or repositioned. If the load did not shift, the pallet of material continues down the pallet-input conveyor onto the pick-up conveyor at end of the assigned aisle. As the pallet is directed to the appropriate aisle pick-up conveyor, the location record obtained from the computer is passed from the conveyor system controller to the vehicle system controller. Palletized material is held on the pick-up conveyor until the operator of the hybrid vehicle transfers the pallet of material to the vehicle for putaway.

Loaders (outbound) at rack storage (Spurs 195 and 196) transfers the pallets from the conveyor system to a towline cart. When the pallet is placed on the towline cart, the conveyor system controller transfers the destination information to the towline system controller. This information provides the data for directing the towline cart to its assigned destination (i.e. Dedicated Truck (DCCD), Consolidation Control Point (DCCC), Non Conveyable (DCCN), Medium/Heavy (DCCM).

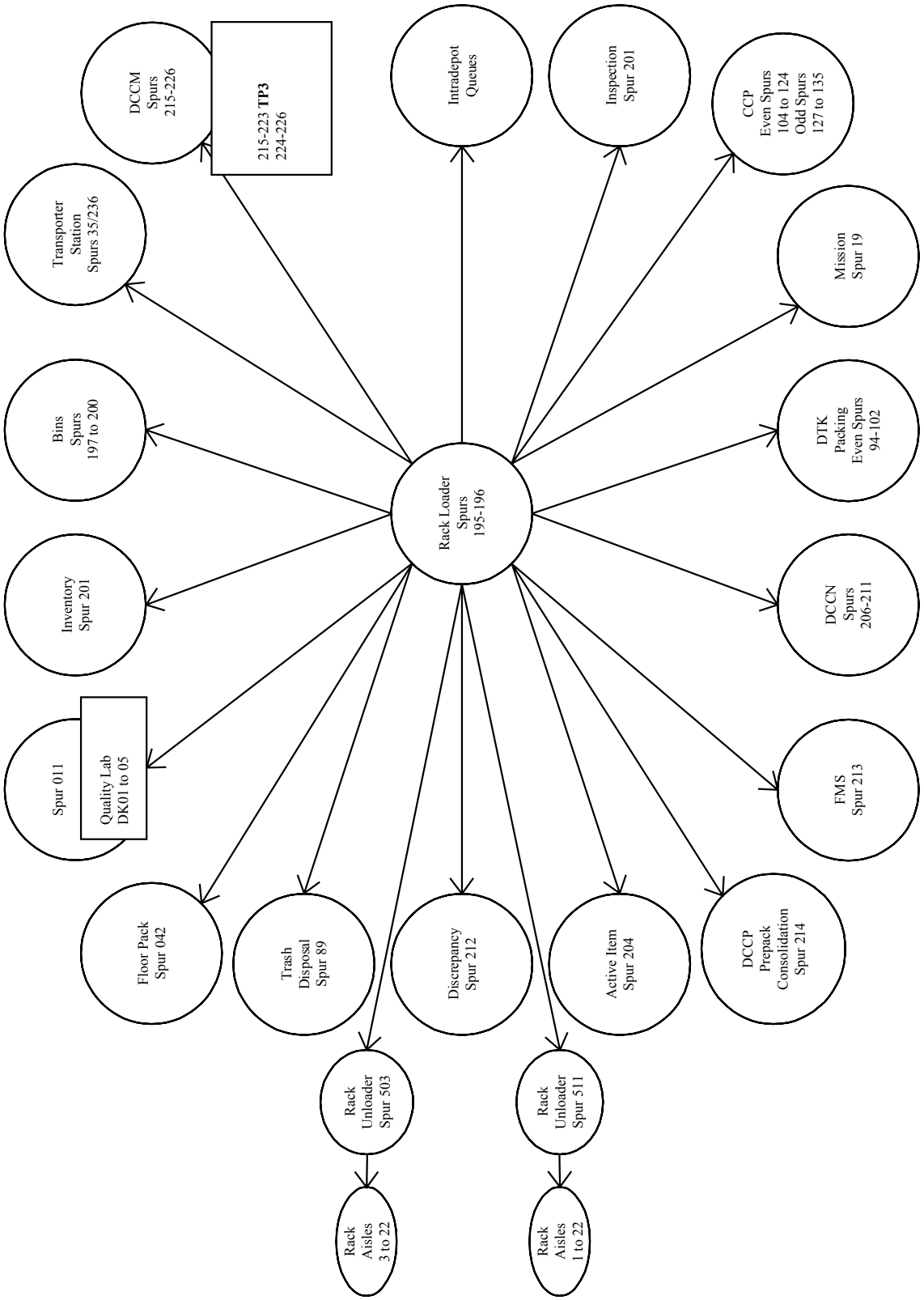

Figure G-6 Storage Racks Towline Flow

1.2.5 **BINS**

1.2.5.1 **SPURS 197 – 200**

Material to be stored in the Bin Storage area arrives by towline cart. An operator removes the material from the cart. This material is hand carried to the hybrid vehicle operator where he/she will properly store the material into the assigned location.

Material being retrieved from the Bin Storage area is hand carried to a towline cart. The operator will wand the pick ticket and enters the cart number. This action transfers the material record from the vehicle system controller to the towline system controller determining destination station and routing. The cart is then released.

1.2.6 **BINS**

1.2.6.1 **Conveyor**

Material assigned at Package Receipt Entry to a storage location in the Bin Area is routed on the conveyor system to the appropriate pickup conveyor, on the mezzanine for storage in the Bin storage area.

Material leaving the Bin Storage area via the conveyor is routed to the Mission or CCP Sorter Induction, Active Item, or DCWN P&P In-Check station.

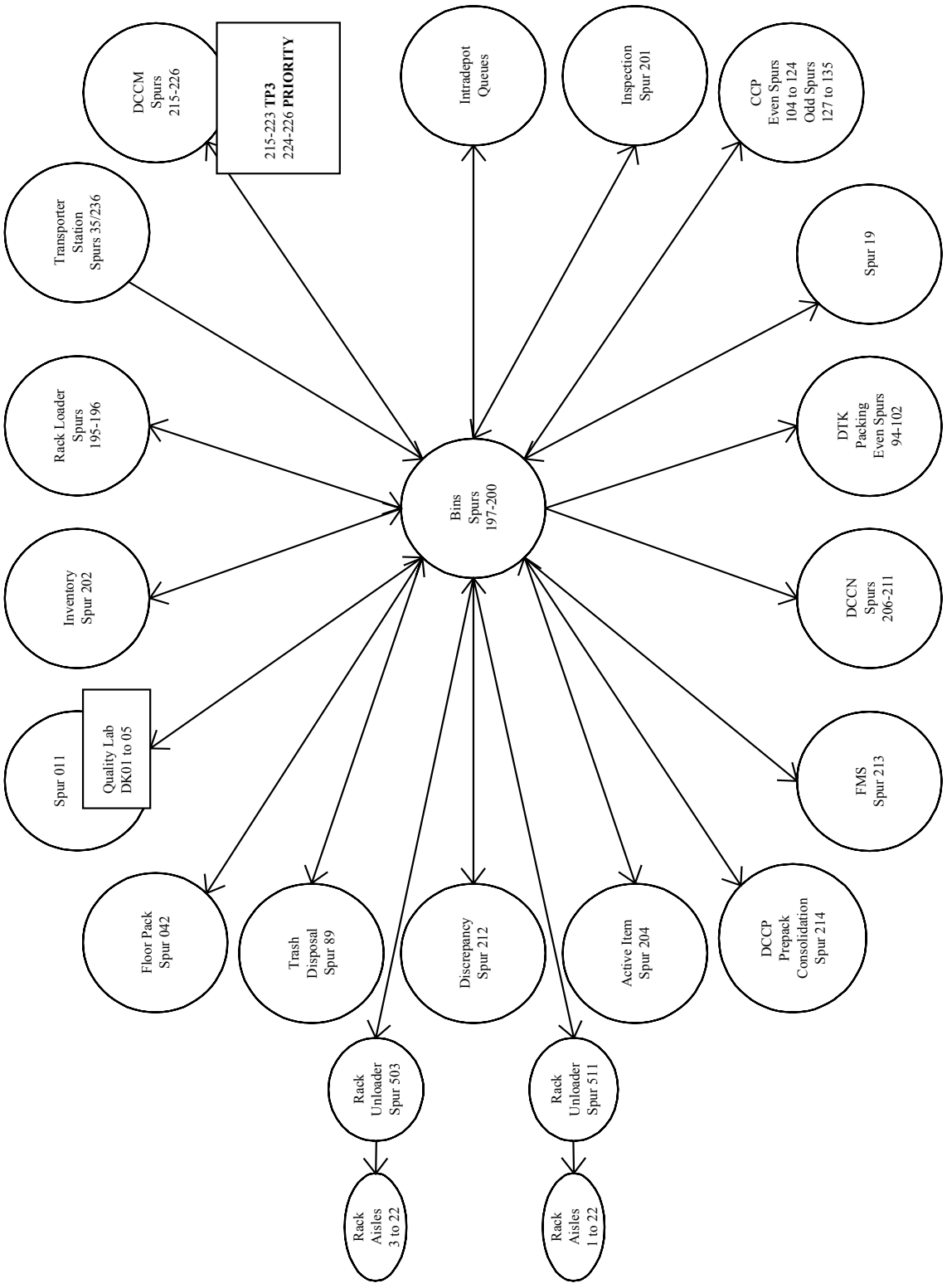

Figure G-7 Storage Bins Towline Flow

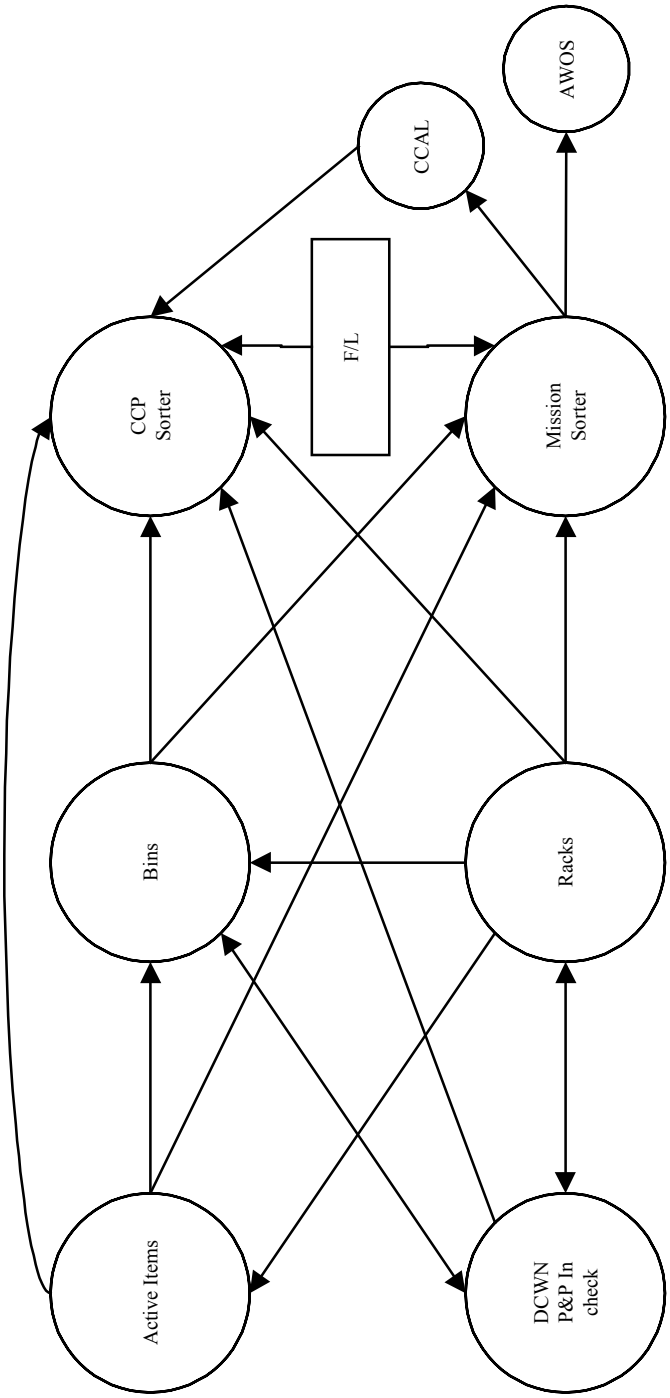

Figure G-8 Storage Conveyor Flow

1.2.7 DISCREPANCY WORKSTATION

1.2.7.1 SPURS 201 and 212

Material will arrive at Discrepancy Workstations (Spurs 201 or 212) as result of an operator entering a discrepancy against a MRO (pick ticket). This may include overages, shortages, damaged material, missing documentation, unidentified material, mix stock, abends, wrong material and error messages (i.e. CCN and TCN not found, Shipment Unit deleted, and etc.). Discrepancy personnel will conduct a research of the material to determine the problem. Appropriate corrective action may include sympathetic pick (multi-line shortages), reallocation of material, cancellation, restocking of material, etc. Any towline cart on the towline without a destination and documentation attached to the material is directed to either Spur 201 or 212. The operator inquires the system to determine if there is an open MRO (pick ticket) in progress. Depending on the status, a duplicate DD Form 1348-1 and pick ticket may be generated and affixed to the material. The cart with material is then release to the appropriate packing workstation. If the material cannot be identified, it is treated as a found on post, a storage ticket is printed, the appropriate files are updated and the material is returned to stock. If discrepancy is classified as an overage or shortage, the quantity is assigned a discrepancy control number and a putaway is generated. The material is then forwarded to the appropriate storage location.

Physical inventories are performed to verify quantities of material in location against quantities reflected on QBL files. Towline carts from Racks, Bins or Active Items storage areas are delivered to Spur 201 for inventory counts and returned to the appropriate storage area. The operator will determine the source of the inventory request, verify quantity, count the material, and update inventory balances accordingly. The material is returned to the original location in which the material was requested from. If the cart has mixed material, new locations are requested and putaway tickets are generated. If material is classified as wrong material and needs to be returned to stock, the operator will attempt to identify location in which the material was picked from, freeze the location and return the material. If the location can not be determined a new location is request and a putaway ticket is generated. Cancellation discrepancy is used to flag picking, packaging, and shipping processes and permit restocking material from MRO cancellation actions.

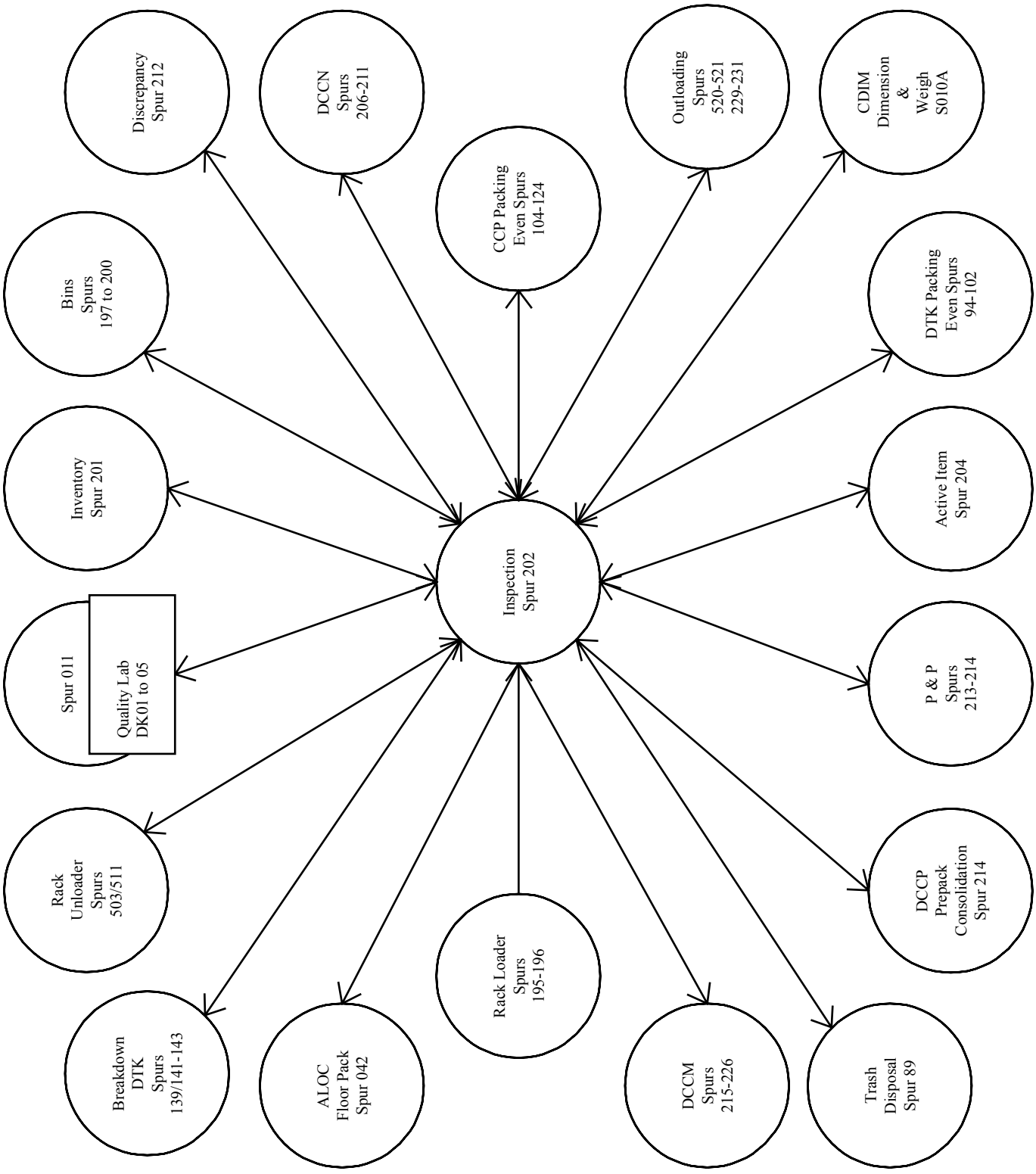

Figure G-9 Storage Inventory Spur 201 Towline Flow

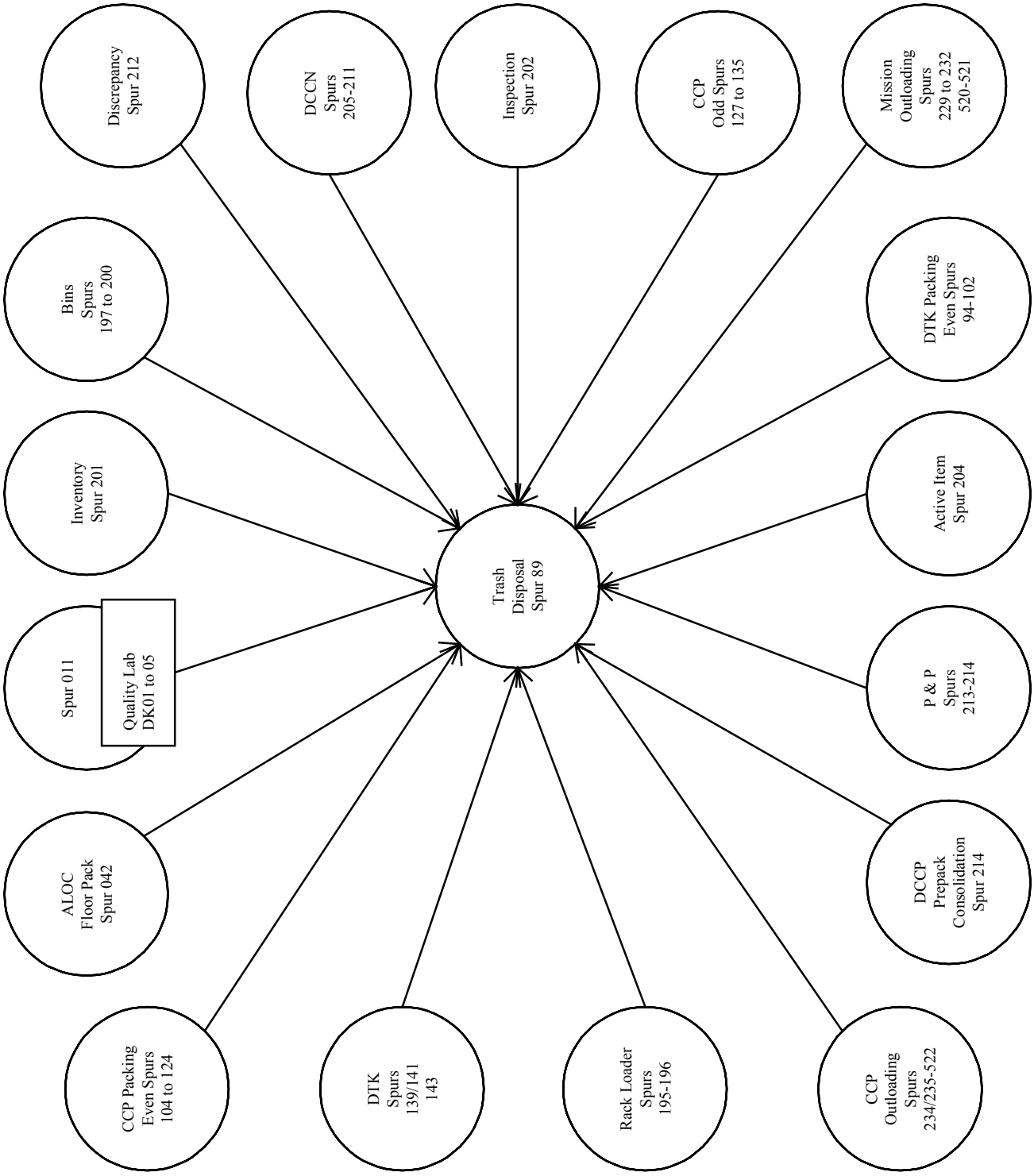

Figure G-10 Trash Disposal Spur 89 Towline Flow

1.2.8 BULK OPERATIONS

1.2.8.1 SPUR 11

The functions of preservation and packaging are no longer performed at Spur 11 workstation. This area is now used for the storage of active bulk item material and processing of material that is destined for the Quality Lab. Currently the racks and bins are unable to rewarehouse or relocate material to these active item bulk locations. Material that is destined for the new active item storage area from the racks and bins has a destination of the first Active Item Storage area (Spur 204). Once the cart arrives at Spur 204, an operator will re-route the cart to Spur 11 using either the Initiate Single Cart (ISC) or Create Single Cart (CSC) move. PCS must be able to acknowledge Spur 11 as the destination spur for material destined for DK01 through DK05 instead of Spur 204. Spur 11 is used for routing material to its assigned destination (i.e. Dedicated Truck (DCCD), Consolidation Control Point (DCCC), Non Conveyable (DCCN), and Medium/Heavy (DCCM). Material, which is packed and is ready for transportation is also routed from Spur 11 to the Outloading Spurs (CCP, Mission or ALOC).

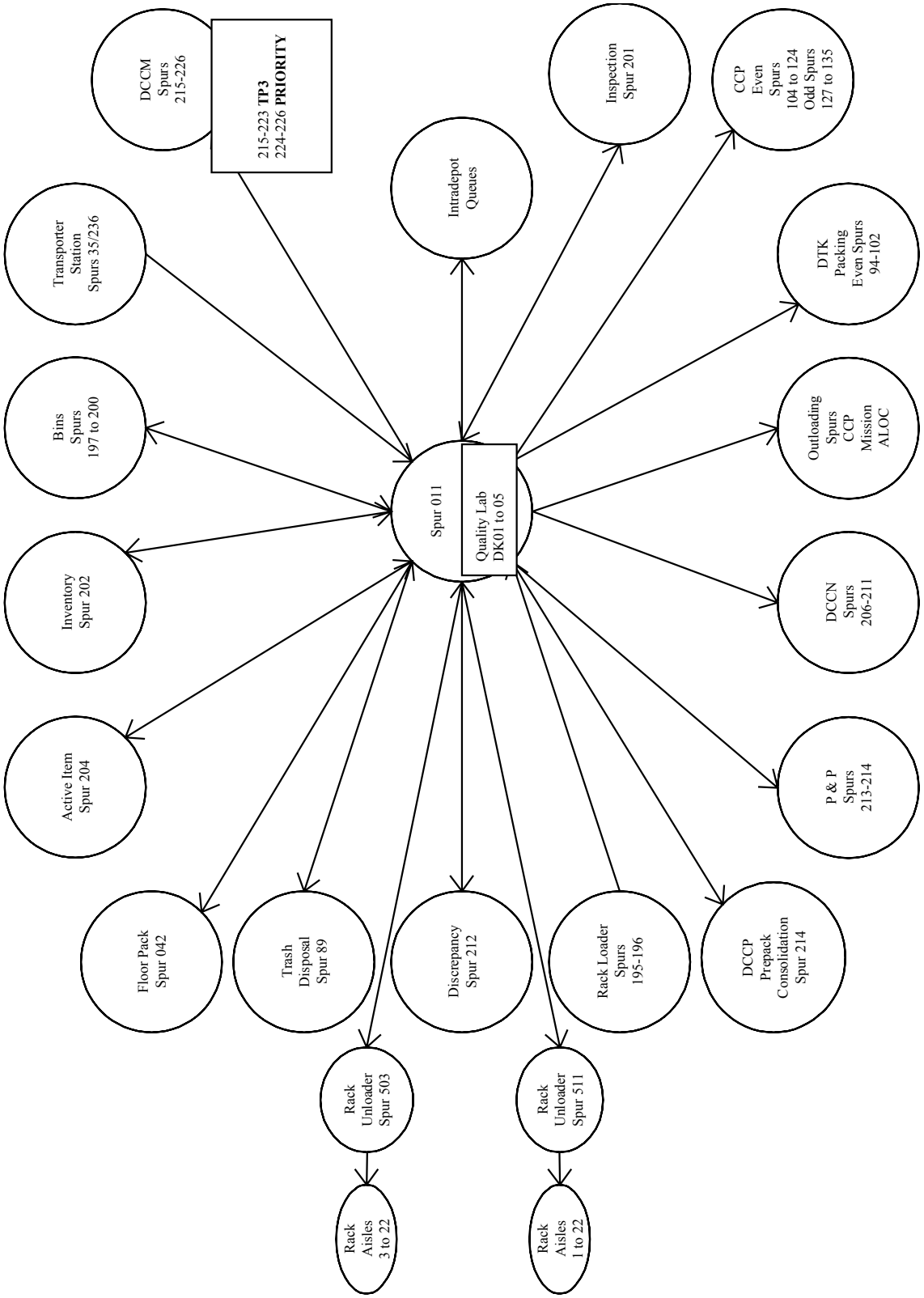

Figure G-11 Storage Active Item Ii Towline Flow

1.2.9 BULK OPERATIONS

1.2.9.1 FLOOR PACK SPUR 42

Material which exceeds the confines of a standard military pallet, shipments units requiring more than four (4) pallets and/or oversize material from Bulk Active II (DK03, DK04 or DK05) is consolidated and packed at this station. This material may be received via the towline system at Spur 42, stake body, flatbed trucks, warehouse tractor w/trailers, and Electric tuggers w/trailers. Spur 42 is utilized for receiving pallets and cartons destined for ALOC. Material from the outlying warehouses destined for packing, storage or relocations for the bins and racks are inducted to the towline through spur 42.

