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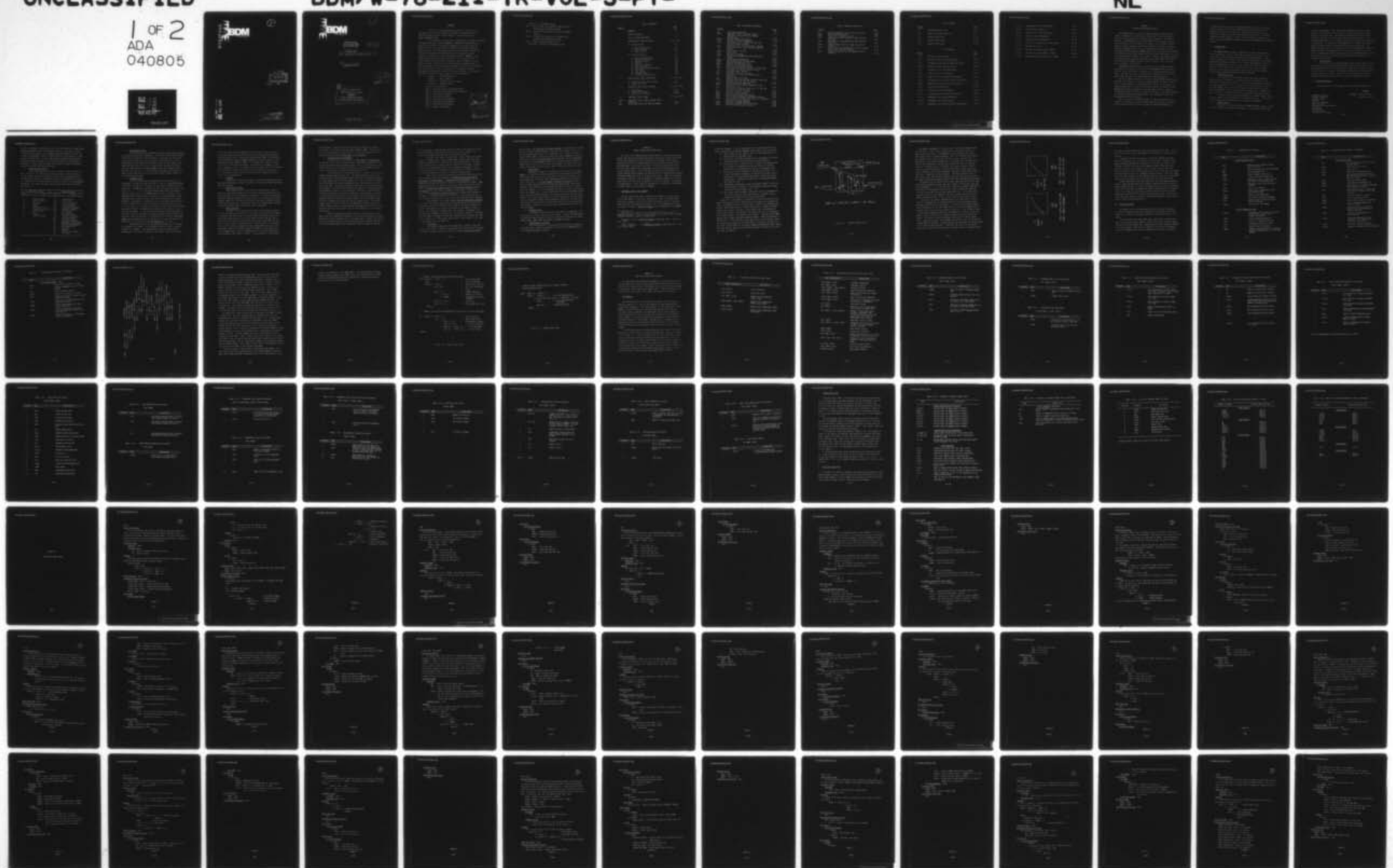

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FOREWORD

This Part of the MAWLOGS Module Catalog is submitted to the Department of the Army, Washington, D.C. 20310 by the BDM Corporation, 1920 Aline Avenue, Vienna, Virginia 22180, as required by Contract Number DAAG39-76-C-0134.

This document is one of sixteen that describes the Models of the US Army Worldwide Logistic System (MAWLOGS). MAWLOGS was developed for the Deputy Chief of Staff for Logistics, Department of the Army, under the monitorship of the US Army Logistics Evaluation Agency and the US Army Logistics Center. The development objective was to provide a capability to analyze and compare the performance of multifunctional logistic systems, to include both current and proposed systems. MAWLOGS is not a model of a particular Army logistic system. It is a system for the rapid assembly of discrete-event stochastic simulation models of a wide range of logistic systems and for the processing and interpretation of data associated with the execution of such models. The original documentation was completed in 1974. Documentation for subsequent software development has added five volumes to the original eleven. The documents describing the system and how to apply it are listed below.

- Volume I - General Description
- Volume II - User's Manual
- Volume IIA - Addendum to User's Manual
- Volume III - Module Catalog
  - Part 1 - Service Modules
  - Part 2 - Field Maintenance and Supply Modules
  - Part 3 - Wholesale Supply and Maintenance Modules
  - Part 4 - Transportation Modules
  - Part 5 - Communication Modules
  - Part 6 - Continuous Service Modules
  - Part 7 - Continuous Supply Modules
  - Part 8 - Containerization Modules
  - Part 9 - Model Change Modules

Volume IV - Programmer's Guide

Part 1 - Writing and Testing Modules, Module Library Maintenance and General Guidance

Part 2 - Technical Description of the Model Assembler Program

Part 3 - Technical Description of the Output Data Postprocessor System and Programs

Part 4 - Module Library Program Listings

Volume IVA - Addendum to Programmer's Guide

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CHAPTER I

INTRODUCTION TO MODULE CATALOG

The MAWLOGS System is a set of computer programs by which a large number of stochastic, discrete-event, computerized simulation models of logistic systems or portions of systems can be generated. The computer programs in the MAWLOGS System may be divided into four groups, each of which constitutes a basic element of the System. One, called the Module Library, contains programs that simulate logistic activities or perform simulation bookkeeping activities. A second group of programs, called the Model Assembler, generates MAWLOGS models by retrieving required modules from the Module Library and creating sufficient additional programs to link the selected modules together into a model. The other two groups constitute the Output Data Postprocessor System and the Automated Input Data System. An overview of the MAWLOGS System is given in Volume I and, in briefer form in Section I of Volume II.

The MAWLOGS Module Catalog is the directory to the Module Library. Its purpose is to describe to the user of the MAWLOGS System the modules that are in the library and the logistic or simulation function each performs. For logistic modules, such additional information as the level of detail, decision rules used, and statistics collected are given.

The User's Manual, Volume II of the four-volume MAWLOGS documentation, describes how to define a model to the Model Assembler in terms of modules, how to run the Assembler to produce the model, how to use the model, to include preparation of inputs for simulation control, and how to use the MAWLOGS Output Data Postprocessor to analyze model outputs. Volume IV, "Programmer's Guide," contains technical descriptions of the Model Assembler and the Output Data Postprocessor System. The Programmer's Guide also discussed the writing of modules.

Thus, the user of the Module Catalog is likely to be working from either of two directions. The more usual case will be that of the model writer using the User's Manuals as a guide and the Module Catalog as a reference from which to select modules appropriate for use in his model. The other case is that of the module writer who wishes to write new modules or modify existing ones. The module writer will be using the Programmer's Guide as his guide, and the technical details in the Module Catalog to determine what to modify in existing modules or what specific points must be accommodated to make any new modules compatible with existing modules.

