CHAPTER 36

UNIFORM SAMMS INVENTORY MANAGEMENT SIMULATION MODEL

SECTION I - GENERAL

236101 - PURPOSE

To provide a general description of the simulation model and prescribe procedures and responsibilities in its use.

236102 - SCOPE

This model is applicable to each DSC and to the Directorate responsible for testing of inventory management policies used in SAMMS. The procedures in this chapter are based on those used in the SAMMS Requirements, Distribution, Procurement and Financial Subsystems.

NOTE 1: As of 31 October 1984, a new enhanced version of the front-end program and USIMS Main Simulation has been distributed to the Defense Supply Centers. While portions of the documentation in the applicable SAMMS Appendices have been superceded, other portions are still applicable to the enhanced model.

NOTE 2: A Users' Guide documenting the changes in the front-end program and the USIMS Main Simulation and providing additional explanatory documentation is available upon request from the DLA Operations Research and Economic Analysis Management Support Office, DLA-LO(DORO), in Richmond, VA. Telephone requests can be made to the USIMS System Coordinator, at AUTOVON 695-4961.

236103 - RESPONSIBILITIES

a. HQ DLA is responsible for:

(1) Development of specifications and initial programming of the SAMMS Inventory Management Simulation Model.

(2) Maintenance of specifications for changes to the model.

(3) Specifications of input data extractions to be used in the model.

(4) Programming future FORTRAN changes and modifications to the basic simulation model, using specifications furnished by HQ DLA.

b. DSCs are responsible for:

(1) Operational use of the model.

(2) Reporting to HQ DLA, ATTN: DLA-LO, any problems or discrepancies in use of the model.

(3) Recommending changes to the model.

(4) Providing a magnetic tape copy of the USIMS sample data on a quarterly basis.

(5) Providing a copy of the parameters used to run the model on a yearly basis.

(6) Providing a copy of the validation report on a quarterly basis (RCS DLA(Q)1902(L))).

236104 - REFERENCES

a. Appendix A-56, SAMMS and DIDS Output Routing Codes.

b. Appendix D-283, Sample Item Selection.

c. Appendix D-284, Sample Item Data Extraction/Validation.

d. Appendix D-285, Simulation Front-End Program.

e. Appendix D-286, SAMMS Inventory Management Simulation.

f. Appendix E-510 P, Uniform SAMMS Inventory Management Simulation (USIMS).

g. Appendix F-424, USIMS NSN Selection Summary Report.

h. Appendix F-425, USIMS Sample Item Dropped List.

i. Appendix F-426, USIMS Front-End Reports.

j. Appendix F-427, USIMS Input Parameters.

k. Appendix F-428, Summary Report Uniform SAMMS Simulation Results.

l. Appendix F-429, Uniform SAMMS Simulation Results Detail Report.

236105 - SIMULATION OVERVIEW

a. USIMS was designed to provide three management capabilities:

(1) To test various management options available in SAMMS.

(2) To test SAMMS procedures and management policies against various uncontrolled (environmental) changes.

(3) To serve as a base against which to test alternatives to SAMMS procedures and policies by changing portions of the Simulation Programs.

b. The Simulation is accomplished through three basic ADP applications:

(1) Sample data extraction (COBOL I and II).

(2) Format the data, perform sample size analysis, and provide reports (FORTRAN 1 Front-End).

(3) Accomplish the actual system simulation (FORTRAN 2).

c. The sample selection and data extraction programs are part of the DSC ADP Baseline Schedule. These programs are executed quarterly after the recurring demand forecast. The Formatting and Sample Analysis Program is executed on an as required basis. The output from this is the Simulation Data Record (SDR). Once the SDR has been developed it becomes the basis for actual simulation and may be used repeatedly.

d. Output from the Simulation Data Extraction Program may periodically be requested by HQ DLA so that studies requested by Headquarters elements may be conducted.