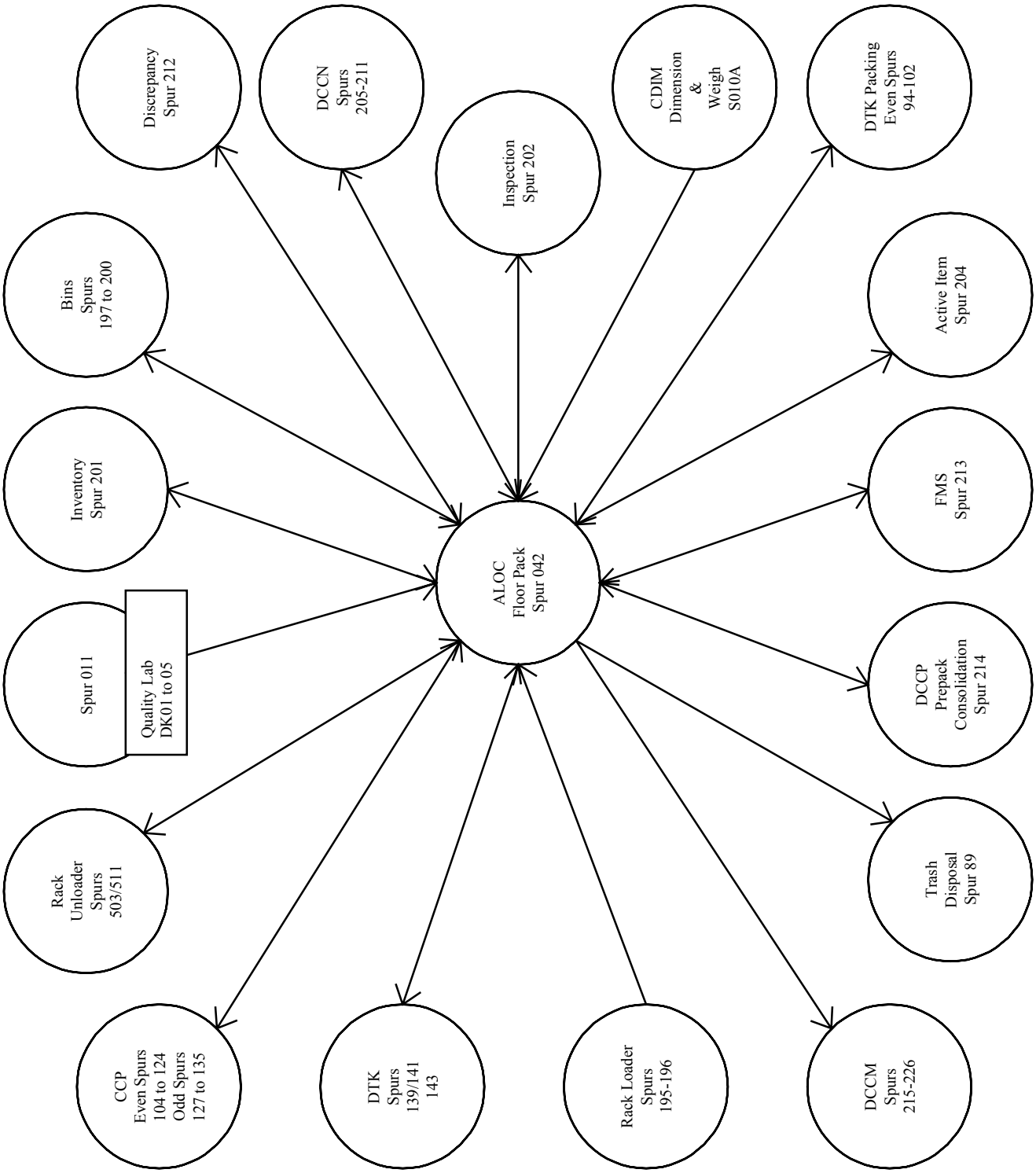

Figure G-12 Packing Aloc And Floor Pack Towline Flow

1.2.10 MISSION SORTER AND LIGHT PACK WORKSTATION

Multiple packages, within a tote pan, are received at the Mission Sorter Induction Station. Three automatic tote dumpers unload tote contents onto an induction chute. Operators retrieve the material from the induction chute, pass the items through the photo eye, and place the items on the tilt tray sorter. The bar code is faced up in such a way it can be read as it passes under a fixed scanner. This scan identifies the item to allow the sorter to dump the item at the correct chute. If the sorter scanner is not able to read the bar coded control number, after 1 revolution without being assigned to a chute the tray automatically tilts at the designated no read chutes. Currently there are 20 "No Read Chutes", and the packages are assigned in a round robin sequence. When the specified destination chute is full, and the material cannot be dumped, it is tilted at the reject chute. Material arrives at the pack workstation from the sorter chute, Light pack Non-conveyable (DCCN), Spurs 212, 213 and 214, Outlying Warehouses (Transporter Station 35/236), and Breakdown Spurs 141 and 143. Material arriving from the towline have multiple Carton Control Numbers (pieces) on the Carts. Materials from the towline cart are carried by hand to the appropriate sorter chute or Pack Station. Material classified as a single line item is packed as it arrives. After packaging, the material is placed into a tote pan and a CCN is assigned to the tote pan. The tote is then placed on the conveyor and passes through the Automatic Weigh and Offering System (AWOS). Material is diverted inside the AWOS room to one of three destinations:

1. CCAL; (material destined for the CCP Sorter)
2. Designated Small Parcel Carrier Lanes
3. Reject Line

Material received at the "No Read Chutes" is processed by an operator by completing the Single Item Pack conversation. This process will update a package to a C38 status (Exterior Carton Closed). After updating completed package the material is placed into a tote and a CCN label is attached to the material and assigned to the tote. The tote is then placed on the conveyor. Tote passes through the Automatic Weigh and Offering System (AWOS). Material is diverted inside the AWOS room to one of two destinations: Designated Small Parcel Carrier lanes or the Reject Line.

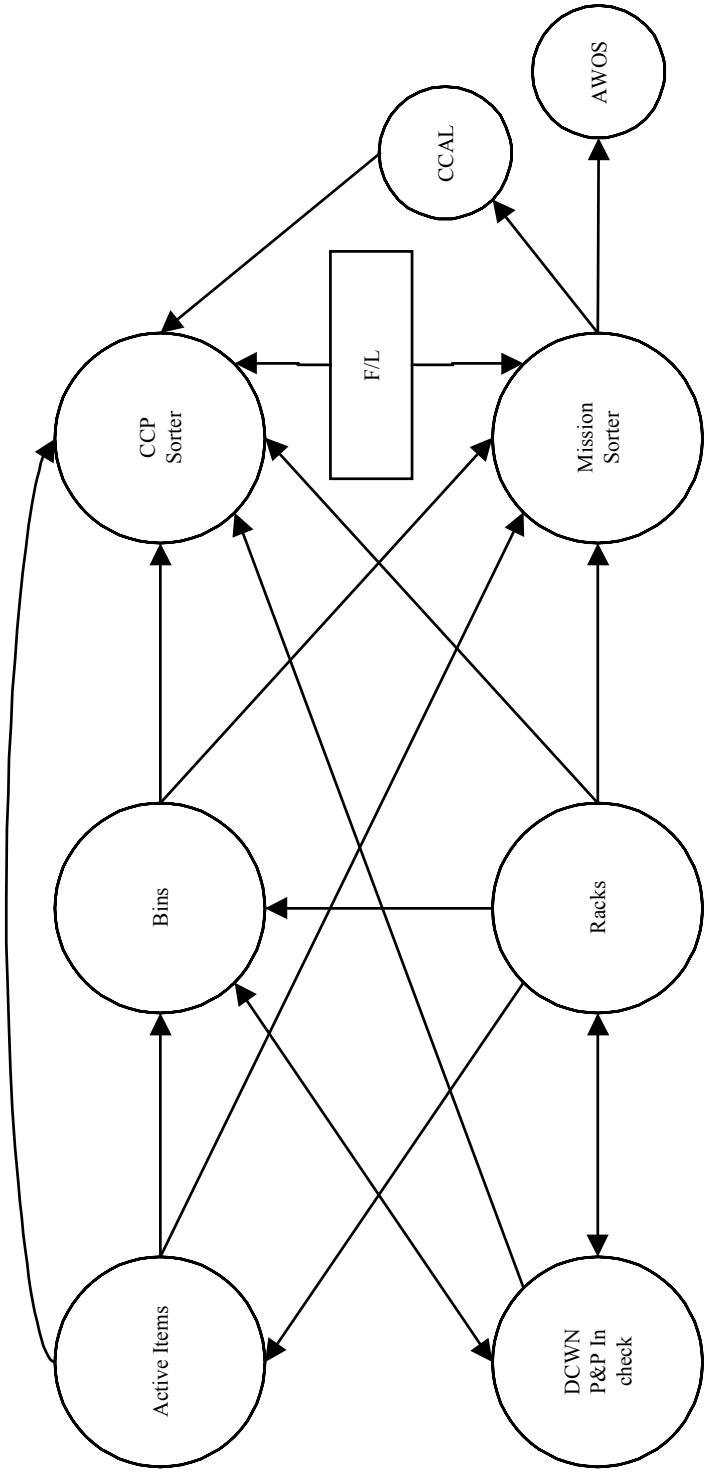

Figure G-13 Storage Conveyor Flow

1.2.11 PREPACK CONSOLIDATION

1.2.11.1 SPUR 214

Items arrive at the Pre-pack consolidation workstation from the Mission Sorter Chutes and/or the towline. Material is placed in holding bin or rack locations as they arrive. When all the line items arrive, a ready list is printed. The operator takes the consolidated line items, ready list and builds a pallet or tote for the towline. The towline carts are then released after the items are packed, offered, and confirmed if necessary to outloading.

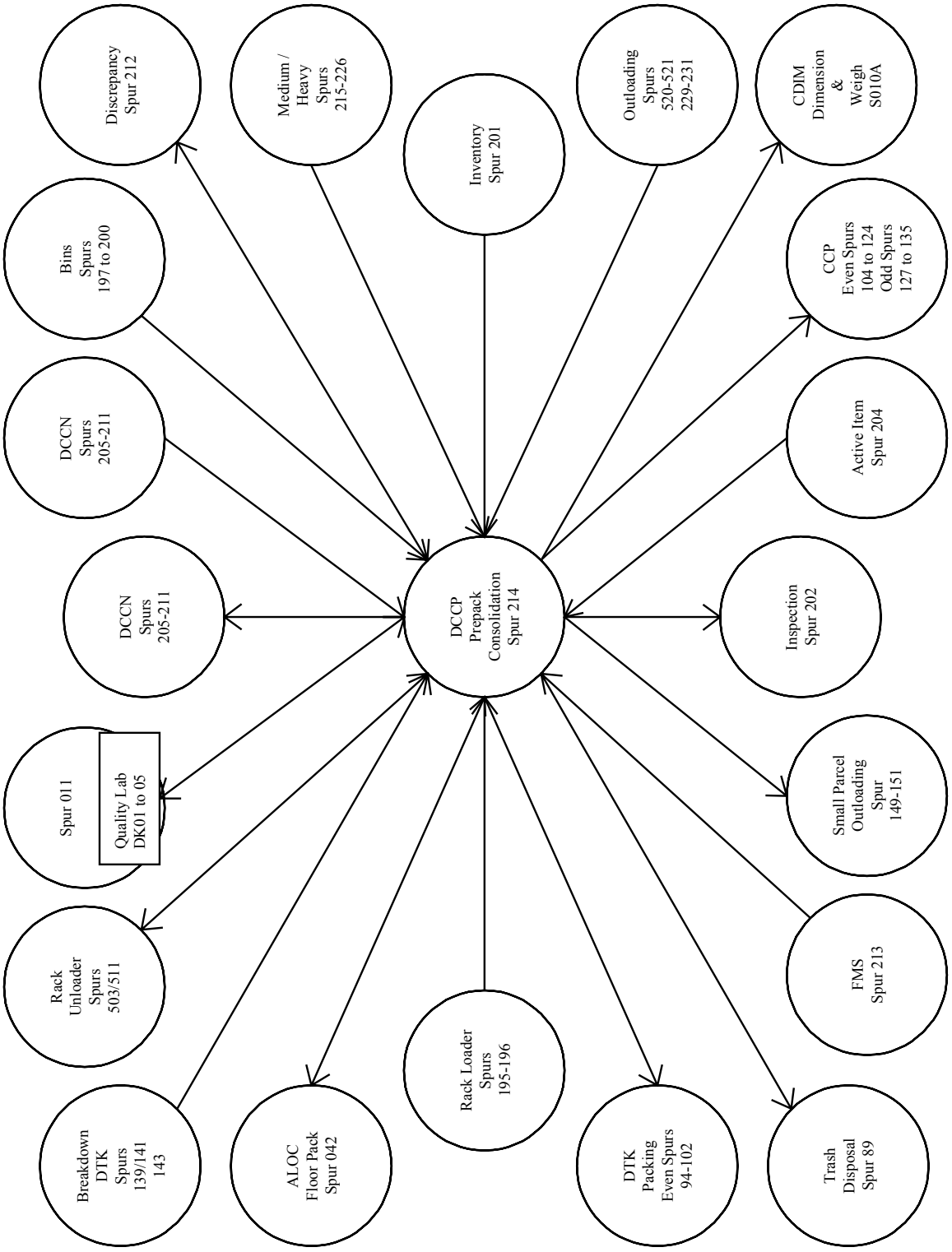

Figure G-14 Packing DCCP Prepack Consolidation Towline Flow

1.2.12 MEDIUM/HEAVY PACK

The Medium/Heavy Pack queues provide buffering of carts until they are ready to be released to Medium/Heavy Pack to be processed. Today, Spurs 215 through 223 are reserved for low priority (TP3's), Spurs 224 through 226 are reserved for high priorities (Supers, TP1's and TP2's). In this area only one item per pallet is processed. The unloader at M/H Pack automatically transfers the pallet load from the towline as the cart arrives to the roller conveyor pack stations. At the workstation the material is identified and packed according to shipment unit. Verification of item type, number of pieces and a check for damage is performed. Discrepancies require the movement of material to Spur 212 for processing. When the packing process is completed, the pick tickets are placed in envelopes and attached to the container and are then released on the conveyor to M/H Pack Dimension and Weigh station. Dimension and Weigh information is manually entered into the system. Address label and packing list are printed and attached to the material. The material is then released to be Stretch wrapped or sent to the loader. The material is then released to the loader where material is automatically conveyed from the line to a waiting towline cart.

Note: Small Parcel Capabilities are being done at Medium /Heavy Pack.

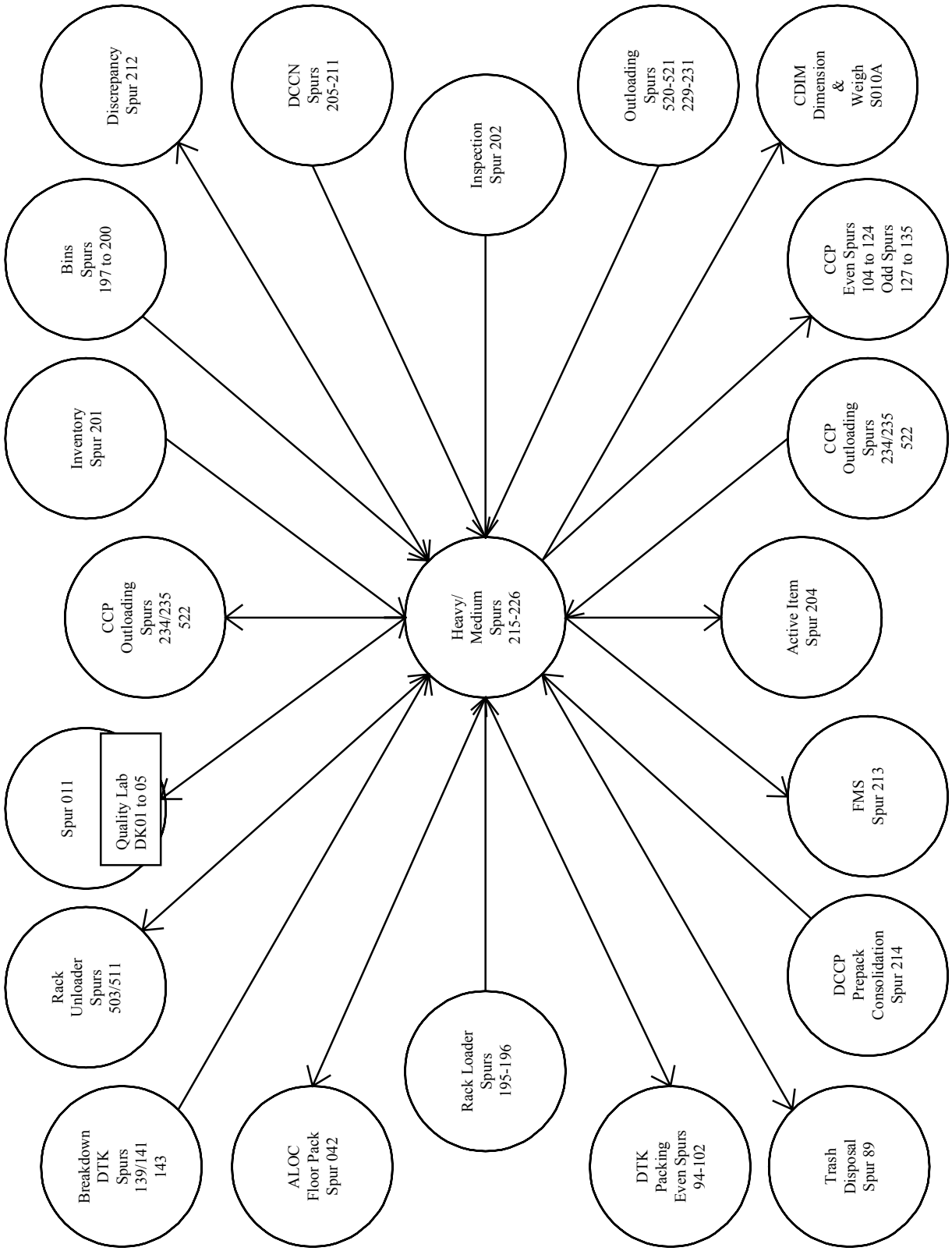

Figure G-15 Packing DCCM Medium/Heavy Spurs 215-226 Towline Flow

1.2.13 DCCN LIGHT PACK NON-CONVEYABLE

Multiple shipment units arrive at the Light Pack Nonconveyable workstation on a cart via the towline. An operator identifies the material as it arrives, checks for number of orders and damages. If any exceptions are found the material is routed to discrepancy workstation 212. If the material is destined for CCP, DTK or ALOC it is left on the cart and routed to Dimension and Weigh (CDIM) for the military shipping label and packing list. Material which is scheduled to be released via Small Parcel carrier, is left on the cart and released to Light Pack Nonconveyable Weigh and Rate at Spur 514. Based on the item weight and identification a carrier is selected. Shipping labels, packing lists and postage are printed and attached. The material is hand sorted by carrier and placed into multiwalls or cage carts. These multiwalls or cage carts are either forklifted to the appropriate carrier or placed on a cart at Spur 205 and released.

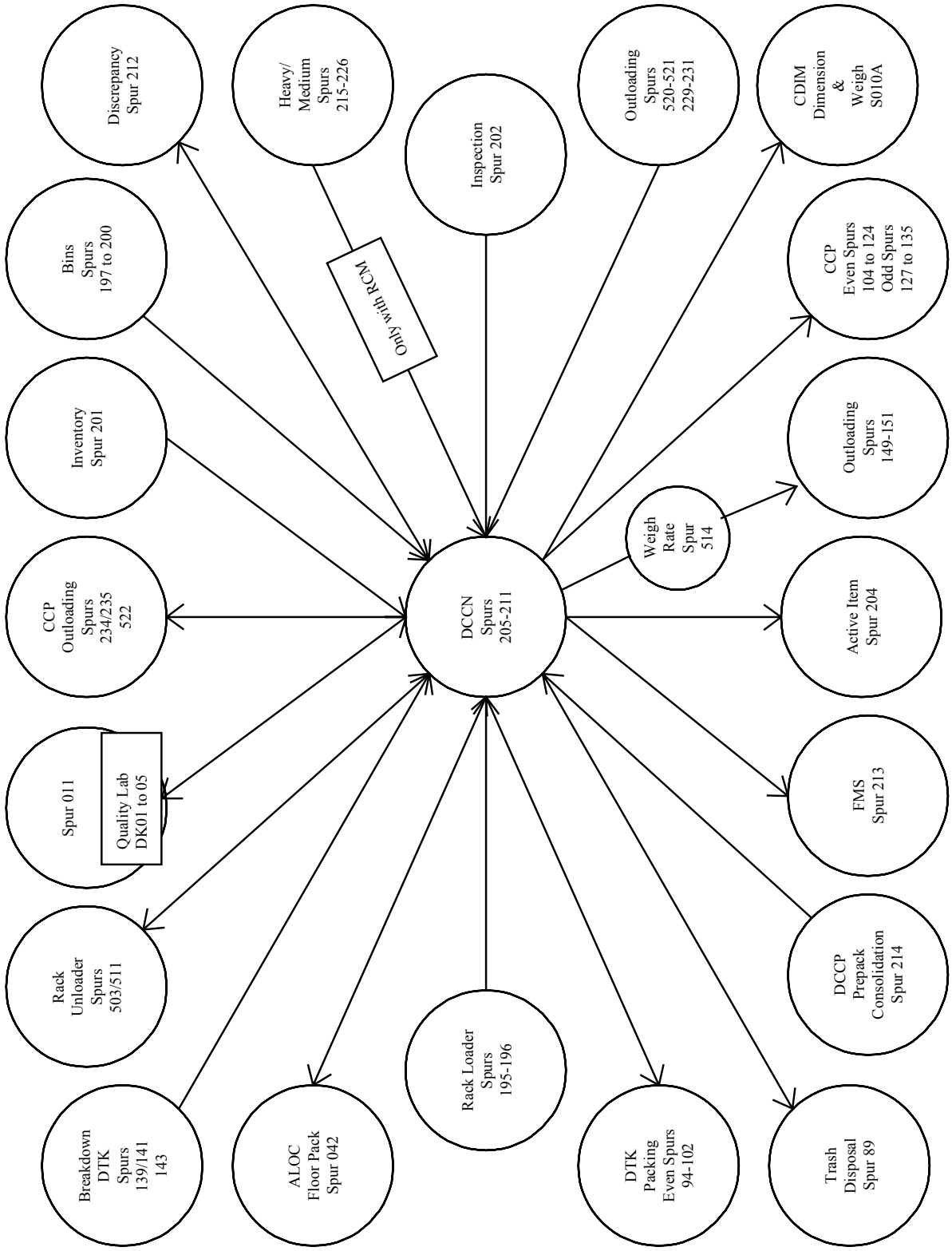

Figure G-16 Packing DCCN Non-Conveyable Spur 205-211 Towline Flow

1.2.14 CCP/DTK PACK

Material for CCP and Mission is now processed at the CCP Sorter and Spurs. Multiple packages, within a tote pan, are received at the CCP Sorter Induction Station. Four automatic tote dumpers unload tote contents onto an induction chute. Operators retrieve the material from the induction chute and place the items on the tilt tray sorter. The bar code is faced up in such a way it can be read as it passes under a fixed scanner. This scan identifies the item to allow the sorter to dump the item at the correct chute. If the sorter scanner is not able to read the bar coded control number, after 1 revolution without being assigned to a chute the tray automatically tilts at the reject chute. When the specified destination chute is full, and the material cannot be dumped, it is tilted at the reject chute. Material arrives at the pack workstation from the sorter chute, Light pack Non-conveyable (DCCN), CCP Receipt Entry (CVIP), Outlying Warehouses (Transporter Station 35/236), and Breakdown Spurs 141 and 143. Material arriving from the towline has multiple Carton Control Numbers (PCNs) on the Carts. Materials from the towline cart and sorter chute are wanded and placed in the appropriate multiwall container. When the multiwall has been closed, the container is placed on a towline cart and released to Dimension and Weigh (CDIM).

Note: Small Parcel Capabilities, with manual dimension and weigh, have been and are being expanded to CCP/DTK. This will allow items to bypass CDIM and go directly to outloading destinations

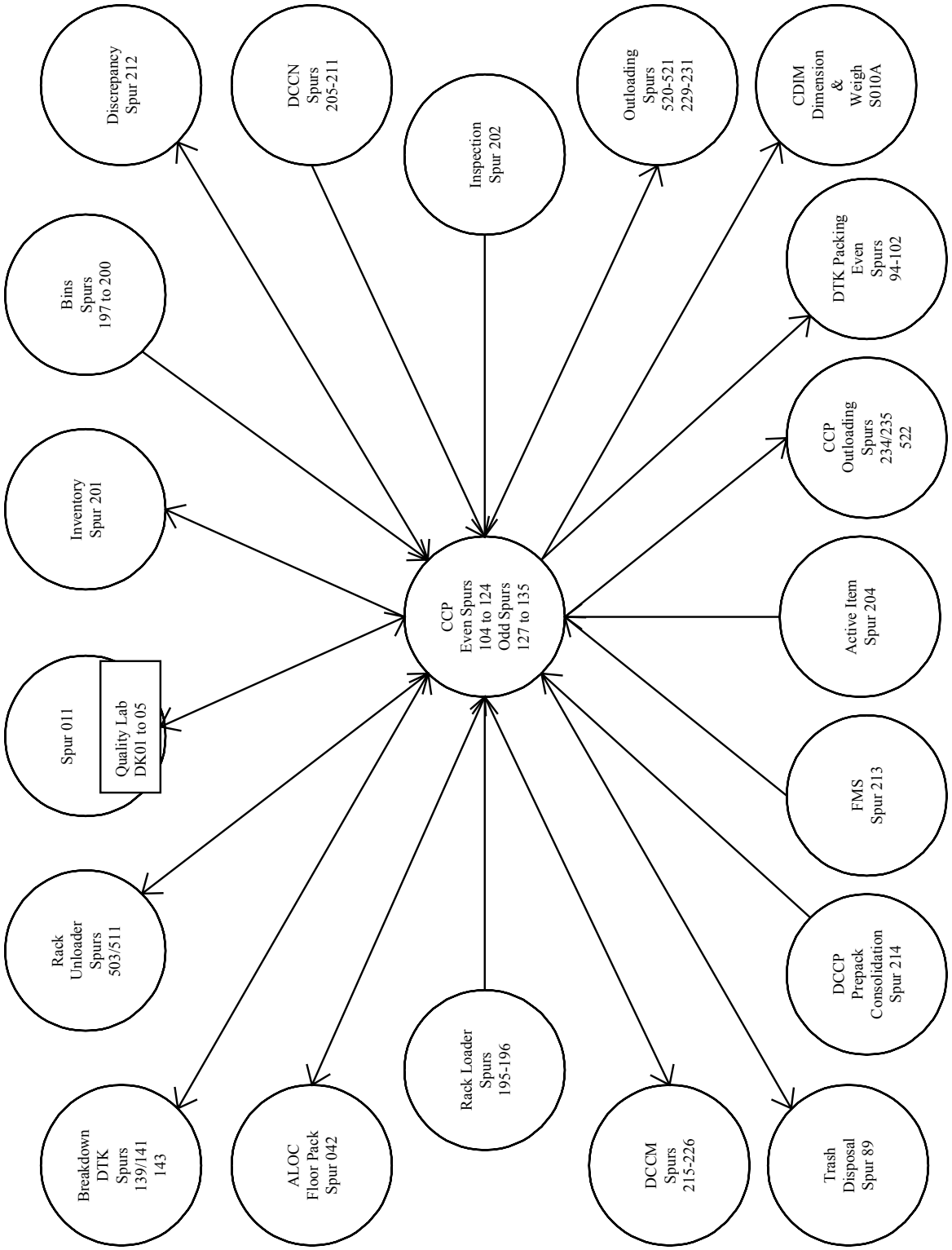

Figure G-17 Packing CCP Even Spurs 104 – 124 & Odd Spurs 127-135 Towline Flow

1.2.15 DISCREPANCY WORKSTATION

1.2.15.1 SPURS 201 and 212

Material will arrive at Discrepancy Workstations (Spurs 201 or 212) as result of an operator entering a discrepancy against a MRO (pick ticket). This may include overages, shortages, damaged material, missing documentation, unidentified material, mix stock, abends, wrong material and error messages (i.e. CCN and TCN not found, Shipment Unit deleted, and etc.). Discrepancy personnel will conduct a research of the material to determine the problem. Appropriate corrective action may include sympathetic pick (multi-line shortages), reallocation of material, cancellation, restocking of material, etc. Any towline cart on the towline without a destination and documentation attached to the material is directed to either Spur 201 or 212. The operator inquires the system to determine if there is an open MRO (pick ticket) in progress. Depending on the status, a duplicate DD Form 1348-1 and pick ticket may be generated and affixed to the material. The cart with material is then release to the appropriate packing workstation. If the material cannot be identified, it is treated as a found on post, a storage ticket is printed, the appropriate files are updated and the material is returned to stock. If discrepancy is classified as an overage or shortage, the quantity is assigned a discrepancy control number and a putaway is generated. The material is then forwarded to the appropriate storage location.