A. CATALOG LAYOUT

The MAWLOGS Module Catalog is organized into Parts, each of which, with the exception of Part 1, describes the modules for a logistic functional area. Part 1 describes the simulation service modules. In the initial catalog, Part 2 covers field maintenance and supply, Part 3 covers wholesale maintenance and supply, Part 4 covers transporation, and Part 5 covers communications. A Part is organized into four major sections in addition to this introduction. Sections 4 and 5 describe the modules. Sections 2 and 3 present information common to large groups of modules under the headings MODULE FAMILIES and DATA STRUCTURE.

1. Module Descriptions

It is essential to distinguish between two types of modules -- those that may be referenced in a model description, called verbs, and those that may not, called routines. The catalog descriptions of verbs for a logistic functional area will be found in the fourth section of a Part, entitled "VERBS," the descriptions of supporting routines in the fifth, entitled "ROUTINES." Within each section the modules are in alphabetical order. Each Part contains an index to its verbs and supporting routines.

A module of either type is documented in a standard format, using a certain amount of phraseological and notational convention. The format and conventions are described further in subsequent paragraphs.

2. Module Families

The presence of a section called "MODULE FAMILIES" reflects recognition of the fact that modules are designed in groups along certain lines chosen by the designer. Thus, the designer chooses the scope and level of detail with which he will cover a set of logistic activities, to what degree he will "modularize" the coverage, which options he will provide, the data structures he will use, and a variety of other details in the programming approach. He will base his work on one or more major assumptions and objectives. A knowledge of the background and viewpoint underlying a group of related modules can greatly facilitate their proper use. The MODULE FAMILIES section is intended to provide this background and overview. Examples of nodes or subnodes in which the verbs of a family are used in their intended patterns should also be sought in the MODULE FAMILIES sections. The types of statistics collected in a module family are tabulated all together in this section.

3. Data Structure

The section called "DATA STRUCTURES" contains descriptions of the organization of the data storage areas that support a module family. The description consists of the names of common blocks and, for each, the names and definitions of variables. Highlights and key points of the data structure are described. Normally there will be a major section to describe permanent attributes and a lesser one to describe temporary attributes.

B. CATALOG CONVENTIONS

A verb description in the catalog follows the outline shown below.

VERBNAME

simple
nonsimple /function/family

month/year written

VERBNAME (arguments)
General Description
Assembler Inputs
Examples
Statistics Collected
GASP Files Used
Permanent Attributes Accessed
Verb Inputs
Verb Outputs
Programs Called
Input/Output Files Used

Supporting routines are described in a similar format with the inapplicable headings "Parameter Slots" and "Examples" omitted. Note that a listing of the computer program is not included; these are available in Part 4 of Volume IV, Programmer's Guide. Further discussion of the content of each section of the outline, to include particular notational or descriptive conventions used, are given next. The sections progress from general to detailed. For most verbs, the model writer should not have to go beyond the section called "Statistics Collected."

1. Upper Righthand Corner

Here a coded summary of the verb is given in two lines under its name. The first line identifies the verb as simple, S, or nonsimple, N. It also gives a code for the logistic or other function represented and, following this, a code for the module family it is considered to be a part of. Values for the function and family codes are given in the accompanying tabulation. The second line under the verb name gives the month and year when written.

Functional areas		Module families	
Code	Area	Code	Family
C	communications	C1	communications
LS	logistic service	CH	change logic
M	maintenance	CS	continuous service
R	rebuild	LS1	logistic service
S	supply	M1	field maintenance
SS	simulation service	M2	wholesale maintenance
ST	statistics collection	PDS	permanent datasets
T	transporation	R1	field rebuild
U	user	S1	field supply
V	salvage	S2	wholesale supply
X	direct exchange	S3	revised field supply
		S4	continuous supply
		SS1	simulation service
		ST1	statistics collection
		T1	aggregate transportation
		T2	detailed transportation
		T3	containerization
		U1	fleet user
		V1	salvage
		X1	field direct exchange
		X2	revised DX

2. General Description

This section contains a general discussion of what the verb does, to include any significant mathematics. The flow of control when execution of the verb is completed is also described. The phrases "to the calling program" and "to the time file" are used for the flow of control when, respectively, a CALL RETLOG returns control to the previous stage of the logic flow that led to the verb, or a CALL ZFADE interrupts the present flow and returns control to program MAWGSP, which then removes the next event from the time file. For modules which read cards, write reports, or read or write other external files, the card formats, report formats, or file formats are described.

3. Assembler Inputs

Here the information to be specified for the verb when it is referenced in a model description written for input to the Model Assembler is defined. Two types of information are identified, arguments and parameter slots. Arguments are variables for which values are specified in the form "P = i, j, ..." i.e., they are variables whose names will appear as arguments of the verb in its FORTRAN subroutine form. Parameter slots, abbreviated "PS," are places in the logic of a verb where access to node references and the logic of other verbs may be provided for by the Model Assembler. The content of a parameter slot is described in general terms. It will be recalled from the User's Manual that a PS need not be filled. If it is filled, it is incumbent on the user to insure that the verbs chosen as content of the PS are compatible with each other and with the verb in whose PS they appear. In particular, this means that the verbs chosen for the PS must not only represent the general functional content required, but that their inputs as described in the section of this outline called Verb Inputs must be compatible with the outputs of the using verb described in the section of this outline called Verb Outputs and vice versa.

Some parameter slots are for sending something out -- a message or a shipment, for example. Such a parameter slot will often be marked "D-delay" or "R-delay." These designations represent cases in which, respectively, (a) control is expected to be given to the time file after the arrival event has been scheduled, and (b) control is to be returned to the verb containing the PS after the arrival event has been scheduled. The prototypical verbs of these types are DELAY and RTURN. The corresponding communications verbs are COMMD and COMMR, and the corresponding transportation verbs are TRAND and TRANR. An important point to note is that in the case of a PS marked "R-delay," the presence of a RTURN or similar verb is mandatory, even if the delay time is to be zero, while in a "D-delay" PS, the DELAY or similar verb may be omitted if the delay is to be zero or if some other disposition of the entity normally thought of as being "sent" is to be provided for.

4. Examples

Examples of how the verb is used in portions of model descriptions are shown or described. Certain limitations or options are often highlighted under this heading.

5. Statistics Collected

The variables on which statistics are collected are listed in terms of a descriptive phrase and, for variables observed through calls to STATI, the names of the variables and common blocks in which the statistics indicator codes and indexes are stored. However, the statistics type code, resource identifier, and node code by which a statistics variable is identified are not given here; they must be sought in the Module Family section of the Part of the catalog in which the verb is described.

6. GASP Files Used

The GASP files accessed by the module are identified, primarily in terms of a general description of the content of the file and the names of variables and common areas in which the GASP file numbers are stored. The indirect identification of the file number reflects the fact that in general the file numbers are assigned to a particular queue when the first entry is to be filed or when the logistic functional area is initialized. Thus, the file number assignments will vary among models and runs of the same model. When a file number is stored in PERMAT in an attribute set of type QUEUE(fcntyp), the form "QUEUE(fcntyp).n" is used to identify the location where a file number is stored. In this notation n is the index of the element in the attribute set that contains the GASP file number and "fcntyp" is a function type code such as MNOD or SNOD. The attributes of a file entry and the ranking scheme for a file are defined under the module description headings Verb Inputs and Verb Outputs.