SECTION II - SAMPLE SELECTION (COBOL 1)

236201 - GENERAL

The Simulation has as its data base a statistical sample of the DSCs assigned NSNs. The sample is representative of all active NSNs managed by the DSC. The sample is based on the following Annual Demand Value (ADV) categories:

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     0 - $    400.00
   400.01 - $  4,500.00
 4,500.01 - $ 15,000.00
15,000.01 - $ 50,000.00
50,000.01 - $100,000.00
to greater than $100,000.00
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236202 - SAMPLE SIZE

Sample Size for each ADV category is based upon variations in demand frequencies and dollar demands of items. Selection is accomplished by the first USIMS Program. This selection is based on the ADV/NIIN Selection Card, DIC ZTH, appendix E-510 P. Based upon analysis of functional SAMMS reports, e.g., Fractionation Report, appendix F-41, the percentage of NSNs to be selected is determined. Based upon this percentage, the appropriate terminal NIIN digits for each of the six ADVs should be selected and input in the appropriate field position for each ADV.

236203 - SAMPLE RANDOMIZATION

The randomization of the item sample is assured since the NIIN is nonsignificant (see DLSC Catalog Manual MI-2, chapter 2, Item Identification, section 270). Once the sample size has been determined (see paragraph 236202) the appropriate terminal digits may be selected. For example, if three-tenths of one percent sample size was desired, the terminal digits 001-003 would be used for that ADV in the ADV/NIIN

Selection Card. All NSNs ending in 001, 002, or 003, for that ADV would be in the DSC Sample.

236204 - SAMPLE ITEM SELECTION PROGRAM OUTPUT

a. This program has four outputs.

(1) The USIMS NSN Selection Summary Report, appendix F-424.

(2) The USIMS FORTRAN Front-End Input Card, Format D.

(3) The Select NSN File.

(4) SSCS Request Card, DIC ZR9.

b. The USIMS NSN Selection Summary Report provides a stratified analysis of the sample items and is used to review the sample for adequacy.

c. The FORTRAN Front-End Card Format D is output on magnetic tape and may be converted to data entry transactions. These transactions are then used to delete items from the DSC sample by their reentry to the FORTRAN Front-End Program.

d. The Selected NSN File is in NSN sequence on magnetic tape and each Selected NSN record is in the same format as subparagraph c above. This file is input to the COBOL Data Extraction/Validation Program.

e. The SSCS Request Card may be used to request studies for detail review of sample items.

SECTION III - SAMPLE ITEM DATA EXTRACTION/VALIDATION PROGRAM (COBOL 2)

236301 - GENERAL

This program extracts data for each sample NSN from the following SAMMS files:

a. Supply Control File.

b. Monthend Asset File.

c. National Inventory Record File.

d. Due-In File.

e. Backorder File.

The data is validated and those items, which do not pass validation, are dropped from the sample.

236302 - DATA EXTRACTION

The following data elements are extracted for each NSN from the file indicated:

DATA ELEMENT		EXTRACT FROM
FSC		Fractionation Detail File
NIIN		Monthend Asset File
Date Mgmt Assumed		
Unit Price		
Supply Status Code		
Demand Value Code		
Total On-Hand Issuable Asset Qty		
Depot Backorder Qty		
Age of Item Indicator		Monthend Asset File
VIP Item Indicator		
Procurement Cycle Indicator		
Item Category Code		
Safety Level Code		
Norfolk FILL Qty		
Oakland FILL Qty		
Quarterly Forecast of Demand Qty		Supply Control File
Quarterly Forecast of Demand Qty (New)		
System Single Smoothed Qty		
System Double Smoothed Qty		
Numeric Stockage Objective Qty		
Quarterly Returns Forecast Qty		
Algebraic Sum of Forecast Error		
Mean Absolute Deviation Qty		
Additional Economic Retention Qty		
Minimum Procurement Qty		
Tracking Signal Correction Counter		
ALT Days		
PLT Days		
Procurement Cycle Months		
Fixed Safety Level Months		
Operating Level Months		
ANRDP		
Key Essential Item Code		
Forecast Basic Code		
OWRMRP		
OWRMR		
Quarterly Sum of Recurring Demands	1st Prev Qtr	
	2nd Prev Qtr	
	3rd Prev Qtr	
	4th Prev Qtr	