Physical inventories are performed to verify quantities of material in location against quantities reflected on QBL files. Towline carts from Racks, Bins or Active Items storage areas are delivered to Spur 201 for inventory counts and returned to the appropriate storage area. The operator will determine the source of the inventory request, verify quantity, count the material, and update inventory balances accordingly. The material is returned to the original location in which the material was requested from. If the cart has mixed material, new locations are requested and putaway tickets are generated. If material is classified as wrong material and needs to be returned to stock, the operator will attempt to identify location in which the material was picked from, freeze the location and return the material. If the location can not be determined a new location is request and a putaway ticket is generated. Cancellation discrepancy is used to flag picking, packaging, and shipping processes and permit restocking material from MRO cancellation actions.

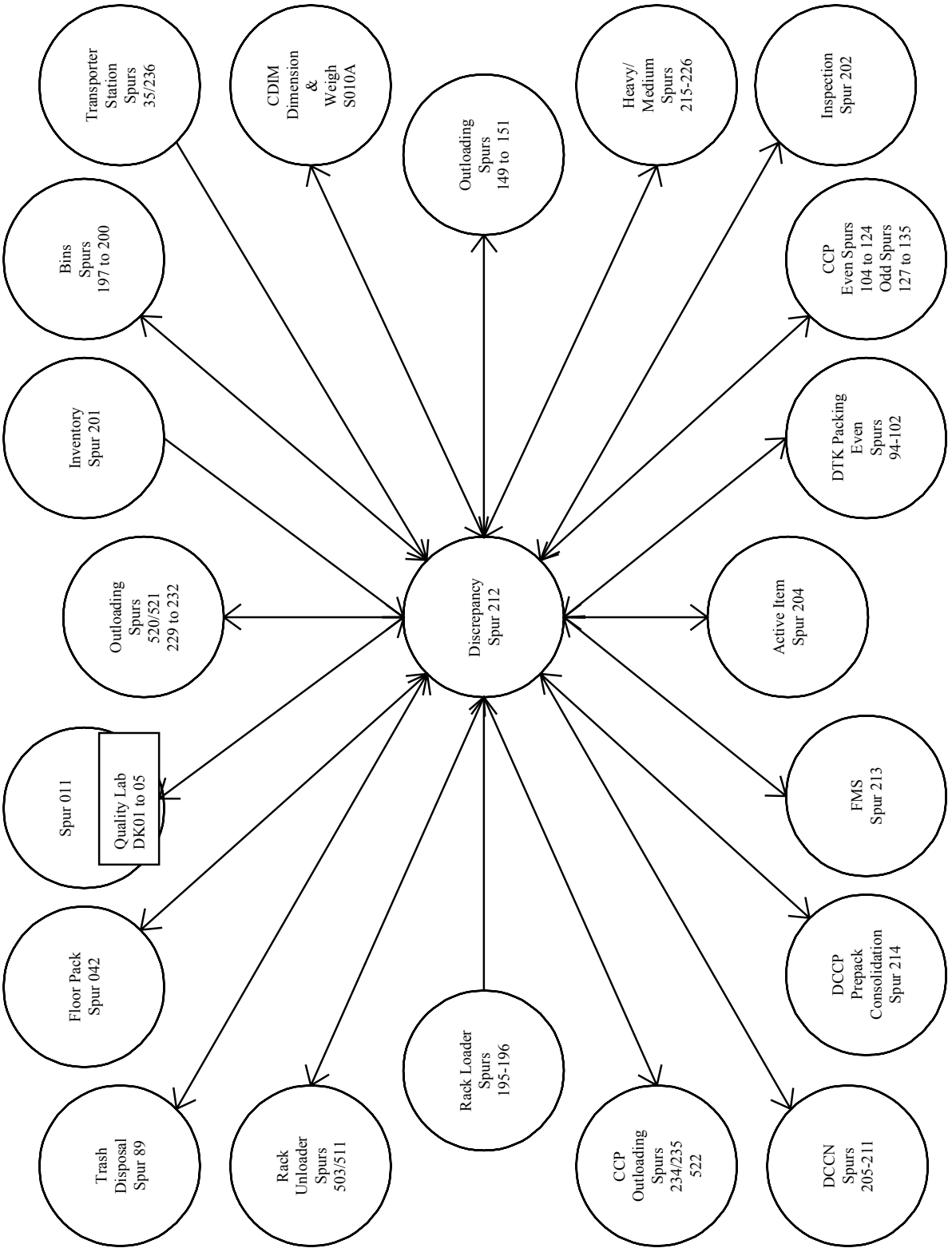

Figure G-18 Packing Discrepancy Spur 212 Towline Flow

1.2.16 FOREIGN MATERIALS SALES (FMS)

1.2.16.1 SPUR 213

Material is received via towline cart and the mission sorter chutes for FMS packaging. Material is brought up to level A pack by proper packaging and marking. This may include the use of special packaging material, heat sealer, and inserting the material in another carton for protection and shipment.

After the material has been packed in the approved Level "A" exterior packaging the operator will system pack the material using PCS/M&CS. The operator can then offer the material, apply MSL, Container Id Label, Tracking Numbers, and other print products as determined by the system. The operator will then send the material via towline cart to the appropriate outloading destination.

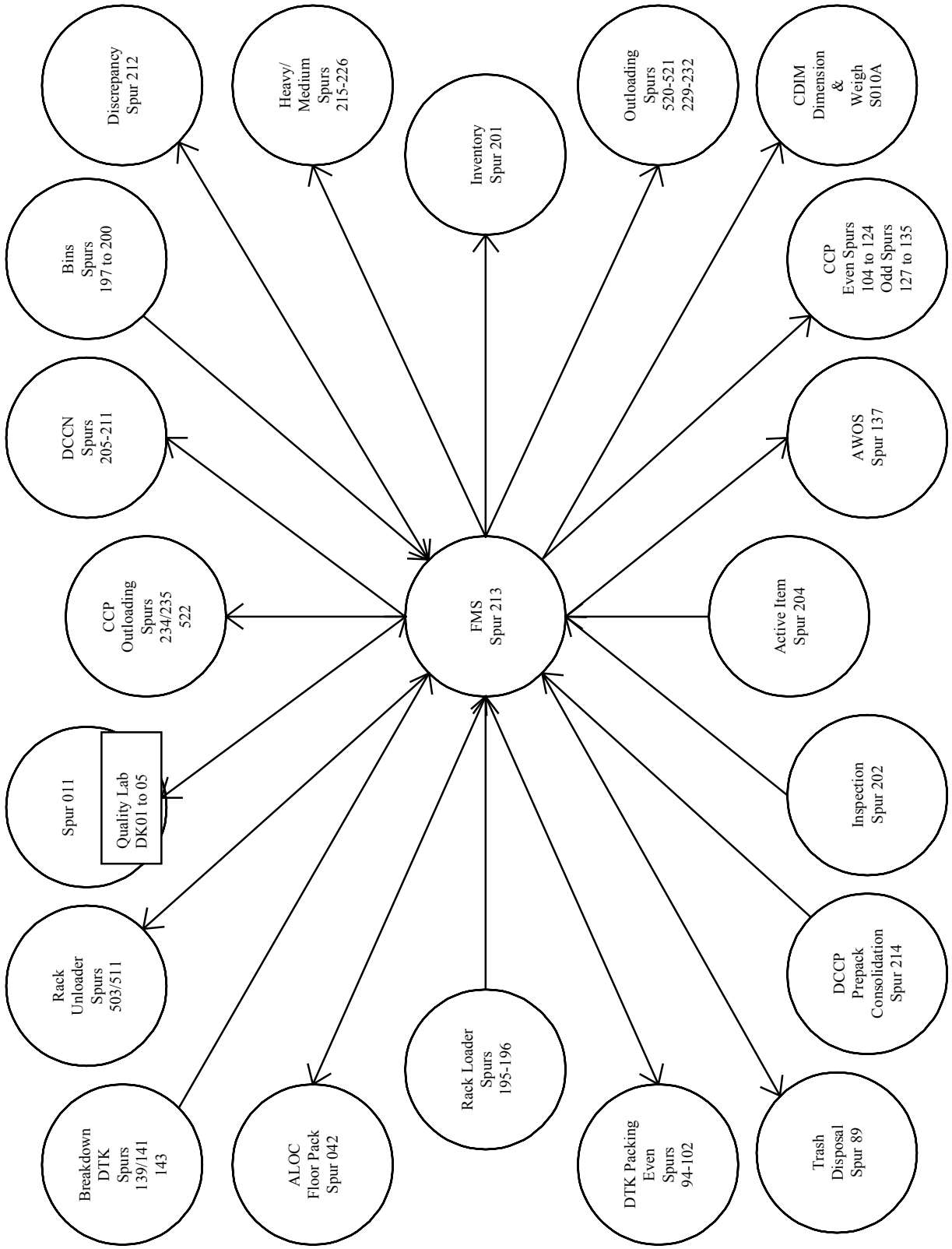

Figure G-19 Packing FMS Spur 213 Towline Flow

1.2.17 TRANSPORTER STATIONS

1.2.17.1 SPURS 35 and 236

Material is received from the outlying warehouses via transporters to spur 35. Material is then scanned using the Pick Control Number (PCN) to enter the arrival information on PCS. Material that arrives with a single PCN will be routed to the appropriate pack area/lane via the PLC on a towline cart. Material with more than one PCN will be directed to either spur 141 or 143 for sortation and routing to appropriate pack area/lane.

Material that displays the error message "CN NOT FOUND" will be routed to spur 227 and in this manner will be entered to PCS and can be tracked as having arrived at the EDC. If material still displays the error message on the second scan will be directed to spur 212.

This Spur will also be utilized for the rewarehousing of material destined for Bin, Rack and Active Item areas. Operator will scan the CN and once the information is validated and received by PCS the operator will release the pallet to a towline cart for routing.

Spur 35 may also be utilized for the proper routing of material from one outlying warehouse to another outlying warehouse. Operator will attempt to scan the CN and when error message is received and the operator determines that the material is a rewarehousing label the pallet is then sent via towline cart using the Request Cart Move (RCM) process to spur 19.

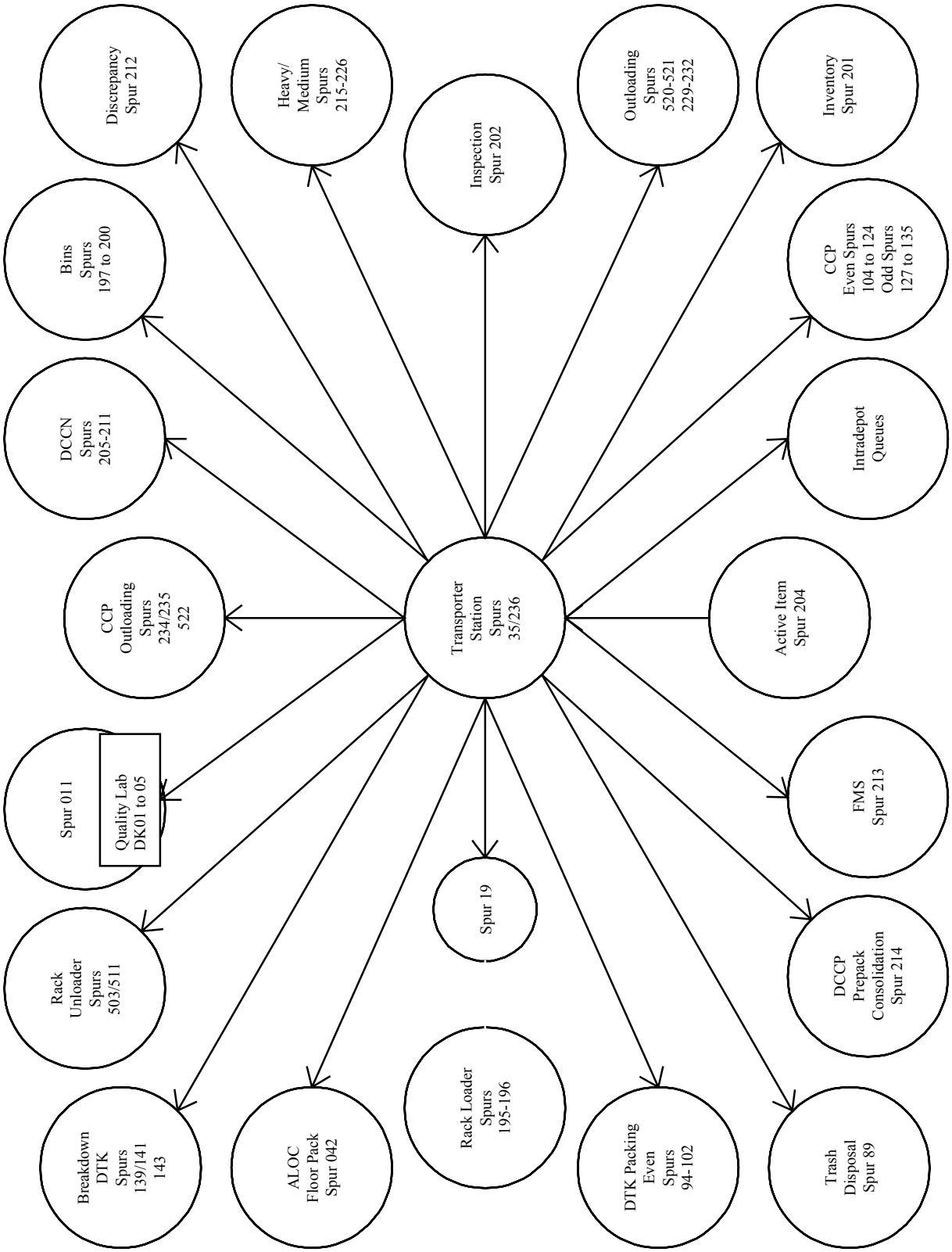

Figure G-20 Packing Transporter Station Towline Flow

1.2.18 CDIM DIMENSION AND WEIGH

The Unloader at Dimension and Weigh automatically transfers the pallet load from the towline as the cart arrives and transfers the material record from the towline system controller to the conveyor system controller. The weight and dimension is manually determined and entered into the system. Depending on the load configuration and/or destination the material is directed to the strapping, stretch wrap, or address label station. If appropriate, AMS Card is attached. Shipping labels and packing lists are produced and attached to the material. As a result of dimension and weigh material is released to a towline cart for routing to Outloading (CCP, Mission or ALOC). Material, which has a discrepancy, is routed to Spur 212 or pulled off line. Regardless of destination the conveyor system controller passes the destination to the towline system controller.

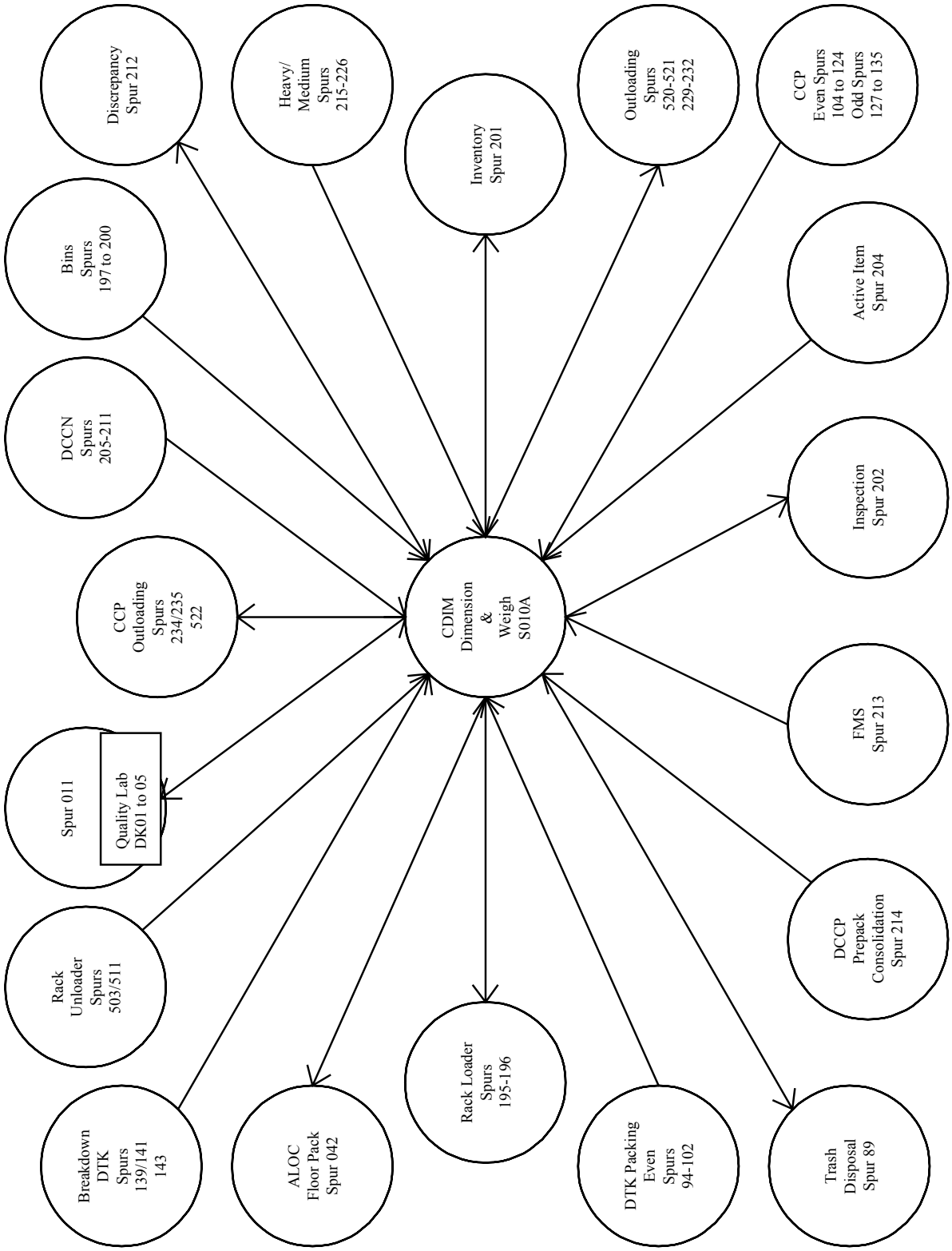

Figure G-21 Packing CDIM Dimension And Weigh Towline Flow

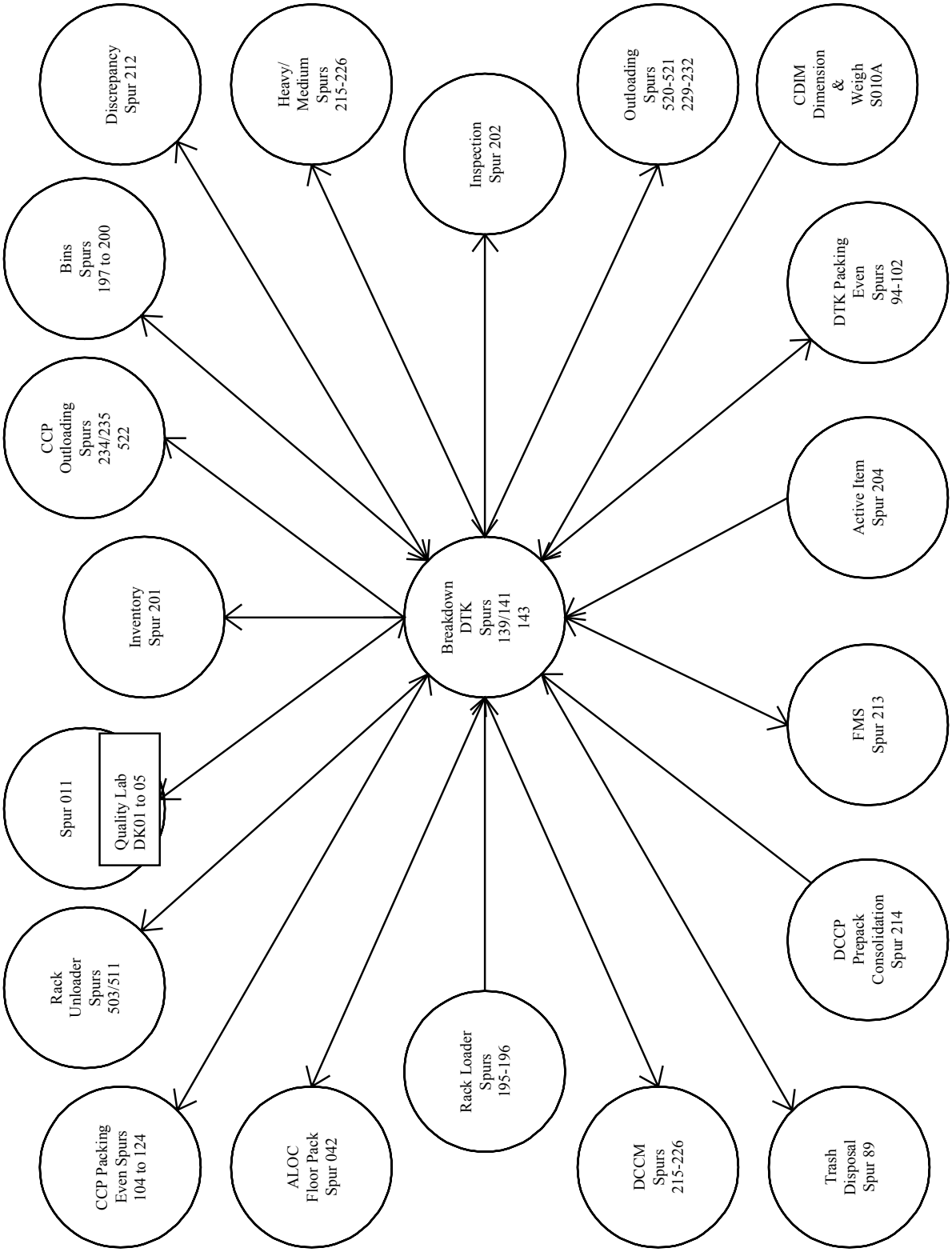

Figure G-22 Breakdown Spur 139, 141-143 Towline Flow

1.3 Legacy PCS

Operators, analysts and technical personnel at DDSP-E and DSDC-MDY utilize or support Legacy PCS in one form or another.

2.0 JUSTIFICATION FOR AND NATURE OF CHANGES

DMRD 902 assigned the DLA responsibility for all CONUS DOD distribution depots. DMRD 925 guided the DLA to select a standard distribution system. The Army's Area Oriented Depot/Modernization (AOD/MOD) was selected as the Distribution Standard System (DSS). Upon completion of the Peat Marwick report it was directed that a standard Equipment Control System be developed for implementation at all mechanized DLA depots. The core of the system, DLA, Navy and Air Force interfaces, have been developed at this time. This base will be modified to include the DDNV, DDJC SHARPE, DDJC TRACY, DDSP-E and DDSP-W IMC AWOS requirements. At this time the site specific AWOS requirements for DDNV, DDJC SHARPE, DDJC TRACY, DDSP-E and DDSP-W IMC must be included in the standard system.

2.1 Description of Needed Changes

- A system must be created that will drive the existing automated MHE at the Navy and Air Force sites and at the DDJC SHARPE, DDJC TRACY, DDSP-E, DDSP-W IMC and DDRV sites when DSS is implemented at those sites.
- The system must control the NLSC, NMC, Norfolk Ministackers, Hill Ministackers, San Diego STACKMAN, Navy Carousels, and Navy AGVs.
- The system must control the AGV and HP controlled devices at DDSP-W IMC, the Allen-Bradley controlled devices at DDRV and DDSP-E, and the PC controlled sortation devices at DDSP-E.
- The system must control all current AWOS and AWOS type systems and hardware.
- All current flows and throughput rates at the intended sites will be accommodated.
- The system will contain a user friendly interface.
- The system must be able to receive a Standard Movement Message (SMM) from the Upper Tier and initiate MHE action based upon that message.
- The system will be standard at all DLA sites.
- The system must be created in an open environment to allow scalable hardware utilization.
- The system will contain logging, recovery, and buffering capability.

- The system will be as portable as possible. In achieving this goal the system must minimally be table driven and be built from reusable software modules.

2.2 Assumptions and Constraints

- When practical, DSS would support the continued use of existing MHE.
- Radio Frequency (RF) technology will be incorporated into the DSS Upper Tier prior to deployment to the Navy and Air Force-based depots.
- Lower tier functionality duplicating DSS functionality is considered redundant and should be removed upon DSS implementation.
- To the greatest extent possible, all changes required to support existing MHE will be made in the lower tier portion of DSS.
- The system will support current system throughput rates.

3.0 CONCEPT FOR A NEW OR MODIFIED SYSTEM

This section describes the concept for the new Equipment Control System (ECS).

3.1 Background, Objectives, and Scope

Early in the evaluation process it was realized that the only viable solutions to the DSS mechanized implementation problem were to either modify the current legacy lower tier systems and the DSS Upper Tier to work together or to build a new standard lower tier. The ECS was the most cost effective solution as defined by the KPMG Peat Marwick LLP report. The following subparagraphs describe the concept of the ECS.

3.2 Operational Policies and Constraints

- All functionality will be performed by the DSS Upper Tier.
- The lower tier will handle all movement processing.

3.3 Description of the New or Modified System

The general concept of the ECS is based upon a Standard Movement Message (SMM) being received from the DSS Upper Tier by an inexpensive, scalable warehouse server computer. This message would then be formatted into the proper message traffic required to institute a piece of material handling equipment activity. The only complexity for the Navy and Air Force sites would be the scheduling of material out of the ministacker or carousel storage areas. This problem could be easily resolved by creating an array with the scheduled work in it. Refer to *Figure G-23*. The only complexity for the DDRV, DDJC SHARPE, DDJC TRACY, DDSP-E and DDSP-W IMC sites would be the scheduling of material out of the staging carousel areas and scheduling of AGV modules. These problems can be easily resolved by creating specific modules to handle the processing and incorporating a database. Refer to *Figure G-24*.

A user interface will be developed to allow operations personnel to start and stop the equipment, view status, perform fault recovery, track material, access logs, and perform any equipment specific actions.

Logging will be performed at each level of the system and can be turned on or off by operations. Messages will be buffered at each level of the system for easy fault recovery.