7. Permanent Attributes Accessed

This and the next two headings -- Verb Inputs and Verb Outputs -- are related in that they all deal with data transmission among modules and between modules and the data storage areas. Thus, an initial point is that they all deal with internal data transmission as distinguished from card inputs or other input or output involving external files.

In discussing this internal data flow, it is useful to distinguish between permanent and temporary data. The phrase "permanent data" refers to data stored in locations whose variable names and the system characteristics they represent are fixed throughout a run. All of the data in PERMAT, in other permanent attribute storage areas, and in the statistics counters are of this type. The phrases "temporary data" refers to all data that are not permanent. It includes such things as the content of array POOL through which PERMAT attribute sets are transmitted, the content of arrays ATRIB and HOLD through which attributes of temporary entities stored in the GASP filing array are transmitted, and the variables IQ, KRA, and KRB, used to designate GASP file numbers and ranking schemes. Utility variables IZSWT and ZSWT in /ZMAWSY/ are also often used for temporary data. The dynamic storage areas in which the GASP files and MAWLOGS stacks are stored also contain temporary data, but these areas are accessed directly only by a few simulation service routines and so are not often referred to in the module descriptions.

The term "permanent attributes" refers to those elements of permanent data that characterize aspects of the logistic system being simulated. Examples are policy parameters such as a reorder point, resource characteristics such as the price of an item, and the capacity and response characteristics of such system elements as transporation links or materiel handling and storage points. Data such as statistics counters and statistics indicators and indexes, or the GASP file descriptors stored in /GSPFIL/ are examples of permanent data that are not permanent attributes.

Two other terms remain to be defined: "module inputs" and "module outputs." A module input is any variable whose value (a) was determined outside the module and (b) influences the logical path taken in the module or the amount by which a module output variable will be changed. A module output is any variable whose value may be changed by the module. Inputs and outputs may be either permanent or temporary data. Further discussion of inputs and outputs may be found in the next two subsections.

Here, it will suffice to summarize the overall conventions governing the content of the three sections: Permanent Attributes Accessed, Verb Inputs, and Verb Outputs. Permanent Attributes Accessed lists all permanent attributes retrieved by, stored by, or modified by a module. Verb Inputs does not list all inputs; it lists only inputs that are not listed under the Permanent Attributes Accessed and Statistics Collected headings. Verb Outputs lists all outputs, temporary and permanent, including any entries under Permanent Attributes Accessed whose values may be changed by the module. The objective here is to minimize the multiple mention of a variable while retaining the utility of the three headings under discussion.

The purpose of the present heading, Permanent Attributes Accessed, is to list in one place those principle variables, by which the status of the logistic system is represented in the model, that have interplay in a module. From the point of view of the student of the logistic system, it is just this aspect of the module that is of interest. An element of an attribute set in PERMAT is referenced in the following notation -- FUNC(arg).m, where FUNC is a PERMAT function name representing an attribute set type, such as SICOM, arg is the argument type, such as "item," and m is the index of the element in the attribute set.

8. Verb Inputs

The data described under this heading are a subset of the total internal verb inputs. Categories not described are the statistics indicators and indexes implied by the entries under the heading Statistics Collected and any inputs under Permanent Attributes Accessed. Inputs that are listed include primarily temporary data. A major type of temporary input is the set of attributes associated with a temporary entity, usually received in arrays ATRIB or HOLD. Inputs are listed under major subheadings indicating their source, such as Calling Program, PS1 (parameter slot 1), Verb DISTR. The purpose of the Verb Inputs section is to facilitate determination of whether the verb will fit in a particular parameter slot and to facilitate the writing of new verbs which may be used in conjunction with this verb.

9. Verb Outputs

The general purpose of this section is similar to that for Verb Inputs -- to facilitate determining whether one verb meshes with another and to facilitate the writing of new verbs that mesh with existing verbs. The outputs are listed under major subheadngs representing their destination -- PS1, PS2, ..., Calling Program, Permanent Attributes, and any other suitable headings such as the names of subroutines or verbs called directly. Only variables the module was designed to affect are listed. Thus, for example, if a set of temporary attributes is input to the module and is not changed by it, they are available for use by a subsequent module and in this sense may be thought of as having been "output" by the current module. But if the current module will never change any of the attributes and is not naturally thought of as "producing" an event of the type represented by the input attributes, these attributes will not be listed under Verb Outputs. The same is true of any other temporary data that are input but not changed.

10. Programs Called

Any programs called directly by the module are named here, with the exception of a few whose use is very common. These are CALLOG, RETLOG, and LINK for stack accessing; STAT1 for statistics collection; and FPOOL, GPOOL, PPOOL, CHPMT, PRMT, and SETPMT for PERMAT accessing.

11. Input/Output Files Used

The files referred to here are external files as distinguished from GASP files. They are identified in terms of their FORTRAN logical file numbers and general contents.

CHAPTER II
SUPPLY MODULE FAMILY DESCRIPTION

This part of the MAWLOGS Module Catalog describes the continuous supply modules that have been developed and used in conjunction with the continuous flow service modules described in Part 6 of this catalog. These supply modules can be used to represent both army-in-the-field supply activities and CONUS depot or wholesale activities. This module family differs from the Field Supply Module Family described in Part 2 of the Module Catalog[1] in the level of detail at which the supply activities are simulated. The original MAWLOGS supply modules were discrete-event in nature and represented individual demands for items on an item by item basis. These new continuous flow modules consider a rate of demand for a specified amount of a class of supply and a rate of receipt of materiel in a class of supply. This method of representation is very useful in representing a system with a large number of supply items or a large number of demands.

A. CONTINUOUS SUPPLY CLASS CONCEPT

The new supply logic makes it possible to simulate a logistic system with a large number of items and a high activity level in a single model. This logic is based on the idea of simulating complex systems in terms of rates and levels of aggregated resources. This is the approach described by Forrester in 1961 in Industrial Dynamics[2] and implemented in the DYNAMO[3]

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[1] Markham, H.A., Models of the US Army Worldwide Logistics System (MAWLOGS), Volume III, Part 2, Field Maintenance and Supply Modules, General Research Corporation, OAD-CR-41, August 1974.

[2] Forrester, Jay W., Industrial Dynamics, Cambridge, Mass.: The M.I.T. Press, 1961

[3] Pugh, Alexander L., III, DYNAMO User's Manual, Cambridge, Mass.: The M.I.T. Press, 1963.

simulation language. It may be contrasted with the item and transaction detail simulated by the previous MAWLOGS[1] supply module family as follows:

(1) Supply operations are viewed in terms of large aggregations of items instead of individual items

(2) The flows of information and materiel are regarded as continuous streams instead of discrete requisitions and shipments