DATA ELEMENT		EXTRACT FROM
Quarterly Sum of Recurring Demand Freq	1st Prev Qtr 2nd Prev Qtr 3rd Prev Qtr 4th Prev Qtr	
Quarterly Sum of Nonrecurring Demands	1st Prev Qtr Qty 2nd Prev Qtr Qty 3rd Prev Qtr Qty 4th Prev Qtr Qty	
Qty Sum Nonrecurring Demand Freq	1st Prev Qtr 2nd Prev Qtr 3rd Prev Qtr 4th Prev Qtr	Supply Control File
Out-Of-Track Indicator		
Alpha Factor		
Weapon System Indicator		
MRQ		Monthend Asset File
Freq of Returns for Prev Yr		Supply Control File
%IPG 1		National Inventory Record File
%IPG 2		
UMMIPS Control Level 1 Qty		
UMMIPS Control Level 2 Qty		
Reserved		
Shelf-Life (Months)		Supply Control File
Peculiar Management Field		
Future SSC		
Catalog Change Code		
SL Quantity		
Returns Qty Previous Year		
Backorder Date Established		Backorder File or Due-In File for BV Backorders
Backorder Quantity		
Priority Code		
Backorder Advice Code		
Due-In Date Procurement		Due-In File
Due-In Quantity Procurement		
Due-In Type Code		
Due-In Condition Code		
Due-In Date Returns		
Due-In Quantity Returns		
Due-In Returns Credit Ind		

236303 - VALIDATION

The validation of the extracted data is outlined in appendix E-510 P. Those items which fail to pass validation are dropped from the sample

and listed on the USIMS Sample Item Dropped List, appendix F-425, part B. This list should be reviewed to ensure that the validation/dropping of sample items has not invalidated the sample representation.

236304 - OUTPUT

In addition to the Sample Item Dropped List, this program outputs the Edited Simulation Data File, and a summary report, appendix F-424. This file is on magnetic tape and is used as input to the FORTRAN Front-End Program.

SECTION IV - FORTRAN FRONT-END PROGRAM

236401 - GENERAL

This routine accepts the output tape created from the SAMMS files by the data extraction/validation routine. It permits subsampling, allows for various options to be exercised on the sample, provides a means for detailed analysis of the sample, and formats the data for input to the actual simulation routine.

236402 - INPUT TO FORTRAN FRONT-END PROGRAM

a. There are five basic inputs to this program. The formats are provided in USIMS FORTRAN Front-End Input Cards, DIC ZTH. These are:

(1) Percentage of Priority Group/Returns Factor Card.

(2) Execute Option Card(s) 1-14.

(3) FSG Delete Option Card.

(4) FSC Delete Card.

(5) NSN Deletion Card.

The processing routine is outlined in appendix D-285.

b. Percentage of Priority Group/Returns Factor: This card provides for the percentage of IPG I and II requisitions received by DSC for use in the demand generators. This data may be estimated from existing MILSTRIP reports, e.g., RCS DLA(M)96(O)MIN. The returns factor is to be input if DSC does not want to use the factor determined by DLA-LO. This factor is used to increase the number of returns received in the file to represent the number of FTEs received by the DSC. If the factor is acceptable, leave blank.

c. Execute Option Cards (1-14): These cards provide for the following options:

(1) Provides capability to delete either Weapons System items or Nonweapons System items.

(2) Provides for optional demand tape.

(3) Converts items above input ADV to be coded VIP.

(4) Converts items above input frequency to be coded as VIP.

(5) Deletes backorders on stocked items which have been held on backorder for over input days.

(6) Deletes delinquent dues-in which are over input days.

(7) Deletes overage returns based on input days.

(8) Deletes stock on items in excess of input days.

(9) Deletes overage direct delivery dues-out based on input days.

(10) Deletes items which have shelf-life months less than input months.

(11) Deletes either NSO or non-NSO items.

(12) Deletes items by FSG.

(13) Deletes items by FSC.

(14) Deletes items by NSN.

d. NSN Delete Option Card: This option is exercised by input of format C and is used in conjunction with format D.

e. NSN Delete Card: This card accompanies input of subparagraph d above. The NSN Delete Card is output from the Item Selection Program (see paragraph 236204c) (COBOL 1).

f. Detailed procedures for processing are provided in appendix E-510 P.

236403 - FORTRAN FRONT-END PROGRAM OUTPUT

The USIMS Front-End Report, appendix F-426, is output from this program. The composition of this report is:

a. List of Parameter Cards/Effects of Options. This provides a copy of the input to this program and the number of items and/or due-in/due-out/excess impact by the exercise of the 14 options (see paragraph 236401c).

b. Edited Sample Item Count/Annual Frequency of Demands.

c. Dues-In Procurement: Number/Dollar Value.

d. Dues-In Return: Number/Dollar Value.

e. Dues-Out Backordered: Number/Dollar Value.

f. Dues-Out Direct Delivery: Number/Dollar Value.

g. Required Sample Size based upon ADV for selected confidence and precision levels.

h. Required Sample Size based upon quantity demanded for selected confidence and precision levels.

i. Required Sample Size based upon frequency of demands for selected confidence and precision levels. (See appendix F-426 for detail format of this report.) This report provides for analysis of the finalized sample, which will be utilized in the main simulation. In addition to the reports, the Simulation Data File (SDF) will be output on magnetic tape. The SDF is input to the main simulation.