3.3.1 Receiving System DSS-ECS Matrix

Receiving Workstation ID / Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Receiving Material Movement Screen/Process
3.1.1 Receiving Unloading North (CCP Unloading)	Material Flow	• Receiving Doors	☐ CCP Receipt Entry (Pallet) **(3.1.23)** ☐ CCP Frustrated Freight **(3.1.20)** ☐ CCP Multipack Breakdown **(3.1.22)** ☐ CCP Security **(3.1.21)** ☐ Package Mail **(3.1.40)** ☐ Queues @ Intradepot Receiving **(3.1.45)**	3270 (Inquiry Only)	Not Applicable	ECS Keypad: • Create Single Cart Move • Create Chained Cart Move
			☐ CCP Oversize Receipt Entry **(3.1.26)**	3270	Ignore SMM	Not Applicable
	Return & Service Flow *(Note: Tote Boxes to S015 Only)*	• CCP Pack **(3.4.24)** • ALOC Pallet Build-Up **(3.5.6)** • DT Pack **(3.4.26)** • CCP Shipping Consolidation **(3.5.10)** • Loaders at M/H Pack Address/ Label **(3.4.21)** • Light Pack Non-Conveyable **(3.4.10)** • Tote Box Stacker **(3.4.3)** • Trash Disposal @ Receiving **(3.1.33)** • Mission Multipack Breakdown **(3.1.4)** • CCP Multipack Breakdown **(3.1.22)** • Receiving Unloading South **(3.1.1)** • Unloaders @ M/H Pack **(3.4.15)**	☐ Trash Disposal @ Receiving **(3.1.33)** ☐ Receiving Unloading South **(3.1.1)**	None	Not Applicable	ECS Keypad: • Queue Empty Cart ECS Process: • Empty Cart Management

Receiving Workstation ID / Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Receiving Material Movement Screen/Process
3.1.1 Receiving Unloading South (Mission Unloading)	Material Flow *(Note: Intra-depot Receipt Entry to S019 Only)*	• Receiving Doors	☐ Mission Inspection /Induction Queues **(3.1.44)** ☐ Mission Multipack Breakdown **(3.1.4)** ☐ Mission Frustrated Freight **(3.1.2)** ☐ Mission Security **(3.1.3)** ☐ Package Mail **(3.1.40)** ☐ Intradepot Receipt Entry **(3.1.30)**	3270 (Inquiry Only)	Not Applicable	ECS Keypad: • Create Single Cart Move • Create Chained Cart Move
			☐ Mission Oversize Receipt Entry **(3.1.25)**	3270	Ignore SMM	Not Applicable
	Return & Service Flow (*Note: Tote Boxes to S016 Only)*	• CCP Pack **(3.4.24)** • ALOC Pallet Build-Up **(3.5.6)** • DT Pack **(3.4.26)** • CCP Shipping Consolidation **(3.5.10)** • Loaders at M/H Pack Address Label **(3.4.21)** • Light Pack Non-Conveyable **(3.4.10)** • Mission Multipack Breakdown **(3.1.4)** • CCP Multipack Breakdown **(3.1.22)** • Receiving Unloading North **(3.1.1)** • Tote Box Stacker **(3.4.3)** • Trash Disposal @ Receiving **(3.1.33)** • Unloaders @ M/H Pack **(3.4.15)**	☐ Trash Disposal @ Receiving **(3.1.33)** ☐ Receiving Unloading North **(3.1.1)**	None	Not Applicable	ECS Keypad: • Queue Empty Cart ECS Process: • Empty Cart Management
3.1.2 Mission Frustrated Freight	Material Flow Only	• All Mission Receiving Workstations	☐ Mission Inspection /Induction Queues **(3.1.44)** ☐ Mission Multipack Breakdown **(3.1.4)**	3270	Ignore SMM	ECS Keypad: • Create Single Cart Move • Create Chained Cart Move

Receiving Workstation ID / Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Receiving Material Movement Screen/Process
3.1.3 Mission Security	Material Flow Only	• Receiving Unloading South (Mission Unloading) **(3.1.1)**	■ Queues @ Intradepot Receiving **(3.1.45)**	3270	Based On Previously Stored SMM	• SMM Initiates Movement Or ECS Keypad: • Initiate Singe Cart Move
3.1.4 Mission Multipack Breakdown	Material Flow	• Receiving Unloading South (Mission Unloading) **(3.1.1)** • Mission Frustrated Freight **(3.1.2)** • Mission Manual Processing (Pallet) **(3.1.43)**	☐ Mission Inspection /Induction Queues **(3.1.44)** ☐ Intradepot Receipt Entry **(3.1.30)** ☐ Mission Inspection (Package) **(3.1.42)** ☐ Mission Receipt Entry (Package) **(3.1.17)**	3270	Ignore SMM	ECS Keypad: • Create Single Cart Move • Create Chained Cart Move
	Return & Service Flow	• Tote Box Stacker **(3.4.3)** • Trash Disposal @ Receiving **(3.1.33)**	☐ Tote Box Stacker **(3.4.3)** ☐ Loading/Unloading @ Bin Storage (Main) **(3.2.6)** ☐ Trash Disposal @ Receiving **(3.1.33)** ☐ Receiving Unloading North **(3.1.1)** ☐ Receiving Unloading South ☐ CCP Multipack Breakdown **(3.1.22)**	None	Not Applicable	ECS Keypad: • Create Single Cart Move ECS Process: • Empty Cart Manager
3.1.5 Mission Detail Receiving (Package)	*Obsolete Function*					
3.1.6 Mission Detail Receiving (Pallet)	*Obsolete Function* (Workstation ID has been changed to 3.1.44; and Workstation Name has been changed to Mission Inspection/Induction Queues)					
3.1.7 Random Inspection (Pallet)	*Obsolete Workstation*					
3.1.8 Retrograde Inspection (Pallet)	Retrograde Inspection, New Procurement Inspection, and Depot Property Inspection have been combined *See Workstation ID 3.1.41*					
3.1.9 New Procurement Inspection (Pallet)	Retrograde Inspection, New Procurement Inspection, and Depot Property Inspection have been combined *See Workstation ID 3.1.41*					

Receiving Workstation ID / Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Receiving Material Movement Screen/Process
3.1.10 Depot Property Inspection (Pallet)	Retrograde Inspection, New Procurement Inspection, and Depot Property Inspection have been combined *See Workstation ID 3.1.41*					
3.1.11 Mission Receipt Entry (Pallet)	Material Flow Only	• Mission Inspection /Induction Queues **(3.1.44)** • Mission Manual Processing (Pallet) **(3.1.43)**	■ Unloaders @ Rack Storage **(3.2.1)** ■ Loading/Unloading @ Bin Storage (Main) **(3.2.6)** ■ Active Item Pallet Storage **(3.2.11)** ■ Queues @ Intradepot Receiving **(3.1.45)** ■ Loading/Unloading Pallets @ Active Item Bulk **(3.2.25)** ☐ Mission Manual Processing (Pallet) **(3.1.43)** ☐ Mission Frustrated Freight **(3.1.2)** ☐ Warehouse Inspection **(3.2.15)**	3270	Store SMM *(Note: ECS will no longer pass weight or height information to DSS).*	SMM Initiates Movement OR ECS Keypad: • Create Single Cart Move
			☐ Warehouse Inventory **(3.2.14)**	3270	Ignore SMM	ECS Keypad: • Create Single Cart Move
3.1.12 New Item ID (Pallet)						
3.1.13 Random Inspection	*Obsolete Workstation*					
3.1.14 Retrograde Inspection (Package)	Retrograde Inspection, New Procurement Inspection, and Depot Property Inspection have been combined *See Workstation ID 3.1.42*					
3.1.15 New Procurement Inspection (Package)						
3.1.16 Depot Property Inspection (Package)	Retrograde Inspection, New Procurement Inspection, and Depot Property Inspection have been combined *See Workstation ID 3.1.42*					

Receiving Workstation ID / Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Receiving Material Movement Screen/Process
3.1.17 Mission Receipt Entry (Package)	Material Flow Only	• Misread Tote Conveyor **(3.1.38)** • Package Mail **(3.1.40)** • Mission Multipack Breakdown **(3.1.4)**	■ Loading/Unloading @ Bin Storage (Mezzanine) **(3.2.7)** ☐ Repalletize Package to Pallet **(3.1.31)** ☐ Misread Tote Conveyor **(3.1.38)** ■ Active Item Tote Storage **(3.2.12)** ☐ Warehouse Inspection **(3.2.15)**	3270	Store SMM	SMM Initiates Tote Movement OR ECS Keypad: • Create Single Tote Move • Initiate Single Tote Move
3.1.18 Package Close Up	*Obsolete Workstation*					
3.1.19 Package Breakdown	*Obsolete Workstation*					
3.1.20 CCP Frustrated Freight	Material Flow Only	• All CCP Receiving Workstations	☐ CCP Multipack Breakdown **(3.1.22)** ☐ CCP Receipt Entry **(3.1.23)**	3270	Ignore SMM *(Note: Pallet Material - Use ECS keypad to move material.)*	ECS Keypad: • Create Single Cart Move • Create Chained Cart Move
3.1.21 CCP Security	Material Flow Only	• Receiving Unloading North (CCP Receiving) **(3.1.1)**	☐ CCP Receipt Entry (Pallet) **(3.1.23)**	3270	Ignore SMM	ECS Keypad: • Create Single Cart Move • Create Chained Cart Move
3.1.22 CCP Multipack Breakdown	Material Flow	• Receiving Unloading North (CCP Receiving) **(3.1.1)** • CCP Frustrated Freight **(3.1.20)**	☐ CCP Receipt Entry (Package) **(3.1.24)**	3270	Ignore SMM	ECS Keypad: • Create Single Tote Move
	Return & Service Flow	• Tote Box Stacker **(3.4.3)** • Unloaders @ M/H Pack Address Label **(3.4.15)** • ALOC Pallet Build-Up **(3.5.6)** • Trash Disposal @ Receiving **(3.1.33)** • Mission Multipack Breakdown **(3.1.4)**	☐ Tote Box Stacker **(3.4.3)** ☐ Trash Disposal @ Receiving **(3.1.33)** ☐ Receiving Unloading North **(3.1.1)** ☐ Receiving Unloading South **(3.1.1)**	None	Not Applicable	ECS Keypad: • Create Single Cart Move ECS Process: • Empty Cart Management

Receiving Workstation ID / Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Receiving Material Movement Screen/Process
3.1.23 CCP Receipt Entry (Pallet)	Material Flow Only	• Receiving Unloading North (CCP Receiving) **(3.1.1)** • CCP Frustrated Freight **(3.1.20)** • CCP Security **(3.1.21)**	■ CCP Shipping Consolidation **(3.5.10)** ■ CCP Pack **(3.4.24)** ■ ALOC Pallet Build-Up **(3.5.6)** ■ Unloader @ CCP/DT Dimension & Weigh **(3.4.27)** □ CCP Frustrated Freight **(3.1.20)**	3270	Store SMM *(Note: ECS will not pass weight and height information to DSS)*	SMM Initiates Cart Movement OR ECS Keypad: • Create Single Cart Movement • Initiate Single Cart Move
3.1.24 CCP Receipt Entry (Package)	Material Flow Only	• Package Mail **(3.1.40)** • CCP Multipack Breakdown **(3.1.22)**	■ CCP Sorter Induction **(3.4.22)** □ Mission Inspection **(3.1.42)**	3270	Store SMM *(Note: ECS will not pass weight and height information to DSS*)	SMM Initiate Tote Movement OR ECS Keypad: • Create Single Tote Movement • Initiate Single Tote Move
3.1.25 Mission Oversize Receipt Entry	Material Flow Only	• Receiving Unloading South **(3.1.1)**	□ Outyling Storage **(3.2.19)**	3270	Ignore SMM	Not Applicable
3.1.26 CCP Oversize Receipt Entry	Material Flow Only	• Receiving Unloading North **(3.1.1)**	□ ALOC Pallet Build-Up **(3.5.6)** □ CCP Shipping Consolidation **(3.5.10)**	3270	Ignore SMM	Not Applicable
3.1.27 Unloader @ Intradepot Receiving	Material Flow	• Queues @ Intradepot Receiving **(3.1.45)**	■ Dock @ Intradepot Receiving **(3.1.28)**	None	Based On Previously Stored SMM/User Interface/ Keypad Input	ECS Processes: • Towline Controller to Pallet Conveyor Controller
	Return & Service Flow	Not Applicable	□ Loaders @ Rack Storage (Main) **(3.2.5)**	None	Not Applicable	ECS Process: • Empty Cart Management
3.1.28 Dock @ Intradepot Receiving	Material Flow Only	• Unloader @ Intradepot Receiving **(3.1.27)**	□ Outlying Storage **(3.2.19)**	None	Based On Previously Stored SMM/User Interface/ Keypad Input	ECS Screens: • Release from Intradepot Queues • Fault Handling Intradepot Queue ECS Processes: • Pallet Conveyor Controller Application Software

Receiving Workstation ID / Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Receiving Material Movement Screen/Process
3.1.29 Loader at Intradepot Receiving	*Workstation Not Used* Intradepot Receiving processes material which is outbound (from EDC) only.					
3.1.30 Intradepot Receipt Entry (PLC Redirect)	Material Flow	• Any point within the EDC • Spur 19 of Receiving Unloading South (Mission Receiving) **(3.1.1)**	■ Queues @ Intradepot Receiving **(3.1.45)**	3270 (Inquiry Only)	Based On Previously Stored SMM	ECS Terminal: • Request Move ECS Keypad: • Initiate Single Cart Move
	Return & Service Flow	Not Applicable	☐ Loading/Unloading @ Bin Storage (Main) **(3.2.6)**	None	Not Applicable	ECS Process: • Empty Cart Management
3.1.31 Repalletize Package to Pallet	Material Flow Only	• Mission Inspection (Package) **(3.1.42)** • Mission Receipt Entry (Package) **(3.1.17)**	☐ Mission Manual Processing (Pallet) **(3.1.43)**	None	Not Applicable	ECS Keypad: • Create Single Cart Move
3.1.32 New Item ID (Package)	*Obsolete Function*					
3.1.33 Trash Disposal @ Receiving	Return & Service Flow Only	• Any pallet trash collection point within the EDC	☐ Depot Trash Collection (outside of the EDC) ☐ Receiving Unloading North **(3.1.1)** ☐ Receiving Unloading South **(3.1.1)** ☐ Mission Multipack Breakdown **(3.1.4)** ☐ CCP Multipack Breakdown **(3.1.22)**	None	Not Applicable	ECS Keypad: • Create Single Cart Move • Queue Empty Cart ECS Process: • Empty Cart Manager
3.1.34 Mezzanine Trash	Return & Service Flow	• Manual	☐ Trash Disposal at Receiving **(3.1.33)**	None	Not Applicable	ECS Keypad: • Create Single Cart Move
3.1.35 Inspection Trash	*Manual Workstation*					
3.1.36 - 3.1.37	*No Correlating Workstations*					
3.1.38 Misread Tote Conveyor	Material Flow Only	• Mission Inspection (Package) **(3.1.42)** • Mission Receipt Entry (Package) **(3.1.17)**	☐ Mission Inspection (Package) **(3.1.42)** ☐ Mission Receipt Entry (Package) **(3.1.17)**	None	Not Applicable	ECS Keypad: • Create Single Tote Move
3.1.39	*No Correlating Workstation*					

Receiving Workstation ID / Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Receiving Material Movement Screen/Process
3.1.40 Package Mail ("Blue Monster")	Material Flow Only	• Receiving Unloading North (CCP Unloading) **(3.1.1)** • Receiving Unloading South (Mission Unloading) **(3.1.1)**	☐ Mission Inspection Package **(3.1.42)** ☐ Mission Receipt Entry (Package) **(3.1.17)** ☐ CCP Receipt Entry (Package) **(3.1.24)**	None	Not Applicable	ECS Keypad: • Create Single Tote Move
3.1.41 Mission Inspection (Pallet)	Material Flow	• Mission Inspection /Induction Queues **(3.1.44)** • Mission Manual Processing (Pallet) **(3.1.43)**	■ Unloaders @ Rack Storage **(3.2.1)** ■ Loading/Unloading @ Bin Storage (Main) **(3.2.6)** ■ Active Item Pallet Storage **(3.2.11)** ■ Queues @ Intradepot Receiving **(3.1.45)** ☐ Mission Manual Processing (Pallet) **(3.1.43)**	3270	Store SMM *(Note: ECS will not send height and weight data to DSS)*	• SMM Initiates Movement Or ECS Keypad: • Create Single Tote Move • Initiate Single Tote Move
3.1.42 Mission Inspection (Package)	Material Flow Only	• Package Mail **(3.1.40)** • Mission Multipack Breakdown **(3.1.4)** • CCP Receipt Entry (Package) **(3.1.24)** • Misread Tote Conveyor **(3.1.38)**	■ Active Item Tote Storage **(3.2.12)** ■ Loading/Unloading @ Bin Storage (Mezzanine) **(3.2.7)** ☐ Repalletize Package to Pallet **(3.1.31)** ☐ Misread Tote Conveyor **(3.1.38)**	3270	Store SMM *(Note: ECS will not send height and weight data to DSS)*	• SMM Initiates Movement Or ECS Keypad: • Create Single Tote Move • Initiate Single Tote Move
3.1.43 Mission Manual Processing (Pallet)	Material Flow Only	• Mission Inspection (Pallet) **(3.1.41)** • Mission Receipt Entry (Pallet) **(3.1.11)** • Repalletize Package to Pallet **(3.1.31)** • Mission Inspection/ • Induction Queues (Pallet) **(3.1.44)**	☐ Mission Inspection (Pallet) **(3.1.41)** ☐ Mission Receipt Entry (Pallet) **(3.1.11)** ☐ Mission Multipack Breakdown **(3.1.4)**	None	Not Applicable	ECS Screen: • Create Single Cart Move
3.1.44 Mission Inspection/ Induction Queues (Pallet)	Material Flow Only	• Receiving Unloading South (Mission Unloading) **(3.1.1)** • Mission Multipack Breakdown **(3.1.4)** • Mission Frustrated Freight **(3.1.2)**	☐ Mission Inspection (Pallet) **(3.1.41)** ☐ Mission Receipt Entry (Pallet) **(3.1.11)** ☐ Mission Manual Processing (Pallet) **(3.1.43)**	None	Not Applicable	ECS Keypad: • Create Single Cart Move • Create Chained Cart Move

Receiving Workstation ID / Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Receiving Material Movement Screen/Process
3.1.45 Queues @ Intradepot Receiving	Material Flow Only	• Receiving Unloading North (CCP) **(3.1.1)** • Mission Security **(3.1.3)** • Mission Receipt Entry (Pallet) **(3.1.11)** • Warehouse Inspection **(3.2.15)** • Warehouse Inventory **(3.2.14)** • Loaders @ Rack Storage (Main) **(3.2.5)** • Loading/Unloading @ Bin Storage (Main) **(3.2.6)** • Intradepot Receipt Entry **(3.1.30)** • Mission Inspection (Pallet) **(3.1.41)**	■ Unloader @ Intradepot Receiving **(3.1.27)**	None	Based On Previously Stored SMM	ECS Process: • Towline Controller

Table G-3 Receiving System DSS-ECS Matrix

3.3.2 Storage System DSS-ECS Matrix

Storage Workstation ID / Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Storage Material Movement Screen/Process
3.2.1 Unloaders @ Rack Storage	Material Flow	• Mission Receipt Entry (Pallet) **(3.1.11)** • Warehouse Inspection **(3.2.15)** • Warehouse Inventory **(3.2.14)** • Loader @ Intradepot Shipping N.W. **(3.5.3)** • Mission Inspection (Pallet) **(3.1.41)** • QA Lab **(3.6.12)** • CCP Sorter Reject Chute **(3.4.23)** • Loaders @ Rack Storage (Main) **(3.2.5)**	■ Rack Storage **(3.2.4)**	None	Based On Previously Stored SMM	ECS Processes: • Towline Controller to Pallet Conveyor Controller
	Return & Service Flow	• Tote Box Stacker **(3.4.3)**	□ Rack Storage **(3.2.4)**	None	Not Applicable	ECS Processes: • Towline Controller to Pallet Conveyor Controller • Empty Cart Management
3.2.2 Rack Input Dimension Station	*Obsolete Workstation*					
3.2.3 Repalletize @ Rack	*Obsolete Workstation*					
3.2.4 Rack Storage	Material Flow	• Unloaders @ Rack Storage **(3.2.1)**	■ Loaders @ Rack Storage (Main) **(3.2.5)**	RF	Initiate Pallet Move/ Store SMM (picks)/ Delete SMM (putaway)	ECS Process: • Pallet Conveyor Controller
			■ Loading @ Rack Storage (Mezzanine) **(3.2.24)**	RF	Initiate Tote Move/ Initiate Sorter Move/ Store SMM	ECS Processes: • Sorter Controller • Tote Conveyor Controller
	Return & Service Flow	• Unloaders @ Rack Storage **(3.2.1)**	□ Loaders @ Rack Storage (Main) **(3.2.5)**	RF	Require SMM	ECS Process: • Empty Cart Management

Storage Workstation ID / Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Storage Material Movement Screen/Process
3.2.5 Loaders @ Rack Storage (Main)	Material Flow	• Rack Storage **(3.2.4)**	■ M/H Pack Queues **(3.4.14)** ■ Light Pack Non-Conveyable **(3.4.10)** ■ M/H Prepack Consolidation **(3.4.13)** ■ Warehouse Inspection **(3.2.15)** ■ Warehouse Inventory **(3.2.14)** ■ Unloaders @ Rack Storage **(3.2.1)** ■ Queues @ Intradepot Receiving **(3.1.45)** ■ Active Item Pallet **(3.2.11)** ■ Loading/Unloading Pallets @ Active Item Bulk **(3.2.25)** ■ QA Lab **(3.6.12)** ■ DT Pack **(3.4.26)** ■ Loading/Unloading @ Bin Storage (Main) **(3.2.6)**	None	Based On Previously Stored SMM	ECS Processes: • Pallet Conveyor Controller to Towline Controller
	Return & Service Flow	• Rack Storage **(3.2.4)** • Unloader @ Intradepot Receiving **(3.1.27)**	□ Tote Box Stacker **(3.4.3)** □ Loading/Unloading @ Bin Storage (Main) **(3.2.6)**	None	Not Applicable	ECS Processes: • Pallet Conveyor Controller to Towline Controller • Empty Cart Management

Storage Workstation ID / Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Storage Material Movement Screen/Process
3.2.6 Loading/ Unloading @ Bin Storage (Main)	Material Flow	• Loaders @ Rack Storage (Main) **(3.2.5)** • Warehouse Inventory **(3.2.14)** • Warehouse Inspection **(3.2.15)** • Mission Receipt Entry (Pallet) **(3.1.11)** • Bin Storage **(3.2.8)** • Loader @ Intradepot Shipping N.W. **(3.5.3)** • QA Lab **(3.6.12)** • CCP Sorter Reject Chute **(3.4.23)** • Mission Inspection (Pallet) **(3.1.41)**	■ M/H Prepack Consolidation **(3.4.13)** ■ Light Pack Non-Conveyable **(3.4.10)** ■ Warehouse Inspection **(3.2.15)** ■ Warehouse Inventory **(3.2.14)** ■ Bin Storage **(3.2.8)** ■ Queues @ Intradepot Receiving **(3.1.45)** ■ Active Item Pallet **(3.2.11)** ■ Loading/Unloading Pallets @ Active Item Bulk **(3.2.25)** ■ QA Lab **(3.6.12)** ■ DT Pack **(3.4.26)**	None	Not Applicable	ECS Keypad: • Create Single Cart Move • Initiate Single Cart Move
	Return & Service Flow	• Tote Box Stacker **(3.4.3)** • Mission Multipack Breakdown **(3.1.4)** • CCP Pack **(3.4.24)** • Loaders @ Rack Storage (Main) **(3.2.5)** • DT Pack **(3.4.26)** • Intradepot Receipt Entry **(3.1.30)**	□ Tote Box Stacker **(3.4.3)**	None	Not Applicable	ECS Keypad: • Queue Empty Cart ECS Process: • Empty Cart Management
3.2.7 Loading/ Unloading @ Bin Storage (Mezzanine)	Material Flow Only	• Mission Inspection (Package) **(3.1.42)** • Mission Receipt Entry (Package) **(3.1.17)** • Bin Storage **(3.2.8)** • Loading/Unloading Totes @ Active Item Bulk **(3.2.26)**	■ Bin Storage **(3.2.8)** ■ Loading/Unloading Totes @ Active Item Bulk **(3.2.26)** ■ Mission Sorter Induction **(3.4.1)**	None	Not Applicable	ECS Processes: • Tote Conveyor Controller • Sorter Controller
3.2.8 Bin Storage	Material Flow Only	• Loading/Unloading @ Bin Storage (Main) **(3.2.6)** • Loading/Unloading @ Bin Storage (Mezzanine) **(3.2.7)**	□ Loading/Unloading @ Bin Storage (Main) **(3.2.6)** ■ Loading/Unloading @ Bin Storage (Mezzanine) **(3.2.7)**	RF	Store SMM/ Delete SMM (putaway)	ECS Process: • Data Manager
3.2.9 Bin Storage Local Inspection	*Obsolete Workstation*					

Storage Workstation ID / Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Storage Material Movement Screen/Process
3.2.10 Active Item Floor Storage	*Changed (see 3.2.22 and 3.2.23)*					
3.2.11 Active Item Pallet Storage	Material Flow	• Mission Receipt Entry (Pallet) **(3.1.11)** • Warehouse Inventory **(3.2.14)** • Loader @ Intradepot Shipping N.W. **(3.5.3)** • Loaders @ Rack Storage (Main) **(3.2.5)** • Loading/Unloading @ Bin Storage (Main) **(3.2.6)** • Mission Inspection (Pallet) **(3.1.41)**	■ Light Pack Non-Conveyable **(3.4.10)** ■ M/H Prepack Consolidation **(3.4.13)** ■ Warehouse Inventory **(3.2.14)** □ Active Item Consolidation **(3.2.13)** ■ DT Pack **(3.4.26)**	RF	Store SMM/ Delete SMM	• SMM Initiates Movement Or ECS Keypad: • Initiate Single Tote Move ECS Process: • Data Manager
	Return & Service Flow	• CCP Pack **(3.4.24)** • Tote Box Stacker **(3.4.3)** • Mission Shipping Consolidation **(3.5.7)** • Light Pack Non-Conveyable **(3.4.10)** • CCP Shipping Consolidation **(3.5.10)** • DT Pack **(3.4.26)**	□ Trash Disposal @ Receiving **(3.1.33)** □ Tote Box Stacker **(3.4.3)**	None	Not Applicable	ECS Keypad: • Create Single Cart Move ECS Process: • Empty Cart Management
3.2.12 Active Item Tote Storage	Material Flow	• Mission Receipt Entry (Package) **(3.1.17)** • Mission Inspection (Package) **(3.1.42)** • Loader @ Intradepot Shipping N.W. **(3.5.3)** • CCP Sorter Reject Chute **(3.4.23)**	□ Active Item Consolidation **(3.2.13)**	RF	Store SMM	ECS Process: • Data Manager
	Return & Service Flow	• CCP Pack **(3.4.24)**	Not Applicable	None	Not Applicable	ECS Process: • Empty Cart Management
3.2.13 Active Item Consolidation	Material Flow Only	• Active Item Tote Storage **(3.2.12)** • Active Item Pallet Storage **(3.2.11)**	■ Mission Sorter Induction **(3.4.1)** ■ CCP Sorter Induction **(3.4.22)**	None	Based On Previously Stored SMM	ECS Keypad: • Create Single Tote Move • Initiate Single Tote Move

Storage Workstation ID / Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Storage Material Movement Screen/Process
3.2.14 Warehouse Inventory	Material Flow Only	• Loaders @ Rack Storage (Main) **(3.2.5)** • Active Item Pallet Storage **(3.2.11)** • Loading/Unloading @ Bin Storage (Main) **(3.2.6)** • Loading/Unloading Pallets @ Active Item Bulk **(3.2.25)** • Mission Receipt Entry (Pallet) **(3.1.11)**	■ Unloaders @ Rack Storage **(3.2.1)** ■ Active Item Pallet Storage **(3.2.11)** ■ Loading/Unloading @ Bin Storage (Main) **(3.2.6)** ■ Loading/Unloading Pallets @ Active Item Bulk **(3.2.25)** ■ Queues @ Intradepot Receiving **(3.1.45)**	3270	Store SMM	• SMM Initiates Movement Or ECS Keypad: • Create Single Tote Move • Initiate Single Tote Move
3.2.15 Warehouse Inspection	Material Flow Only	• Loaders @ Rack Storage (Main) **(3.2.5)** • Loading/Unloading @ Bin Storage (Main) **(3.2.6)** • Loading/Unloading Pallets @ Active Item Bulk **(3.2.25)** • Mission Receipt Entry (Pallet) **(3.1.11)** • Mission Receipt Entry (Package) **(3.1.17)**	■ Unloaders @ Rack Storage **(3.2.1)** ■ Loading/Unloading @ Bin Storage (Main) **(3.2.6)** ■ Queues @ Intradepot Receiving **(3.1.45)** ■ Loading/Unloading Pallets @ Active Item Bulk **(3.2.25)**	3270	Store SMM	• SMM Initiates Movement Or ECS Keypad: • Create Single Tote Move • Initiate Single Tote Move
3.2.16 - 3.2.18	*No Correlating Workstations*					
3.2.19 Outlying Storage	Material Flow Only	• Manual	□ Manual	None	Not Applicable	Not Applicable
3.2.20 Outlying Storage Railcar Tires	Material Flow Only	• Manual	□ Manual	None	Not Applicable	Not Applicable
3.2.21 Misread Tote Conveyor (Active Item Storage)	Material Flow Only	• Manual	□ Manual	None	Not Applicable	Not Applicable