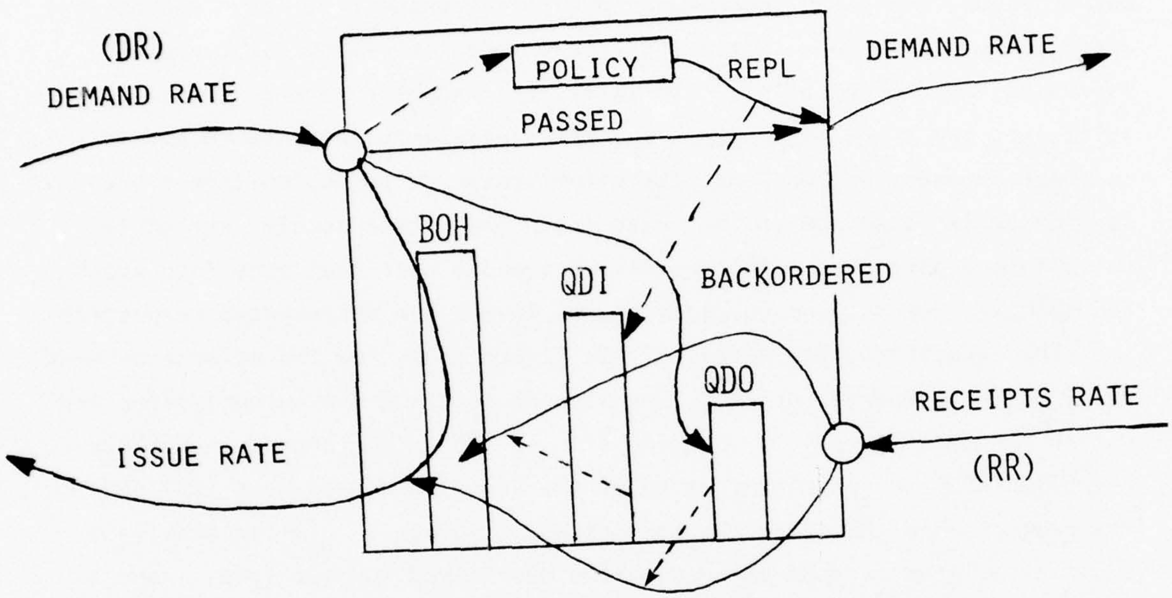
(3) The current rates of materiel flow in response to a demand flow are considered to depend on the current levels of inventory, materiel due in, and materiel due out for the aggregate items

(4) The current levels of materiel in storage and in transit are in turn considered to depend on the current flow rates, some of which tend to increase a particular level, some of which tend to decrease it, instead of on the effect of individual demands and issues by item

(5) Simulation time advances in even steps whose length is set as an input parameter, instead of in the randomly sized steps characteristic of discrete-event models, and

(6) All system status variables (rates and levels) are updated every time step, instead of selecting updating by randomly spaced "events" characteristic of discrete-event models.

Figure II-1 is an attempt to illustrate in rate/level terms the simulation of the activities of a supply point with respect to a category of items. The supply point has two input rates - demands from customers and receipts from higher echelons - and two output rates - demands to higher echelons and issues to customers. All of these flows are expressed in weight units per day. The status of the supplies for this item category at the supply point is represented by three levels - balance on hand (BOH), Quantity due in (QDI), and quantity due out (QDO). These are expressed in weight units. The performance of the supply point would be further characterized by policy parameters or by the results of applying the policy to the items in the category at the node as demand accommodation (DACC), demand fill rate (DFILL), and the rate at which backorders (due outs) are filled from receipts (BOFILL).



$$\Delta BOH = \Delta T * DACC [RR * (1\text{-}BOFILL) - DR * DFILL]$$

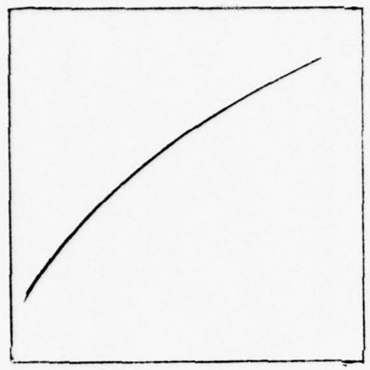
Figure II-1. Aggregated Supply Logic

The demand accommodation is used to split the incoming demand stream into two parts - a part that is fringe to the stockage list and so is passed, and a part that is "accommodated" by the stockage list, against which there exists a stockage objective. DFILL of the damand that matches the stockage list is satisfied by issuing from stock, the remainder is backordered. The perceived demand rate for stockage list items eventually affects the replenishment ordering rate through the effect of reducing stocks to the reorder point. Similarly, the incoming receipt stream is split into two principal parts - one that represents response to passed customer demands, and one that represents response to replenishment orders. The former is passed on to the customers. The latter receipt stream is split into a part that satisfies due-outs and a part that goes into stock. The quantity due out and quantity due in levels are decremented respectively.

The equation at the bottom of the figure shows how the balance on hand level would be updated at each time step in terms of the current rates and policy parameters. Δ T is the time step, Δ BOH is the change in BOH due to the effects of the pertinent parts of the incoming demand rate (DR) and the receipt rate (RR) over the most recent time step. Similar equations could be written to show changes in the due-in and due-out levels, and to update the outgoing rates in terms of the incoming rates and the levels.

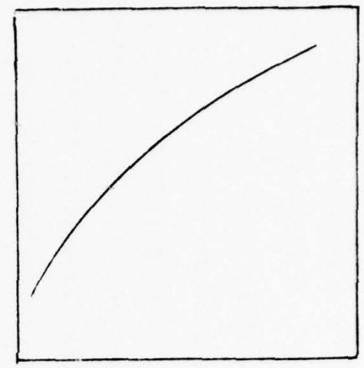
Crucial to a successful representation of the supply point in these terms is a knowledge of the relation between the splitting factors DFILL and BOFILL and the stock status levels. Of course they ultimately depend on the interaction of the item supply policies with the item demand rates. Examples of two fill curves are shown in Figure II-2. Fill curves are used to represent the aggregate behavior for categories of items in a realistic manner, rather than the "all or nothing" behavior of most step function models. The curve on the left indicates what percent of the ASL demand into a supply point can be filled based on the actual stock on hand and the average quantity demanded. As would be expected the percent filled diminishes as the stock on hand diminishes. Similarly, the percent of the receipt rate which is used to fill due outs at the supply points is determined from

% DEMAND FILL



ASOH / QDMD

% RECEIPT FILL OF DUE OUTS



ADOL / ADIL

ASOH - ACTUAL STOCK ON HAND
QDMD - QUANTITY DEMANDED

ADOL - ACTUAL DUE OUT LEVEL
ADIL - ACTUAL DUE IN LEVEL

Figure II-2. Supply Performance Relations the ratio of the actual due outs level to the actual due in level. If this ratio is small then a small percentage of the receipts is used to satisfy due outs.

In general, the flow of materiel is represented between the supply nodes in a model for a class of supply in a full circle. Demands are generated and passed through the system until filled and then receipts are followed as receipt rates back to the demanding node. Alternate return paths are also set up as subloops in the circular path from alternate sources of supply. Each of the classes and priority of materiel at a demand generation node will have this complete linkage structure. Thus, the number of classes and priorities is the determining factor in the size of the model, rather than the activity level in an item based, discrete event model.

Certain alternations from the single class path from demand generation node to source and back again can be made to represent the activities at a node in greater detail. A single class flow rate can be split into multiple classes at a given node to represent different inventory levels or response times. This process utilizes class splitting factors that specify what percentage of the flow will be sent into each separate path. The receipt rates from these multiple classes are then merged together to determine the receipt rate for the original class.

B. SUPPLY ACTIVITIES

The modules in the Continuous Supply Family represent the general activities of demand processing, forecasting, replenishment, and receipt processing. Table II-1 describes the modules currently available in the family.