SECTION V - MAIN SIMULATION PROGRAM

236501 - GENERAL

The main simulation is a composite of several separate routines. Each major functional segment of the SAMMS Subsystems is represented in the simulation by one of the routines. There are, in addition, several routines, which are not specifically related to a SAMMS subsystem. These routines are used to control the operation of the simulation.

a. The operational control routines are:

(1) Main Routine (USIMS).

(2) START.

(3) Policy Table Change.

(4) Reports.

b. The routines which represent segments of SAMMS are:

(1) Forecast.

(2) Procurement.

(3) Due-In/Receipt.

(4) Backorder Release.

(5) Returns.

(6) Obligations.

236502 - MAIN SIMULATION ROUTINE

This routine controls the execution of the simulation. There are three major programming loops within the routine:

a. Policy Loop: This loop reads in the value of each policy table input with the Simulation Card Inputs.

b. Item Loop: This loop calls in each item in the sample individually. This item is then totally processed through the simulation for the time specified in the USIMS Parameter Card.

c. Timing Loop: This procedure establishes a calendar of events, scheduling an occurrence date for each event on the basis of the events frequency and priority. After each event occurs, its next occurrence date is calculated and scheduled on the calendar, and time is incremented to the next calendar date for which an event is scheduled.

d. The main routine contains both disposals and requisition processing. Requisitions are released in priority sequence after first checking backorders.

e. Finally, the main routine includes the random number generator. This is essentially the power residue method modified for System 360/370 equipment. Random numbers are used in determining quantities, dates, and other distributed phenomena.

236503 - START ROUTINE

This routine is called from the main simulation routine on day zero to read in item data and initiate the timing routine. Start is called for each item entering the simulation.

236504 - MANAGEMENT POLICY TABLE CHANGE

This routine provides for the changing of management policy table values within the duration of the simulation. These changes may be effected on a monthly basis. See appendix E-510 P.

236505 - REPORTS

There are several routines used to compute report data and print reports. See appendices F-428 and F-429.

236506 - FORECAST ROUTINE

Forecasts are computed monthly or quarterly, dependent upon the item. The mean absolute deviation is computed and tracking signal used as appropriate. Levels are computed for EOQ, UMMIPS Control levels, Safety levels, creditable levels, and retention limits. Returns are forecast. Since the stock reservation for priorities, i.e., control levels, may have changed, the backorder release routine, BOREL, is called into the program. The variable safety level is the DoDI timeweighted requisitions short model. Assets are checked against the reorder point to determine if procurement action is in order.

236507 - PROCUREMENT ROUTINE

This routine initiates procurement action whenever an item's assets are at or below the reorder point. The buy quantity is computed and adjusted according to the minimum buy quantity, maximum automatic buy,

and adjusted returns quantity; and a variable delivery date is generated.

236508 - DUE-IN RECEIPT ROUTINE

When a due-in arrives into the system, it is processed by DUEINX. A due-in may be from procurement; from customer returns, with credit, without credit; or it may be an automatic return or a late return. Statistics are collected for all types, and stock balances are updated. Backorders are released; however, they are merged by priority with any requisitions which may have arrived on that day.

236509 - BACKORDER RELEASE ROUTINE

This routine is called when stock levels or control levels change making stock available for release of backorders. Backorders are released in priority sequence.

236510 - SIMULATION INPUT-OUTPUT

a. There are two inputs to the simulation:

(1) The Simulation Data File (SDF) from the FORTRAN FRONT-END Program, containing sample item data.

(2) The Simulation Card inputs, including policy change cards and other parameter card inputs.

b. The three forms of output from the simulation are:

(1) USIMS Input Parameters, appendix F-427.

(2) Summary Report Uniform SAMMS Simulation Results, appendix F-428.

(3) Uniform SAMMS Simulation Results Detail Report, appendix F-429.