Storage Workstation ID / Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Storage Material Movement Screen/Process
3.2.22 Active Item Bulk 1 (DK01, DK03-DK07)	Material Flow Only	• Loading/Unloading Pallets @ Active Item Bulk **(3.2.25)** • Loading/Unloading Totes @ Active Item Bulk **(3.2.26)**	☐ Loading/Unloading Pallets @ Active Item Bulk **(3.2.25)** ☐ Loading/Unloading Totes @ Active Item Bulk **(3.2.26)** ■ ALOC Pallet Build-Up **(3.5.6)** ■ Floor Pack **(3.4.34)** ■ Mission Shipping Consolidation **(3.5.7)** ■ CCP Shipping Consolidation **(3.5.10)** ■ Parcel Shipping **(3.5.13)**	3270/ RF	Store SMM *(Note: All SMMs will be stored because ECS has no idea which CNs will be moved manually or by ECS MHE.)*	ECS Process: • Data Manager
3.2.23 Active Item Bulk 2 (DK02)	Material Flow	• Loading/Unloading Pallets @ Active Item Bulk **(3.2.25)** • Loading/Unloading Totes @ Active Item Bulk **(3.2.26)**	☐ Loading/Unloading Pallets @ Active Item Bulk **(3.2.25)** ☐ Loading/Unloading Totes @ Active Item Bulk **(3.2.26)** ■ ALOC Pallet Build-Up **(3.5.6)** ■ Floor Pack **(3.4.34)** ■ Mission Shipping Consolidation **(3.5.7)** ■ CCP Shipping Consolidation **(3.5.10)**	3270/ RF	Store SMM *(Note: All SMMs will be stored because ECS has no idea which CNs will be moved manually or by ECS MHE.)*	ECS Process: • Data Manager
3.2.24 Loading @ Rack Storage (Mezzanine)	Material Flow Only	• Rack Storage **(3.2.4)**	■ Mission Sorter Induction **(3.4.1)** ■ CCP Sorter Induction **(3.4.22)**	None	Based On Previously Stored SMM	ECS Process: • Tote Conveyor Controller

Storage Workstation ID / Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Storage Material Movement Screen/Process
3.2.25 Loading/ Unloading Pallets @ Active Item Bulk	Material Flow	• Loader @ Intradepot Shipping N.W. **(3.5.3)** • Warehouse Inventory **(3.2.14)** • Warehouse Inspection **(3.2.15)** • Loaders @ Rack Storage (Main) **(3.2.5)** • Loading/Unloading @ Bin Storage (Main) **(3.2.6)** • Mission Receipt Entry (Pallet) **(3.1.11)** • CCP Sorter Reject Chute **(3.4.23)** • Mission Sorter Reject Chute **(3.4.4)**	■ Warehouse Inventory **(3.2.14)** ■ Warehouse Inspection **(3.2.15)** ■ Light Pack Non-Conveyable **(3.4.10)** ■ M/H Prepack Consolidation **(3.4.13)** ■ Mission Shipping Consolidation **(3.5.7)** ■ CCP Shipping Consolidation **(3.5.10)** ■ Parcel Shipping **(3.5.13)**	None	Based On Previously Stored SMM	ECS Keypad: • Create Single Cart Move • Initiate Single Cart Move
		• Active Item Bulk 1 **(3.2.22)** • Active Item Bulk 2 **(3.2.23)**	□ Active Item Bulk 1 **(3.2.22)** □ Active Item Bulk 2 **(3.2.23)**	None	Ignore SMM	Not Applicable
	Return & Service Flow	• CCP Pack **(3.4.24)** • Mission Shipping Consolidation **(3.5.7)** • Light Pack Non-Conveyable **(3.4.10)**	□ Trash Disposal @ Receiving **(3.1.33)**	None	Not Applicable	ECS Keypad: • Create Single Cart Move
3.2.26 Loading/ Unloading Totes @ Active Item Bulk	Material Flow Only	• Loading/Unloading @ Bin Storage (Mezzanine) **(3.2.7)**	■ CCP Sorter Induction **(3.4.22)** ■ Mission Sorter Induction **(3.4.1)** ■ Loading/Unloading @ Bin Storage (Mezzanine) **(3.2.7)**	None	Based On Previously Store SMM	ECS Keypad: • Create Single Tote Move • Initiate Single Tote Move
		• Active Item Bulk 1 **(3.2.22)** • Active Item Bulk 2 **(3.2.23)**	□ Active Item Bulk 1 **(3.2.22)** □ Active Item Bulk 2 **(3.2.23)**	None	Not Applicable	Not Applicable

Table G-4 Storage System DSS-ECS Matrix

3.3.3 Preservation and Packing System DSS-ECS Matrix

Preservation and Packing Workstation ID/Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Preservation & Packing Material Movement Screen/Process
3.3.1 P&P Incheck (Pallet)	*Obsolete Workstation*					
3.3.2 P&P Unpack (Pallet)	*Obsolete Workstation*					
3.3.3 P&P Pallet Trash	*Obsolete Workstation*					
3.3.4 P&P Process Planning (Pallet)	*Obsolete Workstation*					
3.3.5 P&P Prefab (Pallet)	*Obsolete Workstation*					
3.3.6	*No Correlating Workstation*					
3.3.7 P&P Cleaning/ Preservation (Pallet)	*Obsolete Workstation*					
3.3.8 P&P FMS Heavy Pack (Pallet)	*Obsolete Workstation*					
3.3.9 P&P Foam in Place (Pallet)	*Obsolete Workstation*					
3.3.10 P&P QA Inspection (Pallet)	*Obsolete Workstation*					
3.3.11 P&P Outcheck (Pallet)	*Obsolete Workstation*					
3.3.12 Tote Boxes	*Obsolete Workstation*					
3.3.13 P&P Incheck (Package)	*Obsolete Workstation*					
3.3.14 P&P Unpack (Package)	*Obsolete Workstation*					
3.3.15 P&P Tote Box Trash	*Obsolete Workstation*					

Preservation and Packing Workstation ID/Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Preservation & Packing Material Movement Screen/Process
3.3.16 P&P Process Planning (Package)	*Obsolete Workstation*					
3.3.17 P&P Prefab (Package)	*Obsolete Workstation*					
3.3.18 P&P Speedline Packaging (Package)	*Obsolete Workstation*					
3.3.19 P&P Form, Fill & Seal (Package)	*Obsolete Workstation*					
3.3.20	*No Correlating Workstation*					
3.3.21 P&P Contact Room/Cleaning /Preservation	*Obsolete Workstation*					
3.3.22 P&P QA Inspection (Package)	*Obsolete Workstation*					
3.3.23 P&P Outcheck (Package)	*Obsolete Workstation*					
3.3.24 - 3.3.25	*No Correlating Workstations*					
3.3.26 Misread Tote Conveyor P&P	*Obsolete Workstation*					

Table G-5 Preservation and Packing System DSS-ECS Matrix

3.3.4 Sortation/Consolidation & Packaging System DSS-ECS Matrix

Sortation/ Consolidation & Packing Workstation ID/Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Sortation/ Consolidation & Packing Material Movement Screen/Process
3.4.1 Mission Sorter Induction	Material Flow	• Loading @ Rack Storage (Mezzanine) **(3.2.24)** • Loading/Unloading @ Bin Storage (Mezzanine) **(3.2.7)** • Active Item Consolidation **(3.2.13)** • CCP Sorter Reject Chute **(3.4.23)** • Mission Sorter Reject Chute **(3.4.4)** • Loading/ Unloading Totes @ Active Item Bulk **(3.2.26)**	■ Mission Sorter Reject Chute **(3.4.4)** □ M/H Prepack Consolidation **(3.4.13)** ■ Foreign Material Sales Pack **(3.4.47)** ■ Light Pack Conveyable **(3.4.5)** ■ Mission Sorter Chute - Inspection **(3.4.42)** ■ Mission Sorter Chute - Floor Pack **(3.4.40)**	None	Based On Previously Stored SMM	ECS Process: • Sorter Controller
	Return & Service Flow	Not Applicable	□ Tote Box Stacker **(3.4.3)**	None	Not Applicable	Not Applicable
3.4.2 Mission Sorter Misread Tote Processing	*Obsolete Workstation*					
3.4.3 Tote Box Stacker	Return & Service Flow Only	• Mission Sorter Induction **(3.4.1)** • CCP Multipack Breakdown **(3.1.22)** • Mission Multipack Breakdown **(3.1.4)** • Loaders @ Rack Storage (Main) **(3.2.5)** • Active Item Pallet Storage **(3.2.11)** • Loading/Unloading @ Bin Storage (Main) **(3.2.6)**	□ CCP Multipack Breakdown **(3.1.22)** □ Mission Multipack Breakdown **(3.1.4)** □ Unloaders @ Rack Storage **(3.2.1)** □ Active Item Pallet Storage **(3.2.11)** □ Loading/ Unloading @ Bin Storage (Main) **(3.2.6)** □ Receiving Unloading North **(3.1.1)** □ Receiving Unloading South **(3.1.1)**	None	Not Applicable	ECS Process: • Empty Cart Management

Sortation/ Consolidation & Packing Workstation ID/Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Sortation/ Consolidation & Packing Material Movement Screen/Process
3.4.4 Mission Sorter Reject Chute	Material Flow Only	• Mission Sorter Induction **(3.4.1)**	■ Foreign Material Sales Pack **(3.4.47)** ■ M/H Prepack Consolidation **(3.4.13)** ■ Light Pack Conveyable **(3.4.5)** □ CCP Sorter Induction **(3.4.22)** □ Mission Sorter Induction **(3.4.1)** □ Loading/ Unloading Pallets @ Active Item Bulk **(3.2.25)**	3270	Store SMM/	ECS Processes: • Sorter Controller • User Interface • Data Manager
3.4.5 Light Pack Conveyable	Material Flow Only	• CCP Sorter Induction **(3.4.22)** • Mission Sorter Induction **(3.4.1)** • Mission Sorter Reject Chute **(3.4.4)** • Mission Sorter Chute - Inspection **(3.4.42)**	■ CCP/DT Conveyable Address/Label **(3.4.8)** ■ Automatic Weighing and Offering System **(3.4.45)**	3270	Delete SMM/ Store SMM	ECS Processes: • Sorter Controller to Tote Conveyor Controller • Data Manager
3.4.6 Light Pack Conveyable Weigh & Rate	*Obsolete Workstation*					
3.4.7 Light Pack Conveyable Address/Label	*Obsolete Workstation*					
3.4.8 CCP/DT Conveyable Address/Label	Material Flow Only	• Light Pack Conveyable **(3.4.5)**	■ CCP Sorter Induction **(3.4.22)**	3270	Based On Previously Stored SMM *(Note: DSS needs to print label.)*	ECS Keypad: • Initiate Single Tote Move
3.4.9 Parcel Consolidation	*Obsolete Workstation*					

Sortation/ Consolidation & Packing Workstation ID/Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Sortation/ Consolidation & Packing Material Movement Screen/Process
3.4.10 Light Pack Non-Conveyable	Material Flow	• Active Item Pallet Storage **(3.2.11)** • Loading/Unloading @ Bin Storage (Main) **(3.2.6)** • Loaders @ Rack Storage (Main) **(3.2.5)** • M/H Prepack Consolidation **(3.4.13)** • Loading/Unloading Pallets @ Active Item Bulk **(3.2.25)**	■ CCP Pack **(3.4.24)** ■ Light Pack Non-Conveyable Weight & Rate **(3.4.11)** ■ M/H Pack Queues **(3.4.14)**	3270/ RF	Store SMM/ Delete SMM	• SMM Initiates Movement Or ECS Keypad: • Initiate Single Cart Move ECS Process: • Data Manager
	Return & Service Flow	• Parcel Shipping **(3.5.13)**	☐ Receiving Unloading North **(3.1.1)** ☐ Receiving Unloading South **(3.1.1)** ☐ Active Item Pallet Storage **(3.2.11)** ☐ Loading/ Unloading Pallets @ Active Item Bulk **(3.2.25)**	None	Not Applicable	ECS Process: • Empty Cart Management
3.4.11 Light Pack Non-Conveyable Weigh & Rate	Material Flow Only	• Light Pack Non-Conveyable **(3.4.10)**	☐ Parcel Shipping **(3.5.13)**	3270	Store SMM Delete SMM	• SMM Initiates Movement Or ECS Keypad: • Create Single Cart Move ECS Processes: • Towline Controller to Pallet Conveyor Controller • Data Manager
3.4.12 Light Pack Supplies	*Obsolete Workstation*					

Sortation/ Consolidation & Packing Workstation ID/Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Sortation/ Consolidation & Packing Material Movement Screen/Process
3.4.13 M/H Prepack Consolidation	Material Flow Only	• Loaders @ Rack Storage (Main) **(3.2.5)** • Loading/Unloading @ Bin Storage (Main) **(3.2.6)** • Active Item Pallet Storage **(3.2.11)** • Loader @ Intradepot Shipping N.W. **(3.5.3)** • Mission Sorter Induction **(3.4.1)** • Loading/Unloading Pallets @ Active Item Bulk **(3.2.25)** • Mission Sorter Reject Chute **(3.4.4)** • Mission Sorter Chute - Inspection **(3.4.42)**	■ M/H Pack Queues **(3.4.14)** ■ Light Pack Non-Conveyable **(3.4.10)**	RF	Store SMM	• SMM Initiates Movement Or ECS Keypad: • Initiate Single Cart Move • Inititate Chained Cart Move
3.4.14 M/H Pack Queues	Material Flow Only	• M/H Prepack Consolidation **(3.4.13)** • Loaders @ Rack Storage (Main) **(3.2.5)** • Light Pack Non-Conveyable **(3.4.10)**	■ Unloaders @ M/H Pack **(3.4.15)**	None	Based On Previously Stored SMM	ECS Process: • M/H Pack Queue Manager
3.4.15 Unloaders @ M/H Pack	Material Flow	• M/H Pack Queues **(3.4.14)**	■ M/H Pack **(3.4.16)**	None	Based On Previously Stored SMM	ECS Processes: • Towline Controller to Pallet Conveyor Controller
	Return & Service Flow	Not Applicable	□ CCP Multipack Breakdown **(3.1.22)** □ Receiving Unloading North **(3.1.1)** □ Receiving Unloading South **(3.1.1)** □ Loaders @ M/H Pack Address/Label **(3.4.21)**	None	Not Applicable	ECS Process: • Empty Cart Manager
3.4.16 M/H Pack	Material Flow Only	• Unloaders @ M/H Pack **(3.4.15)**	■ M/H Pack Dimension & Weigh **(3.4.17)**	3270	Store SMM/ Initiate Pallet Conveyor Movement	ECS Processes: • Towline Controller to Pallet Conveyor Controller

Sortation/ Consolidation & Packing Workstation ID/Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Sortation/ Consolidation & Packing Material Movement Screen/Process
3.4.17 M/H Pack Dimension & Weigh	Material Flow Only	• M/H Pack **(3.4.16)**	■ M/H Pack Strapping **(3.4.19)** ■ M/H Pack Address/Label **(3.4.20)** ■ M/H Pack Stretch Wrap **(3.4.18)**	3270	Store SMM *(Note: 1st and 2nd destinations needed. 1 = Pallet Conveyor Lane 2 = Final Destination)*	ECS Process: • Pallet Conveyor Controller
3.4.18 M/H Pack Stretch Wrap	Material Flow Only	• M/H Pack Dimension & Weigh **(3.4.17)**	■ M/H Pack Address/Label **(3.4.20)**	None	Based On Previously Stored SMM	ECS Process: • Pallet Conveyor Controller
3.4.19 M/H Pack Strapping	Material Flow Only	• M/H Pack Dimension & Weigh **(3.4.17)**	■ M/H Pack Address/Label **(3.4.20)**	None	Based On Previously Stored SMM	ECS Process: • Pallet Conveyor Controller
3.4.20 M/H Pack Address/Label	Material Flow Only	• M/H Pack Dimension & Weigh **(3.4.17)** • M/H Pack Strapping **(3.4.19)** • M/H Pack Stretch Wrap **(3.4.18)**	□ Loaders @ M/H Pack Address/Label **(3.4.21)**	None *(Note: DSS needs to print label.)*	Not Applicable	ECS Process: • Pallet Conveyor Controller
3.4.21 Loaders @ M/H Pack Address/Label	Material Flow	• M/H Pack Address/Label **(3.4.20)**	■ Mission Shipping Consolidation **(3.5.7)** ■ Unloader @ CCP/DT Dimension & Weigh **(3.4.27)** ■ CCP Shipping Consolidation **(3.5.10)**	None	Based On Previously Stored SMM	ECS Process: • Pallet Conveyor Controller to Towline Controller
	Return & Service Flow	• Unloaders @ M/H Pack **(3.4.15)**	□ Receiving Unloading North **(3.1.1)** □ Receiving Unloading South **(3.1.1)**	None	Not Applicable	ECS Process: • Empty Cart Management

Sortation/ Consolidation & Packing Workstation ID/Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Sortation/ Consolidation & Packing Material Movement Screen/Process
3.4.22 CCP Sorter Induction	Material Flow Only	• CCP Receipt Entry (Package) **(3.1.24)** • CCP/DT Conveyable Address/Label **(3.4.8)** • Loading @ Rack Storage (Mezzanine) **(3.2.24)** • CCP Sorter Reject Chute **(3.4.23)** • Active Item Consolidation **(3.2.13)** • Mission Sorter Reject Chute **(3.4.4)** • Loading/ Unloading Totes @ Active Item Bulk **(3.2.26)**	■ Light Pack Conveyable **(3.4.5)** □ CCP Sorter Reject Chute **(3.4.23)** ■ CCP Pack **(3.4.24)** ■ DT Pack **(3.4.26)**	None	Based On Previously Stored SMM	ECS Process: • Sorter Controller
3.4.23 CCP Sorter Reject Chute	Material Flow Only	• CCP Sorter Induction **(3.4.22)**	□ CCP Sorter Induction **(3.4.22)** □ Mission Sorter Induction **(3.4.1)** □ Loading/ Unloading @ Bin Storage (Main) **(3.2.6)** □ Unloaders @ Rack Storage **(3.2.1)** □ Loading/ Unloading Pallets @ Active Item Bulk **(3.2.25)** □ Active Item Tote Storage **(3.2.12)**	3270	Store SMM	ECS Process: • Sorter Controller • User Interface • Data Manager
3.4.24 CCP Pack	Material Flow	• CCP Sorter Induction **(3.4.22)** • CCP Receipt Entry (Pallet) **(3.1.23)** • Light Pack Non-Conveyable **(3.4.10)** • Intradepot Holding **(3.5.1)** • Loader @ Intradepot Shipping N.W. **(3.5.3)** • Foreign Military Sales Pack **(3.4.47)**	■ Unloaders @ CCP/DT Dim & Weigh **(3.4.27)**	RF	Store SMM	• SMM Initiates Movement Or ECS Keypad: • Initiate Single Cart Move ECS Process: • Data Manager

Sortation/ Consolidation & Packing Workstation ID/Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Sortation/ Consolidation & Packing Material Movement Screen/Process
	Return & Service Flow	• Mission Shipping Consolidation **(3.5.7)**	☐ Receiving Unloading North **(3.1.1)** ☐ Receiving Unloading South **(3.1.1)** ☐ Active Item Pallet Storage **(3.2.11)** ☐ Loading/ Unloading @ Bin Storage (Main) **(3.2.6)** ☐ Loading/ Unloading Pallets @ Active Item Bulk **(3.2.25)** ☐ Active Item Tote Storage **(3.2.12)**	None	Not Applicable	ECS Keypad: • Queue Empty Cart ECS Process: • Empty Cart Manager
3.4.25 CCP Pallet Build-Up	*Obsolete Workstation*					
3.4.26 DT Pack	Material Flow	• CCP Sorter Induction **(3.4.22)** • Loading/Unloading @ Bin Storage (Main) **(3.2.6)** • Active Item Pallet Storage **(3.2.11)** • Loaders @ Rack Storage (Main) **(3.2.5)** • Intradepot Holding **(3.5.1)**	■ Unloaders @ CCP/DT Dimension & Weigh **(3.4.27)**	RF	Store SMM	• SMM Initiates Movement Or ECS Keypad: • Initiate Single Cart Move ECS Process: • Data Manager
	Return & Service Flow	Not Applicable	☐ Receiving Unloading North **(3.1.1)** ☐ Receiving Unloading South **(3.1.1)** ☐ Active Item Pallet Storage **(3.2.11)** ☐ Loading/ Unloading @ Bin Storage (Main) **(3.2.6)**	None	Not Applicable	ECS Keypad: • Queue Empty Cart ECS Process: • Empty Cart Management
3.4.27 Unloader @ CCP/DT Dimension & Weigh	Material Flow Only	• CCP Pack **(3.4.24)** • DT Pack **(3.4.26)** • Loaders @ M/H Pack Address/Label **(3.4.21)** • CCP Receipt Entry (Pallet) **(3.1.23)**	■ CCP/DT Dimension & Weigh **(3.4.28)**	None	Based on Previously Stored SMM	ECS Process: • Towline Controller to Pallet Conveyor Controller

Sortation/ Consolidation & Packing Workstation ID/Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Sortation/ Consolidation & Packing Material Movement Screen/Process
3.4.28 CCP/DT Dimension & Weigh	Material Flow Only	• Unloader @ CCP/DT Dimension & Weigh **(3.4.27)**	■ CCP/DT Stretch Wrap **(3.4.29)** ■ CCP/DT Address/Label **(3.4.31)** ■ CCP/DT Strapping **(3.4.30)**	3270	Store SMM *(Note: 1st and 2nd destinations needed. 1 = Pallet Conveyor Lane 2 = Final Destination)*	ECS Processes: • Pallet Conveyor Controller • Data Manager
3.4.29 CCP/DT Stretch Wrap	Material Flow Only	• CCP/DT Dimension & Weigh **(3.4.28)**	■ CCP/DT Address/Label **(3.4.31)**	None	Based On Previously Stored SMM	ECS Process: • Pallet Conveyor Controller
3.4.30 CCP/DT Strapping	Material Flow Only	• CCP/DT Dimension & Weigh **(3.4.28)**	■ CCP/DT Address/Label **(3.4.31)**	None	Based On Previously Stored SMM	ECS Process: • Pallet Conveyor Controller
3.4.31 CCP/DT Address/Label	Material Flow Only	• CCP/DT Stretch Wrap **(3.4.29)** • CCP/DT Dimension & Weigh **(3.4.28)** • CCP/DT Strapping **(3.4.30)**	■ Loaders @ CCP/DT Address/Label **(3.4.32)**	None	Based on Previously Stored SMM *(Note: DSS needs to print label).*	ECS Process: • Pallet Conveyor Controller
3.4.32 Loaders @ CCP/DT Address/Label	Material Flow Only	• CCP/DT Address/Label **(3.4.31)**	■ Mission Shipping Consolidation **(3.5.7)** ■ CCP Shipping Consolidation **(3.5.10)** ■ ALOC Pallet Build-Up **(3.5.6)**	None	Based on Previously Stored SMM	ECS Process: • Pallet Conveyor Controller to Towline Controller
3.4.33 Multi Wall Assembly	*Obsolete Workstation*					
3.4.34 Floor Pack	Material Flow Only	• Loader @ Intradepot Shipping N.W. **(3.5.3)** • Mission Sorter Chute-Floor Pack **(3.4.40)** • Active Item Bulk 1 **(3.2.22)** • Active Item Bulk 2 **(3.2.23)**	□ Floor Pack Measure & Weigh **(3.4.35)**	3270	Ignore SMM	Not Applicable
3.4.35 Floor Pack Measure & Weigh	Material Flow Only	• Floor Pack **(3.4.34)**	□ Floor Pack Address/Label **(3.4.36)**	3270	Ignore SMM	Not Applicable

Sortation/ Consolidation & Packing Workstation ID/Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Sortation/ Consolidation & Packing Material Movement Screen/Process
3.4.36 Floor Pack Address/Label	Material Flow Only	• Floor Pack Measure & Weigh **(3.4.35)**	☐ CCP Staging **(3.5.11)** ☐ Mission Staging **(3.5.8)**	3270	Ignore SMM	Not Applicable
3.4.37 Carton/Box Shop	*Obsolete Workstation*					
3.4.38 - 3.4.39	*No Correlating Workstations*					
3.4.40 Mission Sorter Chute- Floor Pack	Material Flow Only	• Mission Sorter Induction **(3.4.1)**	☐ Floor Pack (manual flow via fork truck) **(3.4.34)**	None	Delete SMM	ECS Process: • Data Manager
3.4.41 Mission Sorter Chute - Depot Property	*Obsolete Workstation*					
3.4.42 Mission Sorter Chute - Inspection	Material Flow Only	• Mission Sorter Induction **(3.4.1)**	☐ Light Pack Conveyable **(3.4.5)** ☐ M/H Prepack Consolidation **(3.4.13)**	3270	Ignore SMM	ECS Process: • Data Manager
3.4.43 M/H Pack Trash	*Obsolete Workstation*					
3.4.44 QA & Inventory Discrepancy	Material Flow Only	• Any Packing or Storage Workstation	■ Any Packing Workstation, Storage, or Intradepot Receiving	3270	Store SMM	SMM Initiates Movement Or ECS Keypad: • Initiate Single Cart Move
3.4.45 Automatic Weigh & Offer System (AWOS)	Material Flow Only	• Light Pack Conveyable **(3.4.5)** • Foreign Material Sales Pack **(3.4.47)**	☐ Small Parcel Costing **(3.4.46)**	3270	Ignore SMM	ECS Process: • Tote Conveyor Controller
3.4.46 Small Parcel Costing	Material Flow Only	• AWOS **(3.4.45)**	☐ Parcel Shipping **(3.5.13)**	3270	Ignore SMM	Not Applicable
3.4.47 Foreign Material Sales Pack	Material Flow Only	• Mission Sorter Induction **(3.4.1)** • Mission Sorter Reject Chute **(3.4.4)**	☐ AWOS **(3.4.45)** ☐ CCP Pack **(3.4.24)**	3270	Ignore SMM	Not Applicable

Table G-6 Sortation/Consolidation & Packaging System DSS-ECS Matrix

3.3.5 Shipping System DSS-ECS Matrix

Shipping Workstation ID / Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Shipping Material Movement Screen/Process
3.5.1 Intradepot Holding	Material Flow	• DDSP-W (CCP)	☐ DT Pack **(3.4.26)** ☐ CCP Pack **(3.4.24)**	None	Not Applicable	ECS Keypad: • Create Single Cart Move
	Return & Service Flow	• Mission Shipping Consolidation **(3.5.7)**	Not Applicable	None	Not Applicable	ECS Process: • Empty Cart Management
3.5.2 Dock @ Intradepot Shipping N.W.	Material Flow Only	• Outlying Storage **(3.2.19)**	■ Loader @ Intradepot Shipping N.W. **(3.5.3)**	RF	Based on Previously Stored SMM	Not Applicable
3.5.3 Loader @ Intradepot Shipping N.W.	Material Flow	• Dock @ Intradepot Shipping N.W. **(3.5.2)**	■ M/H Prepack Consolidation **(3.4.13)** ■ Active Item Pallet Storage **(3.2.11)** ■ Active Item Tote Storage **(3.2.12)** ■ Loading/ Unloading @ Bin Storage (Main) **(3.2.6)** ■ Unloaders @ Rack Storage **(3.2.1)** ■ Loading/ Unloading Pallets @ Active Item Bulk **(3.2.25)** ■ ALOC Pallet Build-Up **(3.5.6)** ■ Mission Shipping Consolidation **(3.5.7)** ■ CCP Shipping Consolidation **(3.5.10)** ■ Floor Pack **(3.4.34)** ■ CCP Pack **(3.4.24)**	None	Based on Previously Stored SMM	ECS Process: • Pallet Conveyor Controller to Towline Controller
	Return & Service Flow	• Mission Shipping Consolidation **(3.5.7)**	Not Applicable	None	Not Applicable	ECS Process: • Empty Cart Management
3.5.4 Dock @ Intradepot Shipping N.E.	*Non-Functional Workstation*					
3.5.5 Loader @ Intradepot Shipping N.E.	*Non-Functional Workstation*					