Several varieties of supply nodes may be described with the current family of continuous supply modules. Figure II-3 shows a standard supply node which receives demands from a demand generator node and passes demands to a higher echelon. Note that this node uses the utility verb RLOOP to loop on all EXRAT datasets for this node which are primed by the module

TABLE II-1. CONTINUOUS SUPPLY MODULES

NAME	DESCRIPTION
	DEMAND PROCESSING VERBS
ACSUP	NONSIMPLE VERB TO HANDLE ACCOUNT SUPPLY ACTIVITIES
CBOP	DERIVE BACKORDER RATE AND PASS DEMAND
CBO	DERIVE BACKORDER RATE
CDMDS	PROCESS DEMANDS FOR SUPPLIES
CICPD	ICP AND CONUS DEPOT PROCESSING
CISSU	CONTINUOUS ISSUE - CONVERTS IFS AND IABO RATES TO RETURN FLOW RATES
CISUI	CONTINUOUS ISSUE TO AN INDIVIDUAL CUSTOMER
CPALL	PASS ALL ASL DEMANDS
CPASI	UPDATE PASSED DEMAND RATE FOR AN INDIVIDUAL ACCOUNT
CPASS	UPDATE PASSED DEMAND RATE
CPNBO	PASS DEMAND AND DO NOT BACKORDER
CSUP	MAINTAIN STOCK STATUS AND CONTROL SUPPLY PROCESSING
PASSL	PASS UNFILLED LOSS DEMAND
	RECEIPT PROCESSING VERBS
CDIVR	CONTINUOUS SUPPLY DIVERSION, DIVERTS A PORTION OF A RECEIPT FLOW TO ANOTHER DESTINATION
CRCPT	PROCESS CONTINUOUS RECEIPTS
CRTI	RECEIPT OF CONTINUOUS TURN-INS
CSTI	CONTINUOUS TURN-INS OF STOCKS
CTI	PROCESS TURN-INS RECEIVED
DUPDI	GENERATES DUPLICATE DUE-INS TO REFLECT DUPLICATE ORDERING SUCH AS AT THE WAR RESERVE

TABLE II-1. CONTINUOUS SUPPLY MODULES (CONTINUED)

NAME	DESCRIPTION
	MISCELLANEOUS VERBS
CLAS	SETS VARIABLES IN /SUPC/ FOR CLASS AND NODE NUMBER
CLRXN	CLEAR ARRAY XN IN /SUPC/
CLSPC	CLEAR /SUPC/
CREPL	GENERATES REPLENISHMENT ORDER
CSMAP	MAPS CONTINUOUS SUPPLY VARIABLES FROM ONE NODE TO ANOTHER TO SIMULATE MERGING OF NODES
CSRPT	CONTINUOUS SUPPLY REPORT
LARPL	LOOK-AHEAD REPLENISHMENT RATE
MDENS	ASSIGN DENSITY FOR CURRENT MANAGEMENT CLASS PORTION OF A RATE
MDLY	RETRIEVE MDLY DATASET; CREATE ONE IF IT DOES NOT EXIST FOR THIS MODE AND CLASS
MSET	SET MCLASS INDEX M IN /SUPC/
PLOOP	LOOP ON PRIORITY IN /SUPC/
PRDST	PRINT SINGLE DATASET TYPE CONTENTS
PRSPL	SPLITS EXOGENOUS DEMAND INTO PRIORITY STEAMS
RDENS	ASSIGN DENSITY TO A RATE STACK ENTRY AS A WEIGHTED AVERAGE OF M-CLASS DENSITIES
RLOOP	LOOPS ON LINKED DATASETS OF A SPECIFIED TYPE
RLPDS	INPUT VERB FOR RATE/LEVEL PDS DATASETS; SETS UP RATE/LEVEL STATISTICS COLLECTION
RLSGN	RATE/LEVEL SHIPMENT GENERATOR
RLTGN	GENERATES EXOGENOUS TURN-IN SHIPMENTS

TABLE II-1. CONTINUOUS SUPPLY MODULES (CONTINUED)

NAME	DESCRIPTION
	MISCELLANEOUS VERBS (CON'T)
SETPR	SETS PRIORITY VARIABLE IN /SUPC/
SFM	RETRIEVE MANAGEMENT CLASS SPLITTING FACTORS
SLOSS	SUPPLY INVENTORY LOSSES
SUMXI	SUMS THE XI VARIABLES IN /SUPC/
TFILL	RETURN VALUE FROM A PIECEWISE LINEAR FUNCTION IN DTABLE
TOCCP	SEND FLOW TO A CONTAINERIZATION AND CONSOLIDATION POINT
UDDMD	UPDATES DEMAND RATES FOR A NODE, CLASS, AND PRIORITY
UDRAT	UPDATES DEMAND AND RETURN RATES EXISTING A NODE FOR A GIVEN CLASS AND PRIORITY
WRCKF	CHECKS WAR RESERVE FILL PERFORMANCE AGAINST A THRESHOLD

```
SNODE.   RLNOD (P = * SNODE, 1.),       +    R/L NODE NAME
         RLOOP (P = * EXRAT $           +    LOOP ON EXOGENOUS RATES
                1 = CLAS, CLRXN,        +    SET CLASS, CLEAR XN
                    CSUP (P = 1 $       +    MAIN SUPPLY MODULE
                          1 = PLOOP (1 = PRSPL,  +   LOOP ON PRIORITY
                                    CDMDS (P = 1$    +    PROCESS DEMAND
                                           1 = WBFIL $   +   DMD. SATISFACTION
                                           2 = PRYBR (1 = CBOP $    +   BO PASS HIPRI NO FILL
                                                      2 = CBO  )), +   BO LOPRI NO FILL
                                    CRCPT (P = 1$    +   RECEIPT PROCESSING
                                           1 = WBFIL$  +  FILL BO
                                           2 + $),  +  NO DIVERSION
                                    UDRAT (P = 2,1,0))$  +
                          2 = PLOOP (1 = BRLKR (P = 2$    +   DEFINE RETURN LINKS
                                           1 = PRYBR (1 = RLRLK (P = * SNODE, 1.)$
                                                      2 = RLRLK (P = * SNODE, 2.))$
                                           2 = RLRLK ( P = * SNODE, 3.)),
                                    RLDLK (P = * SNODE, 0.),  +  DEFINE DEMAND
                                    RLDLK (P = * SUPRT, 0.),  +  LINKS
                                    RLDLK (P = * CONUS, 0.)))),
* NXNOD $
```

Figure II-3. Example Supply Node

RLDGN in an exogenous demand generator node. The main supply module CSUP is used to control processing of demand and receipt rates and to define demand and receipt links during the model setup phase. Parameter Slot 1 (PS1) of CSUP contains PLOOP to loop on the priorities of materiel handled when processing demand rates in CDMDS and receipt rates in CRCPT. PS2 of CDMDS is defined so that high priority demands that can't be filled are passed, while low priority demands are back ordered only. PS2 of CSUP defines the rate links for this node. There is a primary demand path with an exogenous demand link into SNODE, a demand link into the supporting node SUPRT, and a demand link into node CONUS, all defined by RLDLK. There are primary and secondary receipt paths defined by BRLKR and RLRLK. The primary receipt links from node CONUS have different delay times for the two priorities. The secondary receipt path from SUPRT is defined in PS2 of BRLKR. The nodes that utilize these receipt paths are not specified in this node description, but are at the node where the demand is filled.

An example of a supporting node that is compatible with SNODE is shown in Figure II-4. The first subnode processes the demand rates from all supported nodes that are linked into the node SUPRT. This is accomplished through the use of RLOOP on datasets of type FCRAT and the verb CDMDS. Issue rates and passing rates for the individual supported nodes are calculated by CISUI and CPASI respectively. This node uses the secondary receipt path for issue of materiel, indicated by the second argument in CISUI. Passed demands follow the primary demand path, as indicated in the second argument of CPASI. Subnode 2 handles the supply replenishment for the inventory at node SUPRT. MLOOP is used to loop on all classes at this node and SETPR is used to indicate that all replenishment demands are low priority. Replenishment demand rates are calculated by LARPL and replenishment receipts are processed by CRCPT. PS2 of CSUP is used to define the demand and receipt links for the node SUPRT, to and from the node CONUS.