Shipping Workstation ID / Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Shipping Material Movement Screen/Process
3.5.6 ALOC Pallet Build-Up	Material Flow	• CCP Receipt Entry (Pallet) **(3.1.23)** • Loaders @ CCP/DT Address Label **(3.4.32)** • Loader @ Intradepot Shipping N.W. **(3.5.3)** • Active Item Bulk 1 **(3.2.22)** • Active Item Bulk 2 **(3.2.23)** • CCP Oversize Receipt Entry **(3.1.26)**	☐ ALOC Shipping **(3.5.19)**	RF	Ignore SMM	Not Applicable
	Return & Service Flow	Not Applicable	☐ Receiving Unloading North **(3.1.1)** ☐ Receiving Unloading South **(3.1.1)** ☐ CCP Multipack Breakdown **(3.1.22)**	None	Not Applicable	ECS Process: • Empty Cart Management
3.5.7 Mission Shipping Consolidation	Material Flow	• Loaders @ CCP/DT Address/Label **(3.4.32)** • Loaders @ M/H Pack Address/Label **(3.4.21)** • Loader @ Intradepot Shipping N.W. **(3.5.3)** • Active Item Bulk 1 **(3.2.22)** • Active Item Bulk 2 **(3.2.23)** • Loading/Unloading Pallets @ Active Item Bulk **(3.2.25)**	■ Mission Staging **(3.5.8)**	RF	SMM Required	• SMM Initiates Movement Or ECS Processes: • Empty Cart Management • Towline Controller • Data Manager
	Return & Service Flow	Not Applicable	☐ Intradepot Holding **(3.5.1)** ☐ Loader @ Intradepot Shipping N.W. **(3.5.3)** ☐ Active Item Pallet Storage **(3.2.11)** ☐ Loading/ Unloading Pallets @ Active Item Bulk **(3.2.25)** ☐ CCP Pack **(3.4.24)**	None	Not Applicable	ECS Keypad: • Queue Empty Cart ECS Process: • Empty Cart Management

Shipping Workstation ID / Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Shipping Material Movement Screen/Process
3.5.8 Mission Staging	Material Flow Only	• Mission Shipping Consolidation **(3.5.7)** • Floor Pack Address/Label **(3.4.36)**	☐ Mission Shipping **(3.5.9)**	None	Not Applicable	Not Applicable
3.5.9 Mission Shipping	Material Flow Only	• Mission Staging **(3.5.8)**	☐ Manual	None	Not Applicable	Not Applicable
3.5.10 CCP Shipping Consolidation	Material Flow	• Loader @ Intradepot Shipping N.W. **(3.5.3)** • Loaders @ CCP/DP Address/Label **(3.4.32)** • Active Item Bulk 1 **(3.2.22)** • Active Item Bulk 2 **(3.2.23)** • Loading/Unloading Pallets @ Active Item Bulk **(3.2.25)** • CCP Receipt Entry (Pallet) **(3.1.23)** • Loaders @ M/H Pack Address/Label **(3.4.21)** • CCP Oversize Receipt Entry **(3.1.26)**	■ CCP Staging **(3.5.11)**	RF	SMM Required	• SMM Initiates Movement Or ECS Processes: • Empty Cart Management • Towline Controller • Data Manager
	Return & Service Flow	Not Applicable	☐ Receiving Unloading North **(3.1.1)** ☐ Receiving Unloading South **(3.1.1)** ☐ Active Item Pallet Storage **(3.2.11)**	None	Not Applicable	ECS Keypad: • Queue Empty Cart ECS Process: • Empty Cart Management
3.5.11 CCP Staging	Material Flow Only	• CCP Shipping Consolidation **(3.5.10)** • Floor Pack Address Label **(3.4.36)**	☐ CCP Shipping **(3.5.12)**	None	Not Applicable	Not Applicable
3.5.12 CCP Shipping	Material Flow Only	• CCP Staging **(3.5.11)**	☐ Manual	None	Not Applicable	Not Applicable

Shipping Workstation ID / Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Shipping Material Movement Screen/Process
3.5.13 Parcel Shipping	Material Flow	• Small Parcel Costing **(3.4.46)** • Light Pack Non-Conveyable Weigh & Rate **(3.4.11)** • Active Item Bulk 1 **(3.2.22)** • Loading/Unloading Pallets @ Active Item Bulk **(3.2.25)**	☐ Manual	None	Not Applicable	Not Applicable
	Return & Service Flow	Not Applicable	☐ Light Pack Non-Conveyable **(3.4.10)**	None	Not Applicable	ECS Keypad: • Queue Empty Cart ECS Process: • Empty Cart Management
3.5.14 Trash Disposal @ Shipping	*Obsolete Workstation*					
3.5.15 - 3.5.17	*No Correlating Workstations*					
3.5.18 Oversize Shipping	Material Flow Only	• Manual	☐ Manual	None	Not Applicable	Not Applicable
3.5.19 ALOC Shipping	Material Flow Only	• ALOC Pallet Build-Up **(3.5.6)**	☐ Manual	None	Not Applicable	Not Applicable

Table G-7 Shipping System DSS-ECS Matrix

3.3.6 Miscellaneous System DSS-ECS Matrix

Miscellaneous Workstation ID / Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Miscellaneous Material Movement Screen/Process
3.6.1 Redirect Spur Loop 1 - Receiving	Material Flow and/or Return & Service Flow	• Anywhere	☐ Anywhere	None	Not Applicable	ECS Keypad: • Initiate Single Cart Move • Create Single Cart Move • Recreate Cart Move • Set Cart Location • Update Cart Type ECS Process: • User Interface
3.6.2 Redirect Spur Loop 2 - CCP Processing	Material Flow and/or Return & Service Flow	• Anywhere	☐ Anywhere	None	Not Applicable	ECS Keypad: • Initiate Single Cart Move • Create Single Cart Move • Recreate Cart Move • Set Cart Location • Update Cart Type ECS Process: • User Interface
3.6.3 Redirect Spur Loop 3 - Mission Processing	Material Flow and/or Return & Service Flow	• Anywhere	☐ Anywhere	None	Not Applicable	ECS Keypad: • Initiate Single Cart Move • Create Single Cart Move • Recreate Cart Move • Set Cart Location • Update Cart Type ECS Process: • User Interface
3.6.4 Redirect Spur Loop 4 - Intradepot Receipt Entry	Material Flow and/or Return & Service Flow	• Anywhere	☐ Anywhere	None	Not Applicable	ECS Keypad: • Initiate Single Cart Move • Create Single Cart Move • Recreate Cart Move • Set Cart Location • Update Cart Type ECS Screen: • Fault Handling - Intradepot Receiving Queues ECS User Interface

Miscellaneous Workstation ID / Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Miscellaneous Material Movement Screen/Process
3.6.5 Redirect Spur Loop 5 - Storage Input/Output	Material Flow and/or Return & Service Flow	• Anywhere	☐ Anywhere	None	Not Applicable	ECS Keypad: • Initiate Single Cart Move • Create Single Cart Move • Recreate Cart Move • Set Cart Location • Update Cart Type ECS User Interface
3.6.6 Redirect Spur Loop 6 - Packing Distribution	Material Flow and/or Return & Service Flow	• Anywhere	☐ Anywhere	None	Not Applicable	ECS Keypad: • Initiate Single Cart Move • Create Single Cart Move • Recreate Cart Move • Set Cart Location • Update Cart Type ECS Process: • User Interface
3.6.7 Redirect Spur Loop 7 - M/H Pack	Material Flow and/or Return & Service Flow	• Anywhere	☐ Anywhere	None	Not Applicable	ECS Keypad: • Initiate Single Cart Move • Create Single Cart Move • Recreate Cart Move • Set Cart Location • Update Cart Type ECS Screen: • Fault Handling - Medium/Heavy Pack Queues • Fault Handling - Medium/Heavy Pack Lane Counts ECS Process: • User Interface
3.6.8 Redirect Spur Loop 8 - Sortation	Material Flow and/or Return & Service Flow	• Anywhere	☐ Anywhere	None	Not Applicable	ECS Keypad: • Initiate Single Cart Move • Create Single Cart Move • Recreate Cart Move • Set Cart Location • Update Cart Type ECS Process: • User Interface

Miscellaneous Workstation ID / Name	Flow Type	Source Workstations	Destination Workstations	DSS Activity	ECS Response	Miscellaneous Material Movement Screen/Process
3.6.9 Redirect Spur Loop 9 - Northwest Shipping	Material Flow and/or Return & Service Flow	• Anywhere	☐ Anywhere	None	Not Applicable	ECS Keypad: • Initiate Single Cart Move • Create Single Cart Move • Recreate Cart Move • Set Cart Location • Update Cart Type ECS Process: • User Interface
3.6.10 Redirect Spur Loop 41 - Northeast Shipping	Material Flow and/or Return & Service Flow	• Anywhere	☐ Anywhere	None	Not Applicable	ECS Keypad: • Initiate Single Cart Move • Create Single Cart Move • Recreate Cart Move • Set Cart Location • Update Cart Type ECS Process: • User Interface
3.6.11 QA Audit	*Obsolete Workstation*					
3.6.12 QA Lab	Material Flow Only	• Loaders @ Rack Storage (Main) **(3.2.5)** • Loading/Unloading @ Bin Storage (Main) **(3.2.6)**	☐ Unloaders @ Rack Storage **(3.2.1)** ☐ Loading/ Unloading @ Bin Storage (Main) **(3.2.6)**	3270	Store SMM	ECS Keypad: • Initiate Single Cart Move

Table G-8 Miscellaneous System DSS-ECS Matrix

3.4 Users/Affected Personnel

The current analysts, operators and technical support personnel at each site will be able to utilize the material handling equipment as they are being used today. Lower Tier functions will be replaced by the DSS Upper Tier.

3.5 Support Concept

Software support for ECS will be provided by DSDC. Hardware support will be provided by site technical personnel and local vendors. Analyst support will be provided by the current on site analysts.

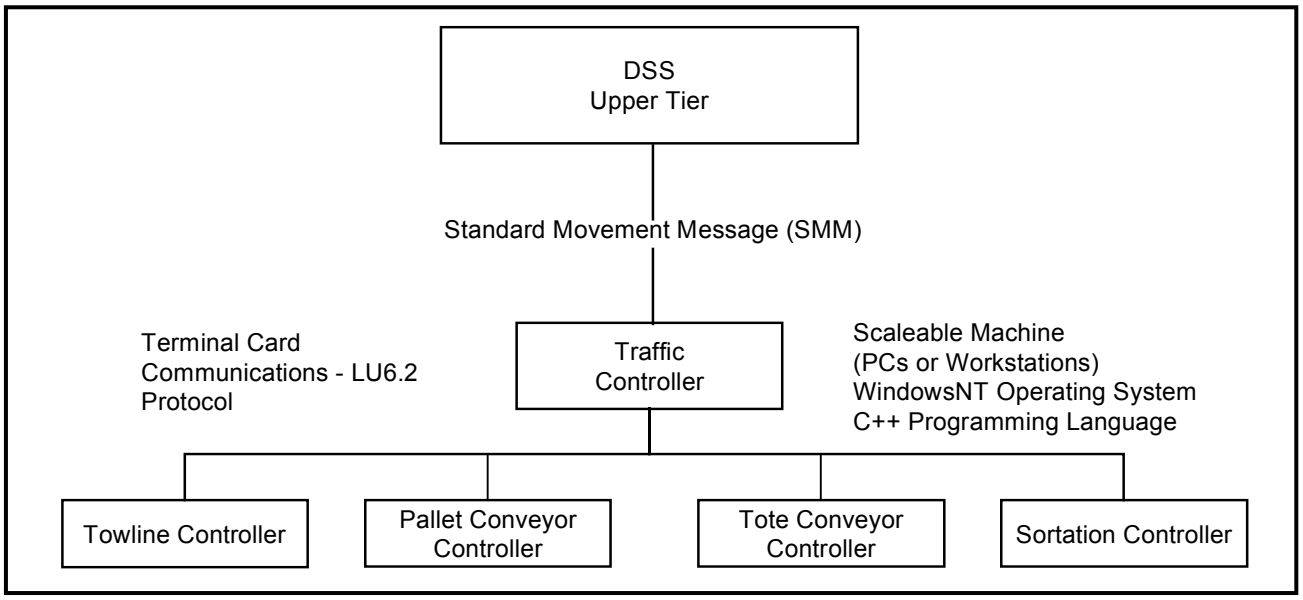

Figure G-23 Proposed ECS Configuration for DDSP New Cumberland

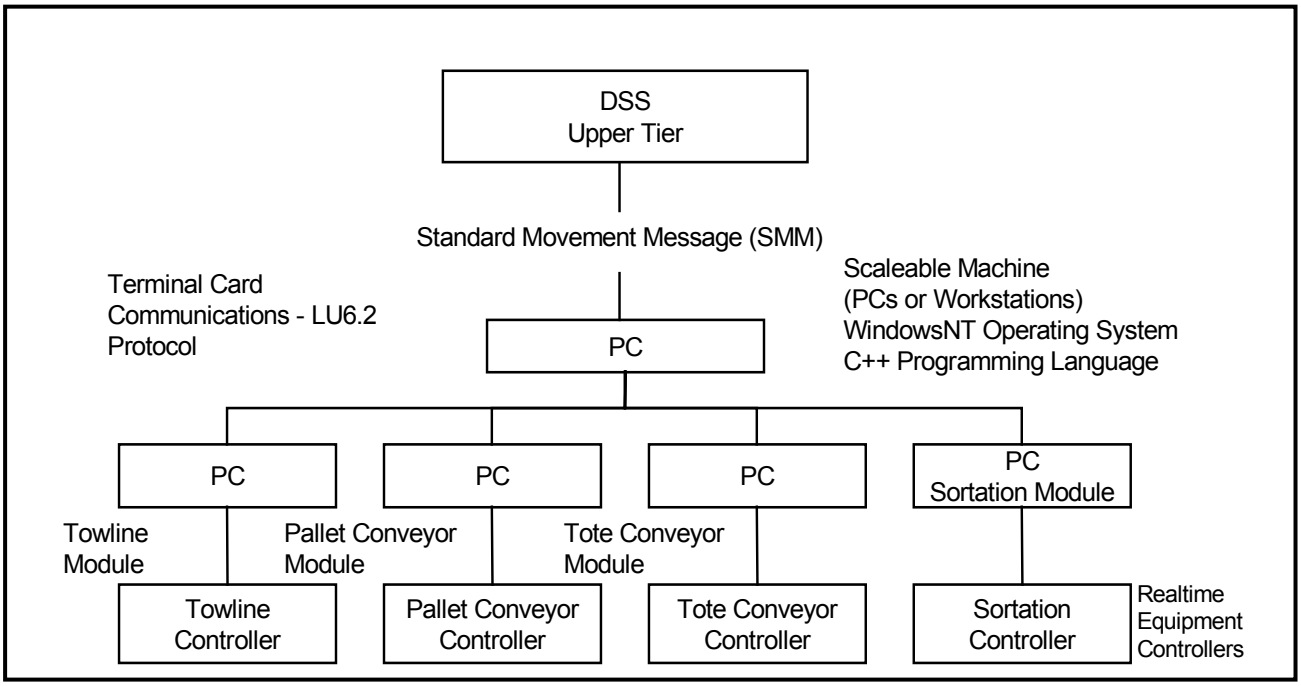

Figure G-24 Possible ECS Hardware Configuration for DDSP-E New Cumberland

4.0 CURRENT DDSP-E NEW CUMBERLAND SITE HARDWARE

4.1 Towline Subcontroller Equipment List

6 Allen-Bradley PLC 3/10

4.2 Pallet Conveyor Subcontroller Equipment List

10 Allen-Bradley PLC 2/30

4.3 Tote Conveyor Subcontroller Equipment List

9 Allen-Bradley PLC 2/30

4.4 Sorter Subcontroller Equipment List

2 IBM Compatible 486 DX 33

4.5 Process Control System (PCS) Equipment List

4.5.1 CPUs

1 DIGITAL VAX 8530
2 DIGITAL VAX 8550
3 380 VAX CONSOLE
1 VAX CLUSTER STAR COUPLER

4.5.2 Disk Drives

2 RA90 (1216 MB ea)
8 RA70 (280 MB ea)
4 RA72 (1 GB ea)
2 ESE50 (600 MB ea)

Note: All disks utilize Digital's Volume Shadowing

4.5.3 Disk Controlllers

2 HSC70 Intelligent I/O Server

4.5.4 Tape Units

9 Track Tape Units
1 TA78 Magnetic Tape Drive
1 TA81 Magnetic Tape Drive

4.5.5 **Digital Communication Equipment**

2 Digital Lanbridge 100's
2 Digital DEMSA-ST (DECnet/SNA Gateways)
DELNIs (Local Interconnect-Baseband Ethernet)

4.6 **AWOS Controllers**

SITE	EQUIPMENT VENDOR	EQUIPMENT NAME	CONTROL TYPE
DDSP-E			

Table G-9 DDSP-E AWOS Controllers

APPENDIX H DSS – ECS CURRENT DDJC TRACY SITE HARDWARE

1.0 CURRENT EQUIPMENT LIST FOR DDJC, TRACY, CA

SITE	EQUIPMENT VENDOR	EQUIPMENT NAME	CONTROL TYPE
Tracy	Horsley	PC	Automatic
Tracy	Allen Bradley	PLC5	Automatic
Tracy	Fairbanks	Inline Scale	Automatic
Tracy	Accusort	Barcode Scanner	Automatic

Table H-1 DDJC TRACY AWOS Control MHE Table

APPENDIX I DSS – ECS CURRENT DDJC SHARPE SITE HARDWARE

1.0 CURRENT EQUIPMENT LIST FOR DDJC, SHARPE, CA

SITE	EQUIPMENT VENDOR	EQUIPMENT NAME	CONTROL TYPE
Sharpe	Digital	MicroVAX 3100	Automatic
Sharpe	Allen Bradley	PLC5	Automatic
Sharpe	Accusort	Barcode Scanner	Automatic
Sharpe	Fairbanks	Inline Scale	Automatic

Table I-1 DDJC SHARPE - AWOS Control MHE Table

APPENDIX J DDWG ECS SITE SURVEY

1.0 DDWG ECS SITE SURVEY December - 1999

The purpose of the site survey was to determine if the Material Handling Equipment (MHE) at Warner-Robins is suitable for interfacing with the DSS Equipment Control System (ECS) and identify DSS processes that will be affected by the change. The ECS team comprised of representatives from DSDC, DDWG and DDC surveyed the package sorter system and the package conveyor systems at Warner-Robins. The following is the results of the survey from a functional/technical perspective.

1.1 AWOS & SORTER/PACKAGE CONVEYORS:

1.1.1 Current Process:

Warner-Robbins (WG) does all AWOS processing at the pack terminal. This includes the weighing and sizing of the material. Once the AWOS offer process is complete and the shipping labels are attached. The operator places the routing label on top of the package or tote in the case of multiple small packages. The package/tote is placed on a conveyor, along with any freight items and routed through what was once the DAWS area. This area consists of four conveyor lines, each line containing a scale and sizing equipment. Since the weight and cube were entered at the pack station, none of the inline sizing devices is active. After the sizing equipment the four conveyor lines are combined into one. The routing label, attached at the packing station, is read by an overhead scanner and diverted to the proper shipping lane. The package sorter at Warner Robins is not currently being utilized. The sorter was designed and implemented for utilization with ECS. The ECS will need to be changed in order to accommodate the package sorter at Warner-Robins.

To accommodate package routing within the facility at DDWG there are two overhead scanners utilized in the receiving process and four overhead scanners utilized in the shipping area. These scanners are either directly wired to a PLC or are communicating to the PLC via an RS-232 interface. The process uses preprinted labels to route material to the proper destination. The operators at the DSS workstations apply these labels to the material.

1.1.2 **Current HW Configuration:**

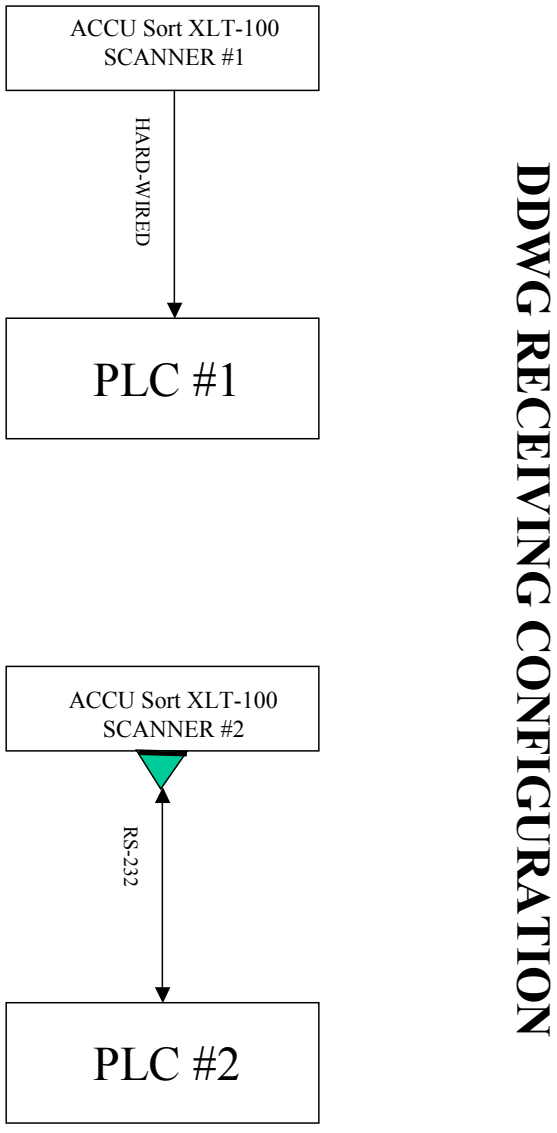

Figure J-1 DDWG Receiving Configuration

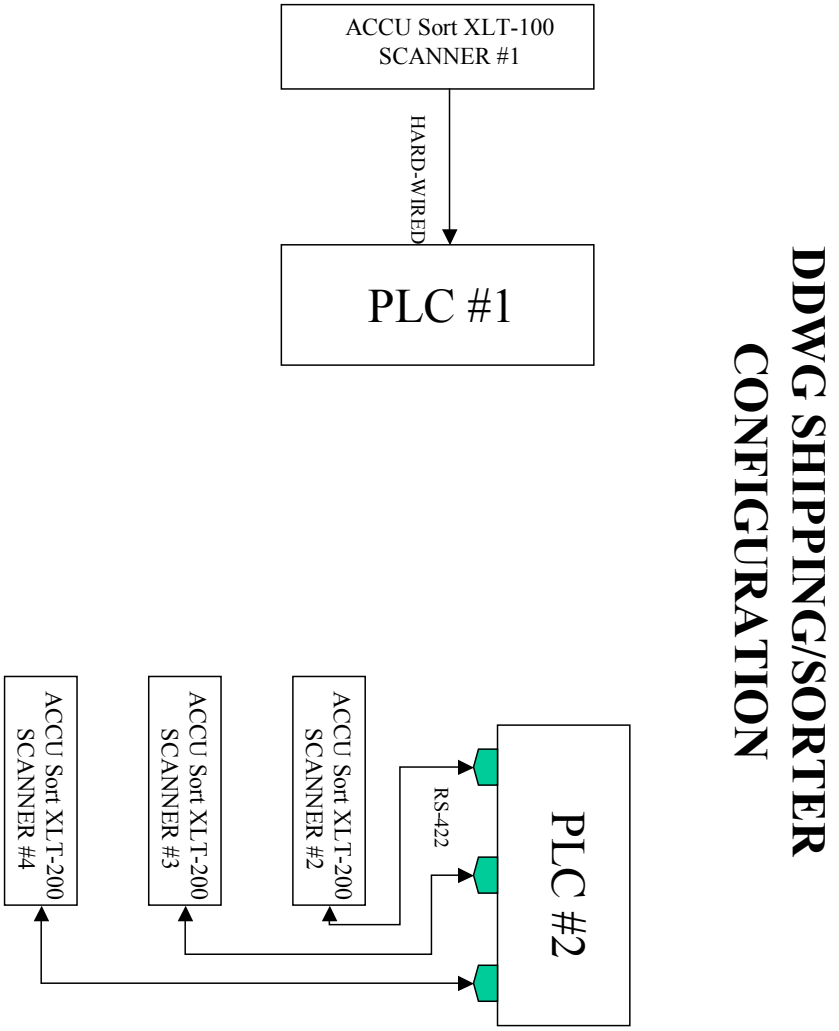

Figure J-2 DDWG Shipping/Sorter Configuration

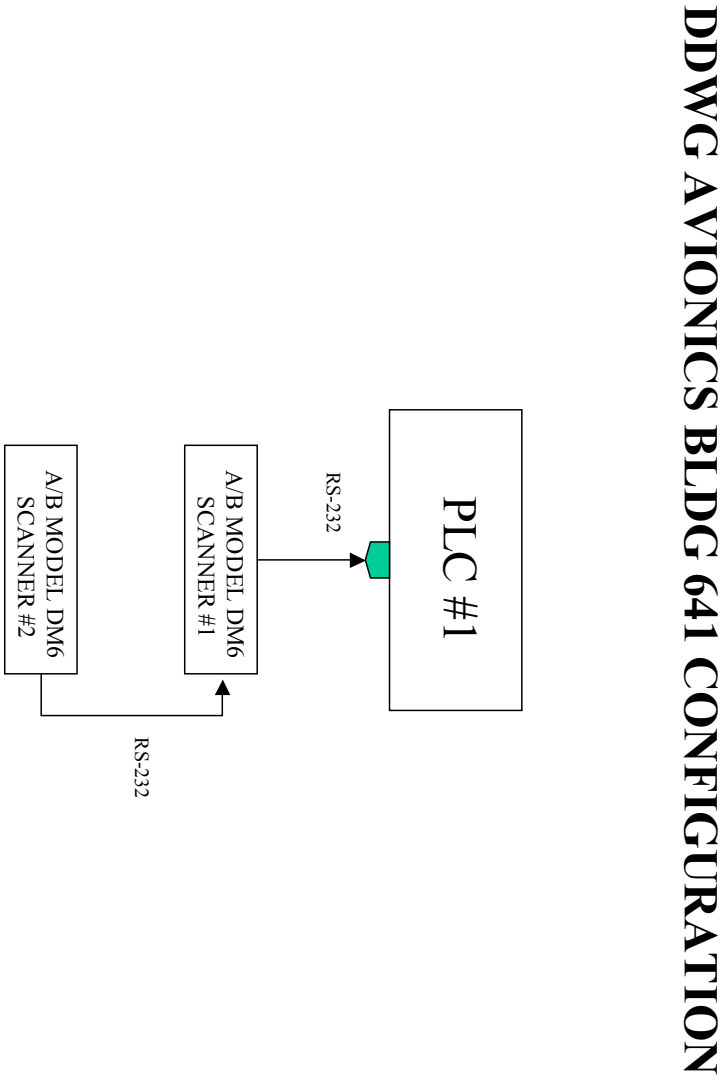

Figure J-3 DDWG Avionics Building 641 Configuration

1.1.3 **DSS Changes:**

1.1.3.1 **ASSUMPTIONS:**

All DSS changes required to support the implementation of ECS at DDWG will be completed under the SCR for the implementation of ECS at Defense Depot Oklahoma City (DDOO).