Figure II-5 shows a simple source of supply node named CONUS. This node loops on all incoming demand rates in the FCRAT datasets and uses the basic verbs CICPD and TOCCP to determine the fill rate and update the first receipt rate referenced in the FCRAT dataset. Containerization of receipt shipments could be added to this node in the first parameter slot of CICPD, utilizing the FCASN and FCLOD verbs as described in the Containerization Family, Part 8 of the Module Catalog.

```
+    SUBNODE 1 PROCESSES DEMANDS FROM SUPPORTED NODES
SUPRT. RLNOD (P = * SUPRT, 12.),                  +    SET R/L NODE NAME
       CLSPC,                                     +    CLEAR/SUPC/COMMON
       RLOOP (P = * FCRAT $                       +    LOOP ON FCRAT DATASETS
              1 = CLAS, MSET,                     +    SET CLASS, MANAGEMENT
                                                  +    CLASS
                  CDMDS (P = 0$                   +    DEMAND PROCESSING
                         1 = TFILL $              +    DEMAND SATISFACTION
                         2 = CPNBO),              +    NO BACKORDER ON PASSED
                                                        DEMANDS
                  CISUI (P = 0,2,1.),             +    ISSUE STOCK
                  CPASI (P = 0,1),                +    PASS DEMANDS NOT FILLED
       * SUPRT .2
+
+    SUBNODE 2 CALCULATES REPLENISHMENT RATE AND DEFINES LINKS FOR SUPRT NODE
+
/2/    MLOOP (1 = SETPR (P = 2.),                 +    SET LOW PRIORITY
                  CSUP (P = 0$                    +    SUPPLY PROCESSING
                         1 = LARPL (P = 0,1),     +    REPLENISHMENT DEMANDS
                             CRCPT (P = 0)$           +    RECEIPT PROCESSING
                         2 = RLRLK (P = * SUPRT, 8.), +    RI LO FROM CONUS
                             RLDLK (P = * CONUS, 0.))),+    DI LO TO CONUS
* NXTND    $
```

Figure II-4. Example Support Node

```
+    SOURCE OF SUPPLY PROCESSING TO FILL DEMANDS, POSSIBLY
+    AFTER BACKORDER DELAYS.
+
  CONUS.  RLNOD (P = * CONUS, 15.),
          RLOOP (P = * FCRAT $           + LOOP ON INCOMING RATES
                 I = CLSPC, CLAS, MDLY, MSET,  + CLEAR/SUPC/, SET CLASS
                     CICPD,              + FILL BY ACCOUNT PRIORITY
                                              AND CLASS
                     TOCCP (P = 1),      + SEND RECEIPT RATE
          * NXTNO    $
```

Figure II-5. Example Source Node

CHAPTER III

RATE/LEVEL SUPPLY DATA STRUCTURE

The continuous supply modules are compatible with the continuous flow service module family data structure and linkage structure as described in Part 6 of this Module Catalog. The modules in this family utilize a number of PDS datasets and a common block named /SUPC/. Each of the datasets and the variables in the common block /SUPC/ are defined in this chapter.

A. PDS DATASETS

The PDS tables which are utilized by the modules in this volume are defined in Table III-1. Most of the datasets for supply modules fall in three general categories: (1) those related to a particular node in table RLNODE, (2) those related to a particular node and class of supply or class and priority combination in table RLNC, and (3) those related to a particular node for a class of supply flow originating from a different node in RLNCN. Two special cases are the RLD datasets in table RLDLY and the RATATT datasets in table RATTR. RLD datasets are referenced by the rate/level delay index assigned when the delay dataset is first created. The RATATT datasets are referenced by the index to the rate stack in array DTABLE.

The PDS dataset types with their coordinates are listed in Table III-2. Definitions of the elements for each of these datasets are given in Tables III-3 through III-21. Certain datasets that deal with rate/level linkage stacks and rate/level delays are dealt with more completely in Part 6 of the Module Catalog, Continuous Service Modules. The key supply dataset is FCSTKS which contains the stock status, flow rates, and policy parameter for each node and class of supply. Four of the dataset types in Table III-2 are generated automatically by modules and need not be specified in the input data stream. These four are LDSC, MDLY, RATATT, and RLD.

TABLE III-1. PDS TABLES USED BY RATE/LEVEL SUPPLY

NAME (COORDINATES)	DESCRIPTION
CLASS (CLASS)	CLASS ATTRIBUTES
RLDLY (DLYIX)	RATE/LEVEL DELAYS
RLNC (NODE, CLASS)	DATASETS WITH COORDINATES (NODE, CLASS)
RLNCN (NODE1, CLASS, NODE2)	DATASETS WITH COORDINATES (NODE, CLASS, NODE)
RLNODE (NODE)	DATASETS WITH COORDINATES (NODE)
RATTR (RSTKIX)	DATASETS WITH COORDINATES (RATE STACK INDEX)

TABLE III-2. PDS DATASET TYPES USED BY RATE/LEVEL SUPPLY

NAME (COORDINATES)	DESCRIPTION
EXRAT (NODE, CLASS)	EXOGENOUS DEMAND RATE
EXTI (NODE, CLASS)	EXOGENOUS TURN-INS
FCDIVR (NODE1, CLASS, NODE2)	DIVERSION FACTORS
FCDMD (NODE, CLASPR)	DEMAND PROCESSING PARAMETERS
FCRAT (NODE, CLASPR)	RATE STACK POINTERS FOR DEMANDS AND RECEIPTS
FCRCPT (NODE, CLASPR)	RECEIPT PROCESSING PARAMETERS
FCSTKS (NODE, CLASS)	STOCK STATUS, INCLUDING FLOW RATES AND SOME POLICY PARAMETERS
LAFC (NODE)	LOOK AHEAD FACTORS
LDSC (NODE)	POINTER TO LIST OF RATE DATASET TYPES LINKED TO CURRENT NODE
MDLY (NODE 1, CLASPR, NODE 2)	INDEXES OF RATE/LEVEL DELAYS AT NODE 2 CONTAINING FLOW ORIGINATING AT NODE 1 FOR CLASS CLASPR, ONE DELAY INDEX PER MANAGEMENT CLASS AT NODE 2.
MGTCL (NODE)	MANAGEMENT CLASSES AT NODE
MGTSF (NODE 1, CLASPR, NODE 2)	MANAGEMENT CLASS SPLITTING FACTORS AT NODE 2 FOR CLASPR DEMANDS FLOWING FROM NODE 1.
NODMAP (NODE)	NODE MAPPING FACTORS
PRIORY (NODE)	PRIORITIES AT THE NODE
OBOX (NODE, CLASS)	ORDERS "BOXCAR TRAIN," I.E., DUE-IN ACCUMULATOR, USED TO MEASURE COST
RATATT (RATE STACK INDEX)	ATTRIBUTES OF RATE STACK ENTRY STORED AT "RATE STACK INDEX" IN DTABLE
RLD (DELAY INDEX)	RATE/LEVEL DELAY DATASET
SLOSS (MODE, CLASS)	SUPPLY LOSS CHARACTERISTICS
WR (NODE, CLASS)	WAR RESERVE FACTORS

TABLE III-3. EXOGENOUS DEMAND RATE PDS DATASET

EXRAT (NODE, CLASS)

ATTRIBUTE	NAME	DESCRIPTION
1	EXDMDI	INDEX IN PARAM OF EXOGENOUS DEMAND RATE
2	DAREXP	EXOGENOUS DEMAND ARRIVAL RATE STACK POINTER
3	FPRI1	FRACTION OF EXOGENOUS DEMAND THAT IS OF PRIORITY PRI1 (SEE PRIORY)
4	FPRI2	FRACTION OF EXOGENOUS DEMAND THAT IS OF PRIORITY PRI2 (SEE PRIORY)
5	FPRI3	FRACTION OF DEMAND LEAVING ACCOUNT THAT IS PRI1

TABLE III-4. EXOGENOUS TURN-IN RATE PDS DATASET

EXTI (NODE, CLASS)

ATTRIBUTE	NAME	DESCRIPTION
1	IXTIR	INDEX IN PARAM OF EXOGENOUS TURN-IN RATE
2	TIRATE	CURRENT TURN-IN RATE

TABLE III-5. DIVERSION FACTORS PDS DATASET

FCDIVR (NODE 1, CLASS, NODE 2)

ATTRIBUTE	NAME	DESCRIPTION
1	DIVFAC	FRACTION OF FLOW RATE WHICH IS TO BE DIVERTED TO NODE 2 FROM NODE 1
2	DIVDLY	RATE/LEVEL DELAY TO BE USED FOR DIVERTED MATERIEL

TABLE III-6. DEMAND PROCESSING PARAMETERS PDS DATASET

FCDMD (NODE, CLASPR)

ATTRIBUTE	NAME	DESCRIPTION
1	PFILD1	ALPHA PARAMETER OF WEIBULL DEMAND FILL CURVE OR NEGATIVE INDEX OF INPAR TABLE CONTAINING FILL CURVE
2	PFILD2	BETA PARAMETER OF WEIBULL DEMAND FILL CURVE
3	PFILD3	GAMMA PARAMETER OF WEIBULL DEMAND FILL CURVE
4	DFILL	WEIBULL FUNCTION VALUE FROM FILL CURVE
5	FDLY	INDEX OF FILL TIME RATE/LEVEL DELAY
6	DACC	DEMAND ACCOMODATION

TABLE III-7. DEMAND/RECEIPT RATE STACK POINTERS PDS DATASET

FCRAT (NODE, CLASPR)

ATTRIBUTE	NAME	DESCRIPTION
1	ND	NUMBER OF DEMAND STACKS (INTEGER)
2	NR	NUMBER OF RETURN STACKS (INTEGER)
3	D/RPTR	FIRST DEMAND RATE POINTER TO DTABLE
4	D/RPTR	SECOND DEMAND RATE POINTER OR FIRST RECEIPT RATE POINTER (DEPENDING ON NUMBER OF DEMAND STACKS.)
5	D/RPTR	NEXT DEMAND/RECEIPT RATE POINTER
6	D/RPTR	NEXT DEMAND/RECEIPT RATE POINTER
7	D/RPTR	NEXT DEMAND/RECEIPT RATE POINTER
.	.	.
.	.	.
.	.	.
n	D/RPTR	LAST DEMAND/RECEIPT RATE POINTER ($n \leq 20$)

TABLE III-8. RECEIPT PROCESSING PARAMETERS PDS DATASET

FCRCPT (NODE, CLASPR)

ATTRIBUTE	NAME	DESCRIPTION
1	PFILB1	ALPHA PARAMETER OF WEIBULL BACKORDER FILL CURVE
2	PFILB2	BETA PARAMETER OF WEIBULL BACKORDER FILL CURVE
3	PFILB3	GAMMA PARAMETER OF WEIBULL BACKORDER FILL CURVE
4	BFILL	WEIBULL FUNCTION VALUE FROM BACKORDER FILL CURVE
5	RDLY	INDEX OF RECEIPT PROCESSING DELAY
6	RACCS1	RECEIPT ACCOMODATION FOR RETURNS FROM 1ST SOURCE
7	RACCS2	RECEIPT ACCOMODATION FOR RETURNS FROM 2ND SOURCE
.	.	.
.	.	.
.	.	.

(RECEIPT ACCOMMODATION FRACTION OF RECEIPTS FOR ASL ITEMS)

TABLE III-9. STOCK STATUS PDS DATASET

FCSTKS (NODE, CLASS)

ATTRIBUTE	NAME	DESCRIPTION
1	AOHL	ACTUAL ON HAND LEVEL
2	ADIL	ACTUAL DUE-IN LEVEL
3	ADOL	ACTUAL DUE-OUT LEVEL
4	DOHL	DESIRED ON HAND LEVEL
5	DOHF	DESIRED ON HAND FACTOR (MULTIPLIES DAR)
6	DAR	DEMAND ARRIVAL RATE
7	SDAR	SMOOTHED DEMAND ARRIVAL RATE
8	DPASR	DEMAND PASSING RATE (INCLUDES BOPR)
9	IFSR	ISSUE FROM STOCK RATE
10	BOP	BACKORDER CREATION RATE
11	REPLR	REPLENISHMENT RATE
12	SREPLR	SMOOTHED REPLENISHMENT RATE
13	RCPTR	RECEIPT RATE
14	FDIR	FILL DUE-INS RATE
15	POST	PERCEIVED ORDER/SHIP TIME
16	IABOR	ISSUE-AGAINST-BACKORDERS RATE
17	RTBAS	BASE PERIOD
18	BOPR	BACKORDER AND PASS RATE
19	TIR	TURN-IN RATE (ARRIVALS)

TABLE III-10. LOOK AHEAD FACTORS PDS DATASET

LAFC (NODE)

ATTRIBUTE	NAME	DESCRIPTION
1	LAF1	LOOK AHEAD FORECAST FACTOR TO INFLATE REPLENISHMENT DEMAND FOR MCLASS 1
2	LAF2	LOOK AHEAD FORECAST FACTOR TO INFLATE REPLENISHMENT DEMAND FOR MCLASS 2
.	.	.
.	.	.
.	.	.
n	LAFn	LOOK AHEAD FORECAST FACTOR TO INFLATE REPLENISHMENT DEMAND FOR MCLASS n

TABLE III-11. LINKED DATASET COORDINATES PDS DATASET

LDSC (NODE)

ATTRIBUTE	NAME	DESCRIPTION
1	LKDSTP	POINTER TO LIST OF RATE DATASET TYPES LINKED TO CURRENT NODE

TABLE III-12. MANAGEMENT CLASS DELAYS PDS DATASET

MDLY (CUSTOMER NODE, CLASPR, SUPPLIER NODE)

ATTRIBUTE	NAME	DESCRIPTION
1	DLYM1	RATE/LEVEL DELAY INDEX FOR MCLASS 1 AT SUPPLIER NODE FOR DEMANDS ORIGINATING AT CUSTOMER NODE
2	DLYM2	SAME USE FOR MCLASS 2
.	.	.
.	.	.
.	.	.