1.1.4 **ECS Changes:**

1.1.4.1 **AWOS**

There currently is no requirement for AWOS support of DAWS at DDWG.

1.1.4.2 **Sorter/Conveyors**

A new ECS subsystem will be developed to interface with the scanners and PLC's controlling the Air Force the conveyors and the sorter. DSS will send SMM's to ECS as receipts, picks and packs are accomplished as it currently does at all sites. ECS will store that CN in its database. Once the Accusort scanners scan the control number, ECS will look up the CN to find its destination. It will cross reference the destination with one the PLC can understand. It will then send the understandable destination to the PLC. In two instances ECS will have to either actuate a diverter directly or the Accusort scanner will have to be modified to accept a message from ECS and actuate the diverter as it does today. This process must occur within 250 ms and testing must take place to verify it can be done with ECS. Portions of the subsystem will have to be developed to interface with the two sortation devices and two additional scanning devices. Six scanners total.

1.1.5 **DSS Equipment Requirements:**

N/A

1.1.5.1 **Proposed Schedule:**

To be provided at a later date.

1.1.5.1.1 **TOTAL SYSTEM CONFIGURATION**

1.1.5.1.2 **Proposed DSS-ECS Hardware Configuration Drawings:**

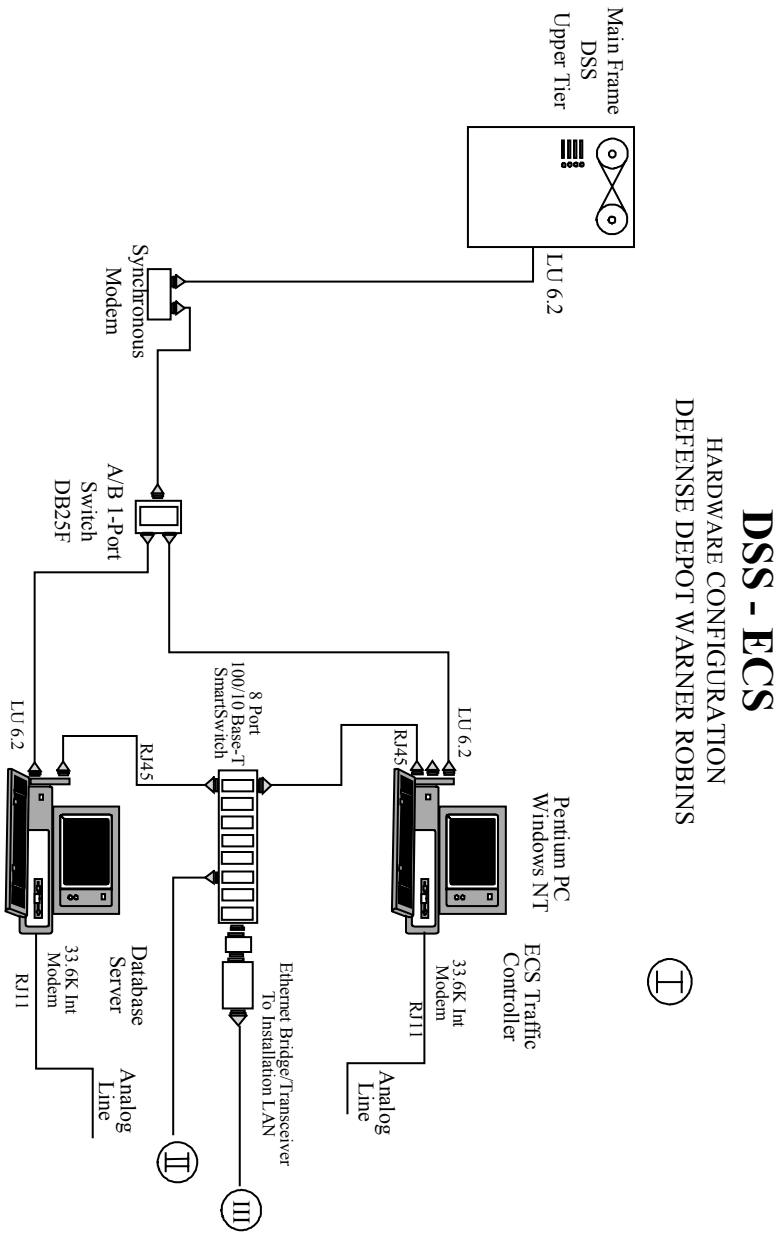

Figure J-4 DDWG DSS-ECS Hardware Configuration

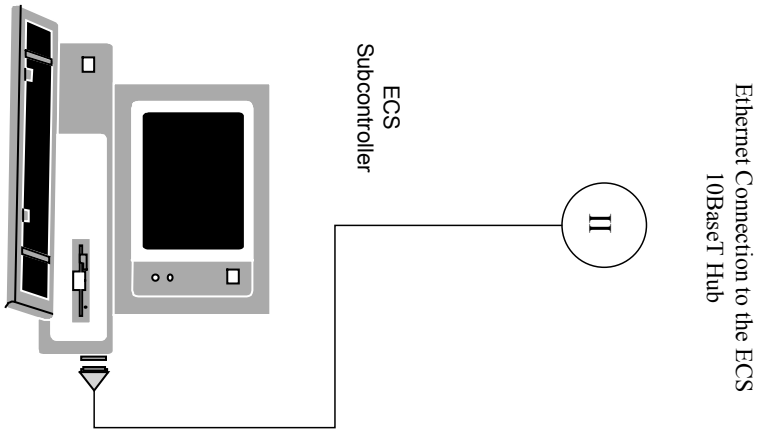

Figure J-5 DDWG DSS-ECS Hardware Configuration

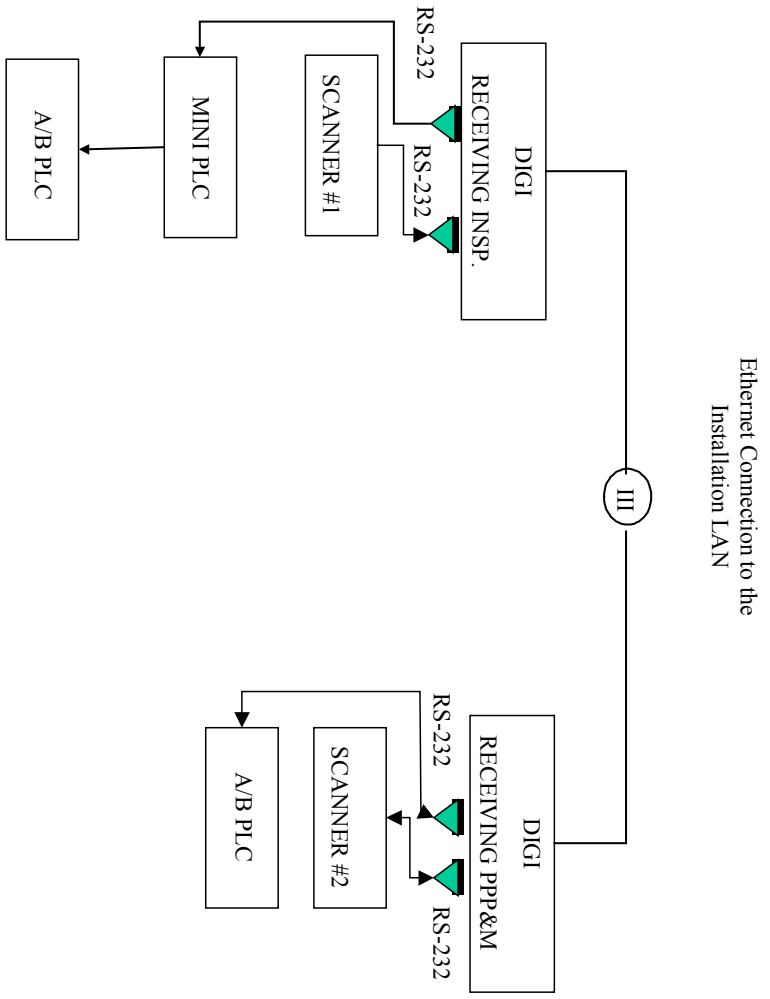

Figure J-6 DDWG DSS-ECS Hardware Configuration

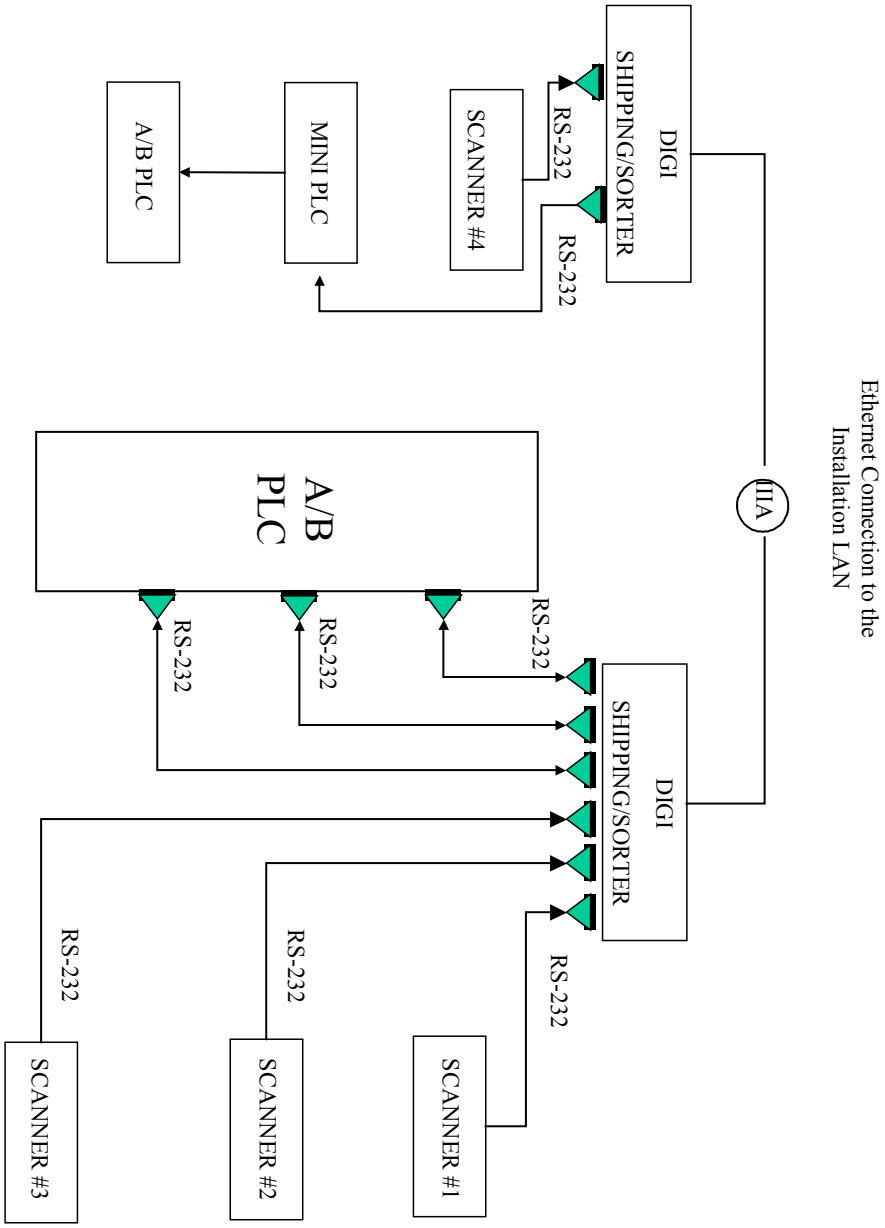

Figure J-7 DDWG DSS-ECS Hardware Configuration

1.1.5.1.3 **ECS Equipment Requirements/Costs:**

The following table represents an estimation of the ECS hardware/system software costs. Determination will need to be made on who will be providing funding for procurement.

	Description	Qty	Unit Price	Total Price
DDWG Sorter/Conveyor	Dell Poweredge 2300 Servers & Storage w/ Windows NT Server 4.0	2	$4,200	$8,400
DDWG Sorter/Conveyor	SNA Communications hardware & software	2	$1,300	$2,600
DDWG Sorter/Conveyor	ECS Subcontroller; Intel 450 Mhz Pentium III processor w/ Windows NT 4.0 CD	1	$2,209	$2,209
DDWG Sorter/Conveyor	Oracle 8 for Windows NT w/ 5 user licenses	1	$3,500	$3,500
DDWG Sorter/Conveyor	Fast Personal MiniHub-5 Plus	1	$1,095	$1,095
DDWG Sorter/Conveyor	Digi PortServer I (8 port)	4	$1,450	$5,800
DDWG Sorter/Conveyor	Digi PC/4 I/O Expansion Module w/ connector	1	$500	$500
DDWG Sorter/Conveyor	Digi Port Expansion Module (8 port)	1	$695	$695
DDWG Sorter/Conveyor	Digi PC/4 I/O Expansion Module w/ connector	1	$500	$500
DDWG Sorter/Conveyor	PLCDirect DL05 Mini PLC	2	$109	$218
DDWG Sorter/Conveyor	**DDWG SORTER/CONVEYOR TOTAL**			**$25,517**

1.2 **RECOMMENDATIONS:**

1. A POAM will be required for implementation of this site. The proposed schedule is based upon all necessary hardware and system software delivered upon a required timeframe. There are additional DSS hardware costs, MHE (i.e. scanners, scales, etc.) costs and communication requirements that have not been provided under this survey. They will need to be determined and added to the POAM. The sorter at DDWG is a very viable candidate for DSS/ECS. ECS is currently operating sorters at Norfolk (DDNV), New Cumberland (DDSP) and San Diego (DDDC) with total success.

2. CONVEYOR. This system is a very viable candidate for DSS/ECS. ECS is currently operating conveyor systems at San Diego (DDDC), Norfolk (DDNV) and New Cumberland (DDSP) with total success. There are additional DSS hardware costs, MHE costs and communication requirements that have not been provided under this survey. These costs will need to be determined and added to the site POAM for this project. The proposed schedule is based upon all necessary hardware and system software delivered upon a required timeframe. The conveyor system in Building 641 at DDWG was surveyed but this area would require that the existing overhead scanners be replaced with new more up to date equipment. Due to this DDWG felt that Building 641 should be considered separately for an upgrade.

3. Testing of the conveyor interfaces will require contractor support for the ACCUSort scanners to be switched to the ECS system and then back to the production environment.

4. DDWG Electronics maintenance personnel responsible for PLC maintenance will be required to handle the switching between the PLCDirect mini PLC and the ACCUSort scanner during testing.

APPENDIX K DDOO ECS SITE SURVEY

1.0 DDOO SITE SURVEY MARCH 1999

The purpose of the site survey was to determine if the Material Handling Equipment (MHE) at Oklahoma City is suitable for interfacing with the DSS Equipment Control System (ECS) and identify DSS processes that will be affected by the change. The ECS team comprised of representatives from DSDC, DDOO and DDC surveyed the Dimension And Weigh System (DAWS) Equipment and the package conveyor systems. The following is the results of the survey from a functional/technical perspective.

1.1 DAWS:

1.1.1 Current Process:

Oklahoma City (OC) uses the DSS/DAWS interface to AWOS for the offer process. The process starts when an operator wands in the control number to BN3U. BN3U in turn starts BN3V passing the control number. BN3V links to DAWS writing a record to a temporary storage queue containing the control number. CICS senses something is in this queue and starts DWRS. DWRS links to the DAWS hardware using a LU6.2 connection and requests the data that's just been read. DWRS writes the retrieved data to another queue, CICS posts a complete to a request id set up by DAWS. DAWS retrieves the data and passes it back to BN3V. BN3V determines if the material is freight or AWOS and generates the proper documentation. The operator attaches the labels and places a routing label on the material. If the material is to be processed by Power Ship the routing label is not placed on the material. The material is placed on a conveyor. A scanner reads the routing label and diverts the material to the proper truck run. If the scanner does not read the label correctly or does not read any label the material is diverted to a Power Ship station, where all discrepancies are resolved. Some freight is placed on the conveyor after DAWS and before the scanner, this material has been previously offered through the AWOS process. The format of the data sent from the DAWS scale is:

2 character package length in whole inches
2 character package width in whole inches
2 character package height in whole inches
5 character package weight in hundredths of a pound (XXX.XX)
1 character carriage return (CR)

1.1.2 **Current HW Configuration:**

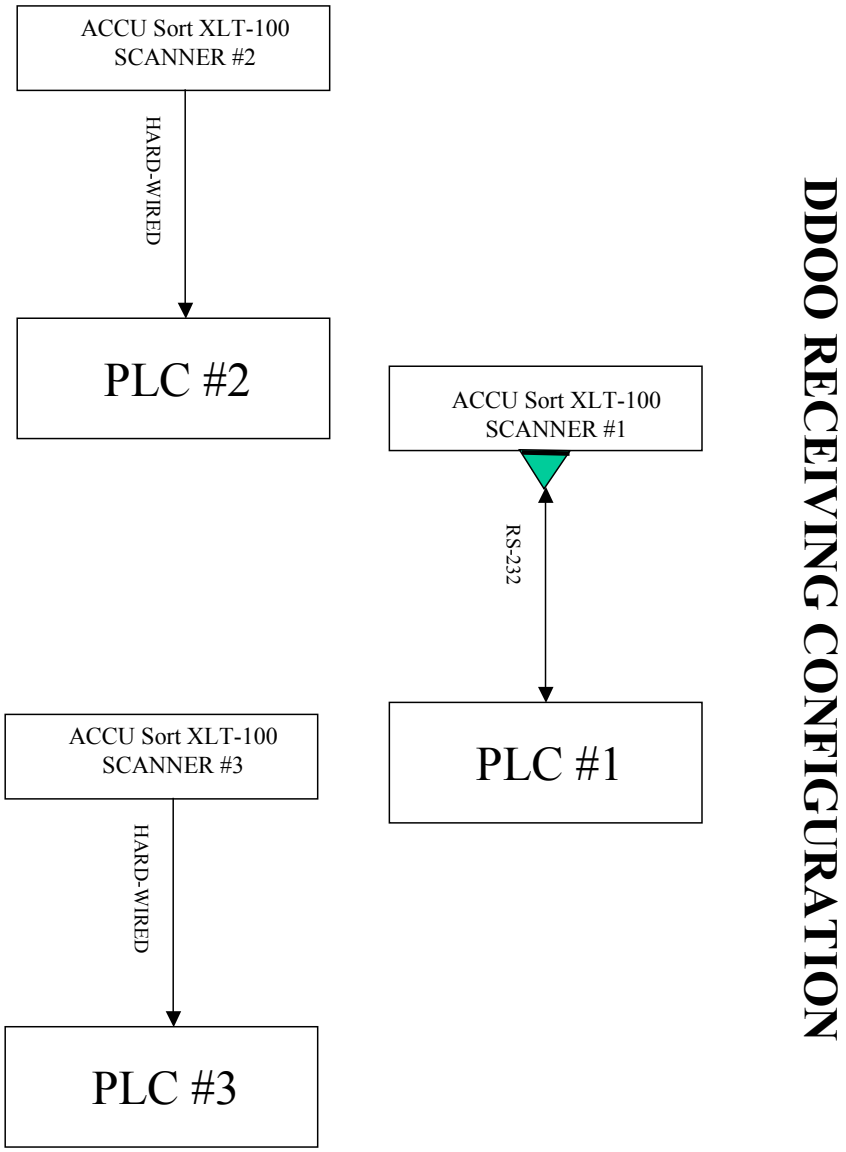

Figure K-1 DDOO Receiving Configuration

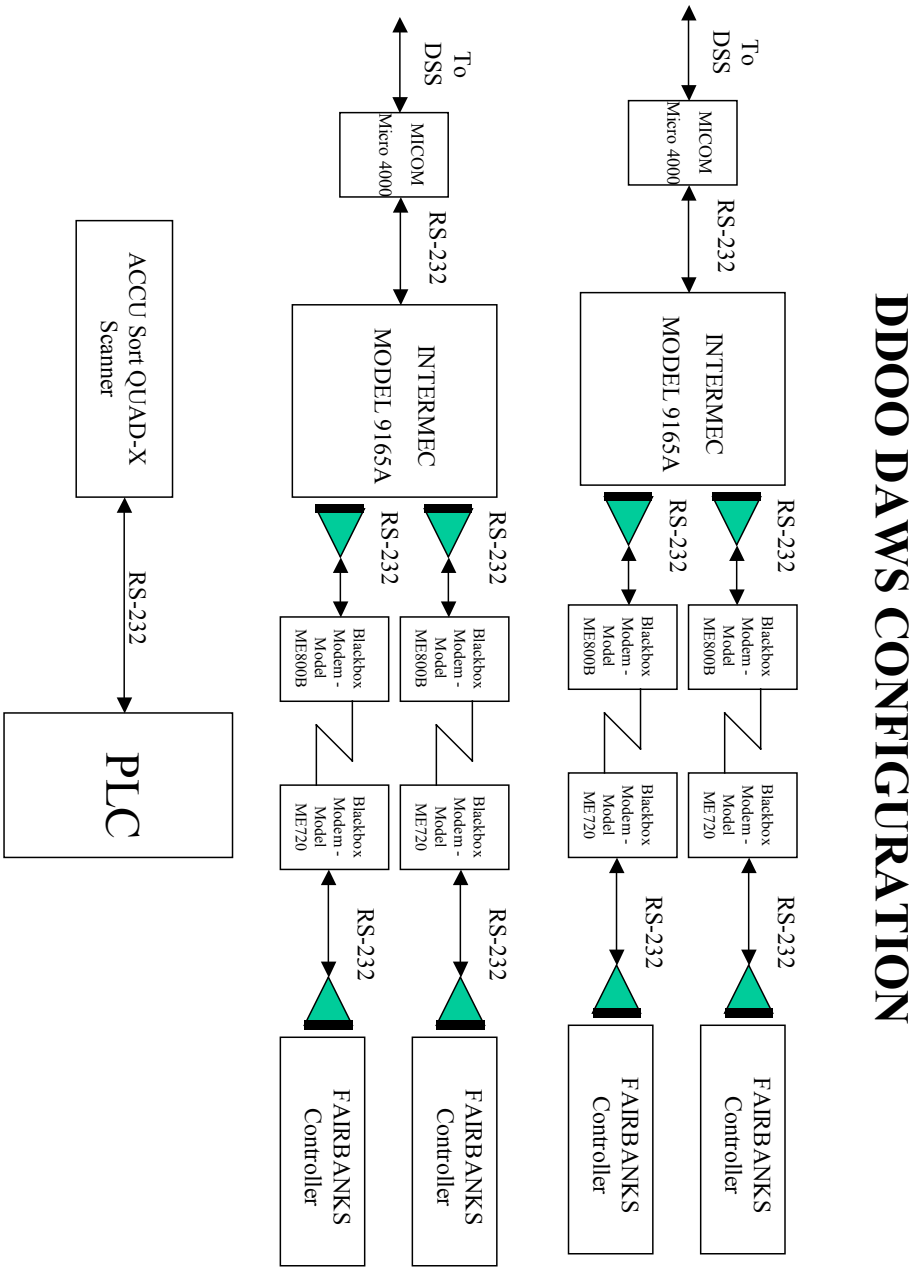

Figure K-2 DDOO DAWS Configuration

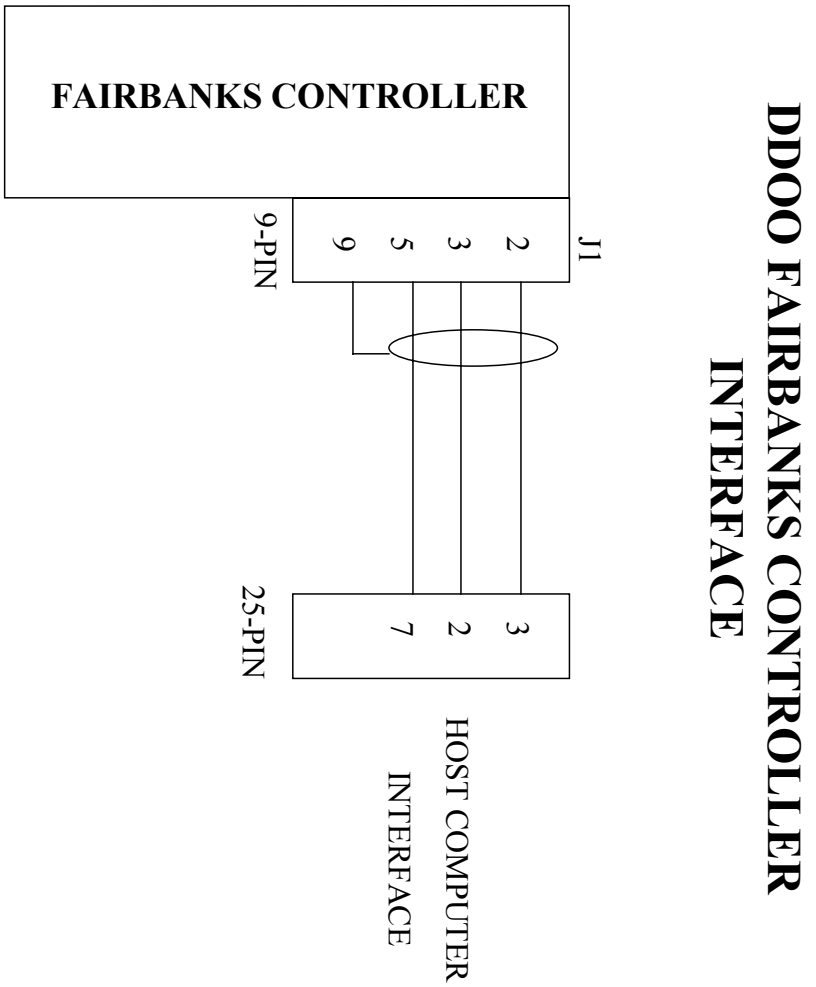

Figure K-3 DDOO Fairbanks Controller Interface

1.1.3 **DSS Changes:**

1.1.3.1 **ASSUMPTIONS:**

Changes will be processed against the DSS 7.3 baseline and retrofitted into the 8.0 baseline. A database would be present on the lower tier

1.1.3.2 **PROGRAM Changes:**

The lower tier will initiate a session with DSS, start the DAWS program and pass the control number, weight, and the dimensions of the material. The DAWS programs will start the B37V. All other changes are to generate SMMs.

1.1.3.3 **ESTIMATE:**

7.3 Baseline	Recompiles	0
	New Programs	120
	Program Changes	100
Total		220 hours

1.1.4 **ECS Changes:**

A standard AWOS subsystem is currently being developed for all AWOS sites. Overhead or handheld ECS scanners will be installed at the first current DSS station on each line in the DAWS room. The control number would be accepted by ECS directly. The weight and sizing information would be received by ECS from the Fairbanks equipment and sent to DSS via a M02 message. DSS would send an SMM to the conveyor subsystem to direct the material to its proper shipping lane.

1.2 **PACKAGE CONVEYORS:**

1.2.1 **Current Process:**

At DDOO there are three overhead scanners utilized in the receiving process to accommodate package routing within the facility. These scanners are either directly wired to a PLC or are communicating to the PLC via an RS-232 interface. The process uses preprinted labels to route material to the proper destination. The operators at the DSS workstations apply these labels to the material.

1.2.2 **Current HW Configuration:**

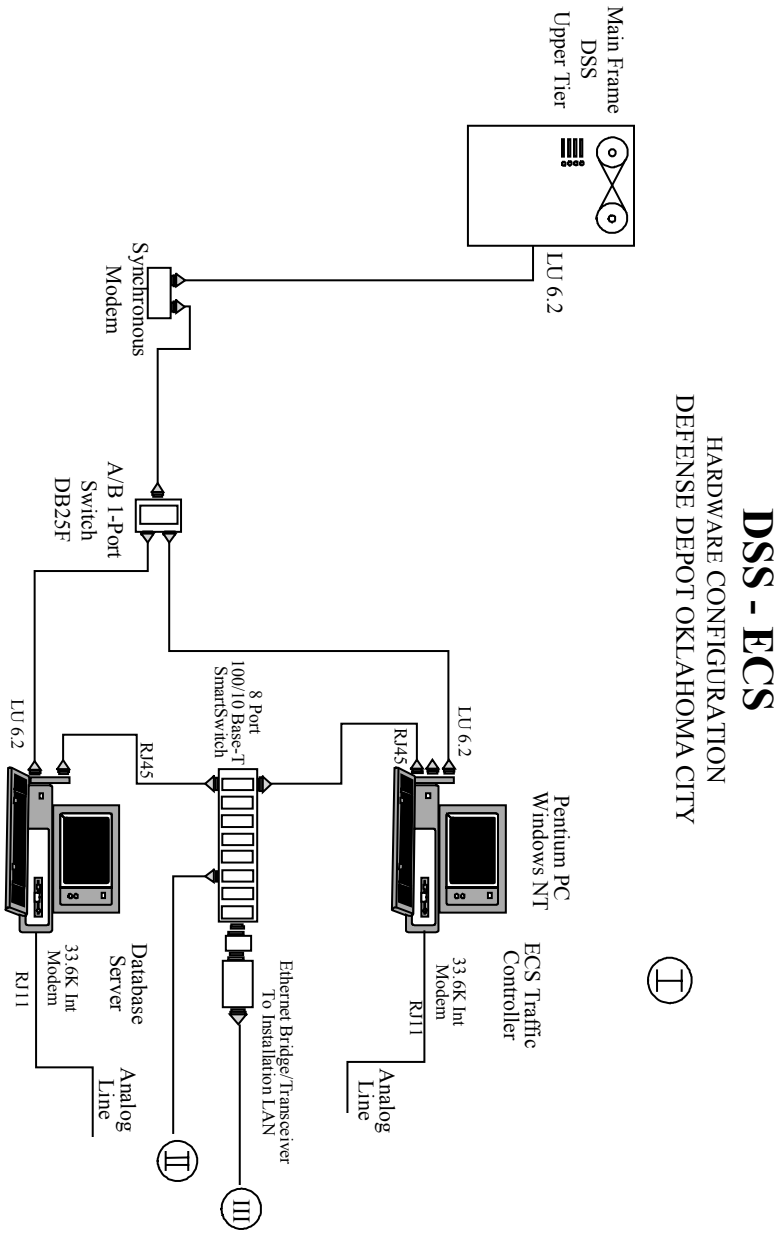

Figure K-4 DDOO DSS-ECS Hardware Configuration

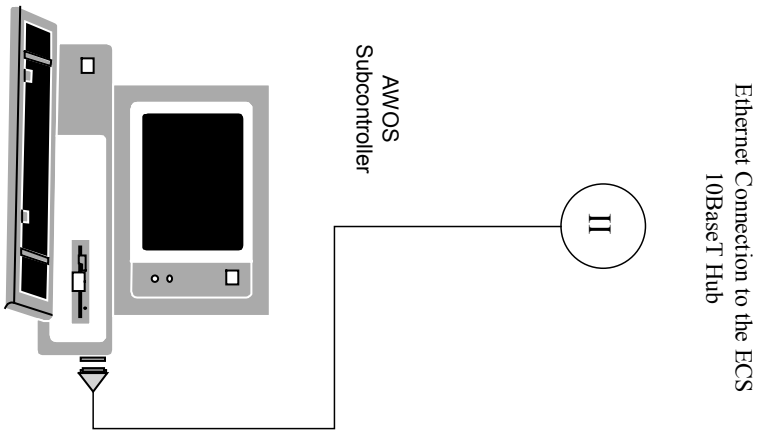

Figure K-5 DDOO DSS-ECS Hardware Configuration

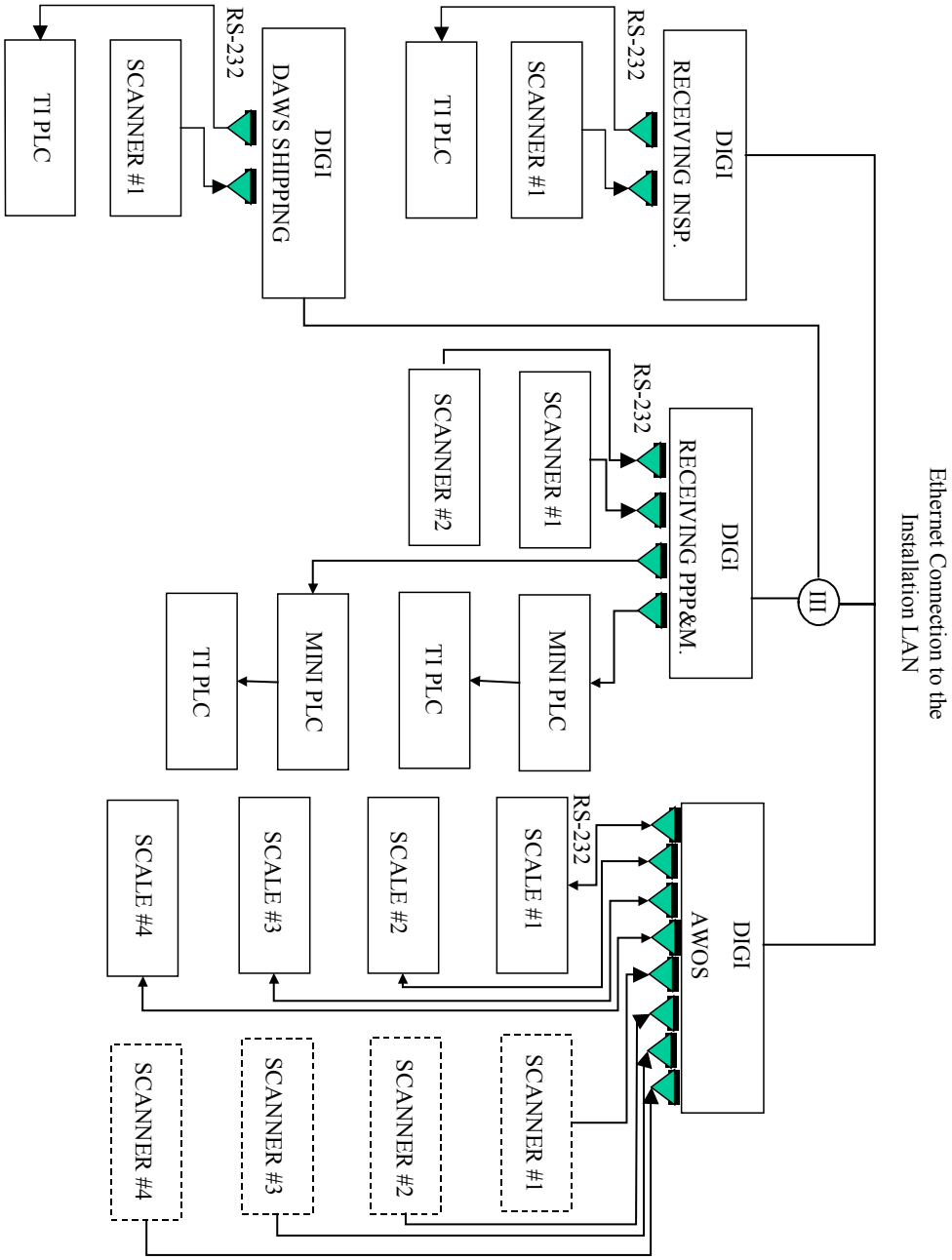

Figure K-6 DDOO DSS-ECS Hardware Configuration

1.2.3 **DSS Changes:**

1.2.3.1 **ASSUMPTIONS:**

Changes will be processed against the DSS 7.3 baseline and retrofitted into the 8.0 baseline. A database would be present on the lower tier

1.2.3.2 **PROGRAM Changes:**

All changes are to generate SMMs.

1.2.3.3 **ESTIMATE:**

1.2.3.3.1 **Receiving:**

7.3 Baseline	Recompiles	0
	New Programs	0
	RF Program Changes	40
Total		40 hours

1.2.3.3.2 **Picking & Packing:**

7.3 Baseline	Recompiles	0
	New Programs	0
	RF Program Changes	180
	Packing & Program Changes	20
Total		200 hours

1.2.4 **ECS Changes:**

A new ECS subsystem will be developed to interface with the scanners and PLC's controlling the Air Force package and tote conveyors. DSS will send SMM's to ECS as receipts, picks and packs are accomplished as it currently does at all sites. ECS will store that CN in its database. Once the Accusort scanners scan the control number, ECS will look up the CN to find its destination. It will cross reference the destination with one the PLC can understand. It will then send the understandable destination to the PLC. In two instances ECS will have to either actuate a diverter directly or the Accusort scanner will have to be modified to accept a message from ECS and actuate the diverter as it does today. This process must occur within 250 ms and testing must take place to verify it can be done with ECS. The Accusort scanners will have to modified to read 1189 barcodes.

1.3 **Proposed Schedule:**

To be provided at a later date.

1.4 TOTAL SYSTEM CONFIGURATION

1.5 ECS Equipment Requirements/Costs:

The following table represents an estimation of the ECS hardware/system software costs. Determination will need to be made on who will be providing funding for procurement.

	Description	Qty	Unit Price	Total Price
DDOO AWOS	Dell Poweredge 2300 Servers & Storage w/ Windows NT Server 4.0	2	$4,200	$8,400
DDOO AWOS	SNA Communications hardware & software	2	$1,300	$2,600
DDOO AWOS	Dell Dimension Workstation w/ Windows NT Workstation for ECS AWOS subcontroller	1	$2,209	$2,209
DDOO AWOS	Digi PortServer I (8 port)	2	$1,450	$2,900
DDOO AWOS	Digi PC/4 I/O Expansion Module w/ connector	1	$500	$500
DDOO AWOS	Oracle 8 for Windows NT w/ 5 user licenses	1	$3,500	$3,500
DDOO AWOS	Fast Personal MiniHub-5 Plus	1	$1,095	$1,095
DDOO AWOS	**DDOO AWOS TOTAL**			**$21,204**

DDOO Conveyor	Digi PortServer I (8 port)	2	$1,450	$2,900
DDOO Conveyor	Digi Port Expansion Module (8 port)	1	$695	$695
DDOO Conveyor	Digi PC/4 I/O Expansion Module w/ connector	1	$500	$500
DDOO Conveyor	PLCDirect DL05 Mini PLC	2	$109	$218
DDOO Conveyor	**DDOO CONVEYOR TOTAL**			**$4,313**
	DDOO AWOS + CONVEYOR TOTAL			**$25,517**

1.6 RECOMMENDATIONS:

1. AWOS. The ECS team is moving out on the AWOS standard development. A POAM will be required for implementation of each site. The proposed schedule is based upon all necessary hardware and system software delivered upon a required timeframe. There are additional DSS hardware costs, MHE (i.e. scanners, scales, etc.) costs and communication requirements that have not been provided under this survey. They will need to be determined and added to the POAM.

2. CONVEYOR. This system is a very viable candidate for DSS/ECS. ECS is currently operating conveyor systems at San Diego (DDDC), Norfolk (DDNV) and New Cumberland (DDSP) with total success. There are additional DSS hardware costs, MHE costs and communication requirements that have not been provided under this survey. These costs will need to be determined and added to the site POAM for this project. The proposed schedule is based upon all necessary hardware and system software delivered upon a required timeframe.

3. Testing of the conveyor interfaces will require contractor support for the ACCUSort scanners to be switched to the ECS system and then back to the production environment.

4. DDOO Electronics maintenance personnel responsible for PLC maintenance will be required to handle the switching between the PLCDirect mini PLC and the ACCUSort scanner during testing

APPENDIX L DDRT ECS SITE SURVEY

1.0 DDRT ECS SITE SURVEY; 15 – 16 November 2000

The purpose of the site survey was to determine if the Material Handling Equipment at Red River is a suitable candidate for interfacing with the DSS Equipment Control System (ECS) and identify DSS processes that will be affected by the change. The site survey team was comprised of representatives from DSIO, DDC, and DDRT. They surveyed the proposed Automated Weigh and Offer System (AWOS) area. They also surveyed the existing Towline, Pallet and Package Conveyor, and the Sortation System. The following is the results of the survey from a functional/technical perspective.

1.1 AWOS:

1.1.1 Current Process:

The current functionality of AWOS does not exist. A manual process captures control number and weight data and passes the information to the Small Parcel Carrier Selection Process. This process uses the data to determine carrier selection.

1.1.2 Current HW Configuration:

N/A

1.2 DSS Changes:

1.2.1 ASSUMPTIONS:

Changes will be processed against the DSS 8.0 baseline.

1.2.1.1 Program changes:

SPC1, SPC2, SPC5, SPC8, BN3V to generate SMMs. Changes to SPC8 and BN3V are technically not needed to support AWOS. Since several of the depots are migrating to a DAWS configuration and to maintain a standard system, it's logical that we change all the programs involved in the DAWS and AWOS processes at the same time. All the changes are minor (20 hours * 5 programs = 100 hours).

1.2.1.2 Program Testing:

Individual scenario preparation and testing three days. String scenario preparation and testing two days.

1.2.1.3 **Training preparation and Training:**

Estimate it would take three days to prepare the training outlines and two days to train.

1.2.1.4 **Table preparation:**

Estimate that once the training is complete, gathering the information and loading the proper tables would take two days.

1.2.2 **DSS Equipment Requirements:**

There are a total of eight workstations at the end of the conveyor lanes in the small parcel area. Each workstation will need a DSS PC with an Intermec and Kyocera printer. Associated costs are not provided with this survey. Richard Shumway from the DDC took an action on this requirement.

1.3 **ECS Changes:**

The standard AWOS subsystem will be utilized to interface with the new scanner and scale, and current PLC equipment at the site. Hours will be submitted for this effort. Reference SCR DSS-RT0-050 Development of AWOS at DDRT.

During the site survey it was determined that there was not a viable communication link from the existing conveyor PLC to establish message traffic with ECS. The site contacted their contractor making the seven digit changes to the tote controller. The contractor stated that with a modification request they would add modularity to the controller to accept a move message from an ECS AWOS subcontroller. A message format and interface requirement was provided by DSIO to the site for inclusion into the modification.

Contractor: Powerlink Technologies
Christopher D. Hornbecker
10505 Judicial Drive
Suite 204
Fairfax, VA 22030
703-277-9797 ext. 20

Message Format:

Message type	-	2 numeric characters
DSS Control Number	-	7 alphanumeric characters
Destination	-	3 numeric characters

1.4 **Open Issues:**

1. During the survey it was determined that the existing conveyor sweeper arm was not designed to handle material in a jiffy pack. The current configuration is set up to handle boxes, not envelopes or jiffy packs. Adjusting the pusher arms to support the envelopes will not work, since the envelopes will not have enough surface for the arm to push the envelope down the chute. The envelopes can be placed into totes, which will provide the needed surface for the pusher arms. New short totes could be purchased that were eight to ten inches high or the current depot totes could be utilized. Each tote offers an advantage. Currently, totes are being sent to the sorter, where the operator takes the material from the tote and places the material on the sorter. The tote is then placed on a take away conveyor, where it is staged and later returned to the bin storage areas. These totes can be used to forward jiffy packed material. This reuse of totes can be combined with the short totes or a stack of the full size totes can be stacked on the sorter platform. The tarring of the tote weight from the material is a problem since a decision needs made as to whether or not all material will be in a tote when it crosses the scale or will only some of the material be in a tote. If all the material is a standard tote, the scale could be set to tare the tote weight. Or, if a magnetic strip is placed on the tote, the totes weight could be selectively tarred from the material crossing the scale. The sweeper arm issue must be resolved prior to implementation. Three options are available:

   a. Place all items into totes going to shipping and modify ECS AWOS or the scale to automatically tare the tote weight. This option would be labor intensive.

   b. Find a new mechanical sweeper capable of handling both types of loads. This option could be expensive.

   c. Implement a tote identification process with the scale and bar code scanner. When a tote is identified have the scale or the ECS AWOS perform the tare.

2. The ergonomics of the shipping lanes needs to be worked out by the site prior to implementation. Currently, FED-EX employees handle all FED-EX material when it arrives at the shipping lanes. Under the ECS AWOS the material will need to have labels applied prior to hand off to the FED-EX employees. The site needs to decide if additional government employees will be placed in this area to print and apply the necessary labels. The DSS workstations must also be in place prior to implementation.

3. The site must modify their current contract with Powerlink to include the new message format and communication interface requirement.

1.5 **Estimate:**

ECS AWOS software modifications should not take more than 400 hours depending upon issue resolution.

1.6 **ECS Equipment Requirements:**

Reference SSDD: DDRT ECS Hardware Diagrams

1.7 **Proposed Schedule:**

According to DDRT, the MHE contract should be completed by the end of December. The current plan is to implement in the Jan – Feb timeframe. Actual dates will be determined during the meeting to establish a POAM.

1.8 **ADDITIONAL MHE:**

1.8.1 **Current Process:**

A towline was being utilized throughout the building. It is similar in construction to the one in existence at New Cumberland. The towline is being driven by pedestal mounted transterm 5 keypads. It is essentially a manual operation. Tote conveyor is also being utilized throughout the building. It is also similar in construction to the one in existence at New Cumberland and also is driven by transterm 5 keypads in a manual operation. The sortation system is being utilized in the packing area of the building. It is driven by an overhead scanner which interprets lane barcode labels. A transterm 5 keypad is in place on the induction platform for manual intervention. A pallet conveyor system is in place at receiving, shipping and P&P. Two pallet offloaders and one pallet loader are located in towline to pallet interface areas. These areas are also driven by transterm 5 keypads.

1.8.2 **Information Gathered:**

Building drawings. Barcode templates utilized by towline and tote keypads for movement.

1.8.3 **Current HW Configuration:**

Tote/Package Conveyor System:

- Allen-Bradley PLC 5/60
- IBM PC – GUI and system controller
- Computer Identics Omni Scanner
- TRANSTERM 5 Keypads (55)

Towline/Pallet Conveyor System:

- Allen-Bradley PLC 5/60
- TRANSTERM 5 Keypads (19)

1.9 **DSS Equipment Requirements:**

The DSS equipment requirements were not reviewed at this time.

1.10 **ECS Changes:**

It will be possible to interface with the tote subsystem when AWOS modifications are in place. Although it is suggested that this subsystem be automated at that time, the current AWOS schedule will not allow any time for this change. The sorter subsystem may be automated with either modification to the sorter controller similar to the AWOS changes or direct interface through the scanner. The site expressed interest in this only if they went to paperless processing. The pallet and towline subsystems are more problematic. In order to automate these areas at least one towline cart puck reader would have to be installed at the receiving pusher. Additionally PLC code must be modified to provide pallet arrivals at the stations and towline cart arrivals. The extent and expense of which is unknown at this time. It remains feasible to automate these areas.

1.11 **Open Issues:**

1. It must be decided if the site will go paperless and if so when the sortation subsystem will be implemented.

2. It must be decided if the entire tote conveyor and the pallet/towline will be automated and when the subsystem will be implemented.

1.12 **Estimate:**

ECS software modifications are estimated at 800 hours for tote conveyor and sortation subsystems. Towline and pallet conveyor modification estimates cannot be made until a course of action is chosen and additional analysis is conducted.

1.13 **Proposed Schedule:**

A proposed scheduled is not available at this time. It would be determined after the open issues have been completed and a new SCR for this work has been submitted and bid.

1.14 **RECOMMENDATIONS:**

1. The ECS AWOS will be implemented at DDRT based on SCR #DSS-RT0-050. The DDC needs to upgrade this SCR to emergency in order to meet the desired implementation timeframe. The DDC should prepare a POAM for the AWOS implementation at the site. The proposed schedule is based upon all necessary hardware and system software delivered upon a required timeframe. There are additional DSS hardware costs and communication requirements that have not been provided under this survey. They will need to be determined and procured for implementation prior to Environmental Testing (ET). DDRT needs to order modular furniture for the new ECS servers. The ECS equipment will be installed in Room 125 of Building 499.

2. The tote conveyor system is a very good candidate for incorporation under ECS. The ECS changes required are minimal and the potential benefits are high. It is recommended that DDRT give serious consideration to incorporating the tote conveyor controls under ECS after the AWOS implementation is complete.

3. The pallet conveyor and towline have a good potential for incorporation under ECS. These systems would require DDRT to make some operational changes in order for ECS to assume control of the MHE. DDRT would need to make the necessary management decisions on the operational changes required prior to DSIO giving a final assessment of the actions required to implement this MHE under ECS.

4. DSIO needs to prepare a Software Installation Plan (SIP) for the AWOS implementation.

2.0 DDRT SCOPE OF WORK

This scope of work will describe the changes required to the existing Powerlink MHE control logic at DDRT in support of the DSS seven digit control numbers and the ECS AWOS implementation. The changes will be implemented in two phases. Phase I will be the DSS seven digit control number change to the current functionality. Phase II will be for the changes required to implement the ECS AWOS at DDRT.

Phase I requirement: The current system will need to be modified to accept a seven digit DSS control number from the existing keypads located at the pack stations at the package sorter chutes. The existing functionality will remain the same.

Phase II requirement: The current system will need to be modified to accept a new message from the government supplied ECS. This message will be transmitted to the existing Powerlink controls system via the DDRT base LAN utilizing TCP/IP.

The new message will minimally contain the following data elements:

Message type – 2 numeric characters
DSS Control Number – 7 alphanumeric characters
Destination – 2 numeric characters

The new message will be utilized to replace the current keypad inputs of DSS control number and lane destination occurring at the pack stations located at the sorter package chutes.

The functionality of the new message will be the same as the current keypad entry process. It will be utilized by the Powerlink system to initiate package diverts in the shipping area when the DSS control number is scanned by the existing overhead scanner. It should be noted that the current functionality of the keypads should remain available after the above changes are incorporated.

2.1 DDRT Hardware Diagrams

Reference SSDD for DDRT Hardware Diagrams

APPENDIX M DDJC ECS SITE SURVEY

1.0 DDJC ECS SITE SURVEY 10 MAY 2001

The purpose of the site survey was to determine if the CCP Sorter in Building 30 at the Tracy site is suitable for interfacing with the DSS Equipment Control System (ECS) and identify DSS processes that will be affected by the change. The ECS team comprised of representatives from DSIO, DDJC and the DDC surveyed the CCP Sorter system. The following is the results of the survey from a functional/technical perspective.

1.1 CCP Sorter:

1.1.1 Current Process:

As stated in PCR 103699:

For each small parcel receipt DSS must now produce a CCP pack lane label to be applied by the operators, along with the CCP receipt control number label. This CCP pack lane label is now required for scanning by the tilt tray sorter induction scanner in order to dump the associated receipt at the correct CCP pack chute. It is estimated that it takes the CCP receiving operator an average of 10 seconds to retrieve and apply the CCP pack label to each associated small parcel CCP receipt.

The current process incorporates a scan on each tilt tray cart as it passes under the scanning device. If no load is detected a four question mark character (????) message is transmitted to the McCombs-Wall PC as a no read. When a valid pack lane destination label is read (C171) it is sent to the controlling McCombs-Wall PC for processing. Time interval between reads appears to be in the one-second timeframe. No header or trailer is transmitted with the four-digit message.

1.1.2 Proposed Process:

As stated in PCR 103699:

Provide ECS control to the new CCP tilt tray sorter located in building 30 at the Tracy worksite. To accommodate this requirement the DDJC copy of DSS must be made to generate Standard Movement Messages (SMMs) from the BN2K single line pack program for all collocated CPP picks; and from the E53C/E53V CCP non-bulk receipt program for all non-bulk CCP receipts.

1.1.3 DSS Changes:

There should be no code changes to DSS.

1.1.4 **ECS Changes:**

ECS will interface the CCP tilt tray sorter through the line connection from the McCombs-Wall controlling PC to the ACCUSORT ACCUVISION APC100 Scanner Decoder. ECS will receive a receipt completion SMM already generated by DSS and store that control number and CCP pack lane destination in an already existing database table (MOVE). When the ACCUSORT device scans the control number, ECS will intercept the seven-digit barcode look up the pack lane destination in the database and transmit the destination to the McCombs-Wall controlling PC for execution.

Due to the short time interval (1 second) between scans this subsystem may require a two-workstation set up. One PC would service the DSS transmitted SMMs for database storage similar to the New Cumberland CCP Sorter Subsystem process. A second workstation may be required to service a memory database for fast access and processing upon label scan.

1.1.5 **ECS Equipment Requirements/Costs:**

The following table represents an estimation of the ECS hardware/system software costs. Determination will need to be made on who will be providing funding for procurement.

Description	Qty	Unit Price	Total Price
Dell Dimension Workstation w/Windows NT	2	$2,209	$4,418
Digi PortServer I (8 port)	1	$1450	$1450
Digi PC/4 I/O Expansion Module w/ connector	1	$ 500	$ 500
RS232 Cable w/ connector	2	$ 100	$ 100
DDJC CCP SORTER TOTAL			**$6468**

APPENDIX N ACRONYMS

ABP	Allen-Bradley PLC's at Richmond
AFLSC	Air Force Laser Scanner Controller
AGV	Automated Guided Vehicle Subcontroller Software
AWOS	Automated Weigh and Offer System
CAR	Navy Carousel Controller
CAR01	Carousel Subcontroller Software
CSF	Consolidated Subsistence Facility
DAWS	Air Force Dimension and Weigh Systems
DDSC	Defense Distribution Systems Center
DLA	Defense Logistics Agency
DSDC	DLA Systems Design Center
DSS	Distribution Standard System
ECS	Equipment Control System
ECM01	Empty Cart Manager Subcontroller Software (New Cumberland)
GUI	Graphical User Interface
HKS	HK Systems
HKU	HK Utah Cranes
HPM	Hewlett-Packard Mini Computer (Mechanicsburg)
HPM01/02	Hewlett-Packard Subcontroller Software
KEY01/02	Keypad Subcontroller Software (New Cumberland)
LT	DSS-ECS Lower Tier
MHE	Material Handling Equipment
MSS	Mechanized Specification System
NMC	NISTARS Ministacker Controller
NMC01	NISTARS Ministacker Subcontroller Software
NLSC	NISTARS Laser Scanner Controller
NT	New Technology (Microsoft Windows)
NVT01	Norfolk Virginia Tote Conveyor Subcontroller Software
OO	Object-Oriented
PAL01	Pallet Subcontroller Software (New Cumberland)
PLC	Programmable Logic Controller
PTR	Production Trouble Report
SIP	Software Installation Plan
SMM	Standard Movement Message
SMN01	STACKMAN Subcontroller Software
SRT01	Sorter Subcontroller Software (New Cumberland)
STACKMAN	Pallet Storage Retrieval System at San Diego
SPS	Software Product Specification
STK01	Stacker (Hill) Subcontroller Software
SUM	Software User Manual
TOT01	Tote Subcontroller Software (New Cumberland)
TOW01/02	Towline Subcontroller Software (New Cumberland)
UPS	Uninterruptible Power Supply
UI	User Interface
UT	DSS-ECS Upper Tier

LIST OF EFFECTIVE PAGES
Operational Concept Description

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Date of issue for revision and changed pages is:

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PAGE NO.	REV. NO.	REASON FOR CHANGE
COVER	5/Change 0	Changed revision/change number and the date.
i-ii	5/Change 0	Updated TOC
Appendix J	5/Change 0	Added DDWG site survey data.
Appendix K	5/Change 0	Added DDOO site survey data.
Appendix L	5/Change 0	Added DDRT site survey data.
Appendix M	5/Change 0	Added DDJC site survey data.
Appendix N	5/Change 0	Updated Acronym listing.

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COVER	5/Change 1	Changed revision/change number and the date.
i-ii	5/Change 1	Updated TOC
C-5 & C-6	5/Change 1	Formatted paragraph lines for clarity.
D-5 & D-6	5/Change 1	Formatted paragraph lines for clarity.