TABLE III-13. MANAGEMENT CLASSES PDS DATASET

MGTCL (NODE)

ATTRIBUTE	NAME	DESCRIPTION
1	NMCL	NUMBER OF MANAGEMENT CLASSES AT THIS NODE (INTEGER)
2	NMCL1	IDENTIFIER OF FIRST MANAGEMENT CLASS
3	NMCL2	IDENTIFIER OF SECOND MANAGEMENT CLASS
.	.	.
.	.	.
.	.	.
n+1	NMCLn	IDENTIFIER OF nTH MANAGEMENT CLASS

TABLE III-14. MANAGEMENT CLASS SPLITTING FACTORS PDS DATASET

MGTSF (NODE 1, CLASPR, NODE 2)

ATTRIBUTE	NAME	DESCRIPTION
1	SFM1	SPLITTING FACTOR FOR MANAGEMENT CLASS 1 AT NODE 1 FOR CLASPR DEMAND ORIGINATING FROM NODE 2
.		
.		
.		
n	SFMn	SPLITTING FACTOR FOR MANAGEMENT CLASS n

TABLE III-15. NODE MAPPING FACTORS PDS DATASET

NODMAP (NODE)

ATTRIBUTE	NAME	DESCRIPTION
1	RLNOD	RLNOD NUMBER OF FIRST NODE FOR COORDINATE NODE TO BE MERGED INTO
2	FRAC	FRACTION OF RATE FLOW AND INVENTORY LEVELS OF COORDINATE NODE THAT WILL BE MERGED WITH FIRST NODE
2n-1	RLNOD	RLNOD NUMBER OF nTH NODE FOR COORDINATE NODE TO BE MERGED WITH
2n	FRAC	FRACTION FOR nTH NODE

TABLE III-16. PRIORITIES PDS DATASET

PRIORY (NODE)

ATTRIBUTE	NAME	DESCRIPTION
1	NPRI	NUMBER OF PRIORITIES
2	PRI1	1ST PRIORITY NUMBER
3	PRI2	2ND PRIORITY NUMBER
.		
.		
.		
n	PRIn	nTH PRIORITY NUMBER

TABLE III-17. "BOXCAR TRAIN" DELAY PDS DATASET

OBOX (NODE, CLASS)

ATTRIBUTE	NAME	DESCRIPTION
1	NMX, IO	NUMBER OF BOXCARS (I.E., CELLS) IN BOXCAR TRAIN (I.E., SET OF CELLS), NMX; AND INDEX OF CURRENT OLDEST CELL, IO
2	NC, INW	NUMBER OF CELLS CURRENTLY OCCUPIED, NC; AND INDEX OF NEWEST - THE ONE CURRENTLY BEING FILLED, INW
3	XW	WIDTH OF A CELL, IN TIME STEPS
4	TOLD	APPROXIMATE TIME OF ORIGIN OF OLDEST ORDERS CURRENTLY IN THE DATASET
5	FOLD	FRACTION OF OLDEST CELL STILL OCCUPIED
6	X(1)	AMOUNT IN CELL 1
7	X(2)	AMOUNT IN CELL 2
.		
.		
.		
NMX + 5	X(NMX)	AMOUNT IN CELL NMX

TABLE III-18. RATE ATTRIBUTES PDS DATASET

RATATT (RATE STACK INDEX)

ATTRIBUTE	NAME	DESCRIPTION
1	RATINC	LEVEL OF MATERIEL WHICH WILL BE USED TO INCREMENT THE RATE WHEN NEXT CALCULATED
2	DENS	DENSITY OF MATERIEL ON RATE LINK

TABLE III-19. RATE/LEVEL DELAY PDS DATASET

RLD (DELAY INDEX)

ATTRIBUTE	NAME	DESCRIPTION
1	DTYP	DELAY TYPE CODE
2	RLDELN	DELAY VALUE (USE VARIES BY TYPE OF DELAY)
.	.	.
.	.	.
.	.	.
n	RLDELN	DELAY VALUE

TABLE III-20. SUPPLY LOSS CHARACTERISTICS PDS DATASET

SLOSS (NODE, CLASS)

ATTRIBUTE	NAME	DESCRIPTION
1	PRLOS	PROBABILITY OF A LOSS OF INVENTORY
2	QLOSS	INDEX TO A PROBABILITY FUNCTION IN PARAM WHICH DEFINES THE QUANTITY LOST
3	RPLDLY	NEGATIVE INDEX TO RATE/LEVEL DELAY TO BE USED FOR REPLENISHMENT OR POSITIVE RLD DATASET CONTAINING DELAYED VALUES

TABLE III-21. WAR RESERVE FACTORS

WR (NODE, CLASS)

ATTRIBUTE	NAME	DESCRIPTION
1	THRFAC	FILL RATE THRESHHOLD FOR DISCONTINUING WAR RESERVE SUPPORT

B. COMMON BLOCK /SUPC/

The common block /SUPC/ is utilized by the continuous supply modules as an interface between the module programs and the PDS datasets utilized. Since the rate/level modules at a node are executed in the same order every time step, the required PDS datasets are accessed and their contents are placed in arrays in /SUPC/ where they can be utilized by a number of modules. This method sharply reduces the number of PDS dataset accesses. It also provides the capability to aggregate values across several datasets at once.

The labled common /SUPC/ consists of numerous arrays and variables. Following the labeled common in the COMDECK named SUPC is a list of dimension and equivalence statements which provide mnemonic variable names for the elements of each PDS dataset stored in /SUPC/. These mnemonic names are used within the code for meaningful references.

The variables in /SUPC/ are defined in Table III-22. The elements of arrays XI, XN, and XIS all have the same meanings for rates at individual nodes, rates from a number of nodes, and the sum of management class rates at an individual node. Table III-23 lists the variables in these arrays by mnemonic name. Each of the arrays which are used to hold particular PDS datasets are listed with the mnemonic variable names in Table IV-24 for reference purposes. The PDS dataset elements were defined earlier in this chapter.

It should be noted that special purposes are given the arrays C1 and C2. These coordinate arrays are set by the verb CLAS to the coordinates of the rates dataset of type FCRTYP specified in SUPC. C1 is set to (RLNOD, CLAS). C2 is set to (RLNOD, CLASPR) where CLASPR is the class *100 + priority.

C. STATISTICS COLLECTION

This section is normally included in the data structure section of the Module Catalog. However, statistics are not collected directly by the rate/level supply modules. For this reason, the discussion of statistics collection has been included in Part 6, Continuous Service Modules.

TABLE III-22. VARIABLES IN LABELED COMMON /SUPC/

NAME	DESCRIPTION
	ARRAYS EQUIVALENT TO PDS DATSETS
DLYM(20)	HOLDING ARRAY FOR MDLY DATASET ELEMENTS
DMD(6)	HOLDING ARRAY FOR FCDMD DATASET ELEMENTS
RATPS(20)	HOLDING ARRAY FOR FCRAT DATASET ELEMENTS
RCPT(15)	HOLDING ARRAY FOR FCRCPT DATASET ELEMENTS
SFM(20)	HOLDING ARRAY FOR MGTSF DATASET ELEMENTS
STKS(19)	HOLDING ARRAY FOR FCSTKS DATASET ELEMENTS
XRAT(5)	HOLDING ARRAY FOR EXRAT DATASET ELEMENTS
ZMCL(21)	HOLDING ARRAY FOR MGTCL DATASET ELEMENTS
	WORKING ARRAYS AND ACCUMULATORS
XI(*MMAX,10)	WORKING ARRAY FOR RATES FOR AN INDIVIDUAL NODE
XN(*MMAX,10)	ACCUMULATOR ARRAY FOR RATES FROM N SUPPORTED OR SUPPORTING NODES
XIS(10)	ACCUMULATOR FOR RATES FOR AN INDIVIDUAL NODE SUMMED ACROSS MANAGEMENT (M) CLASSES
	OTHER VARIABLES
C1(2)	COORDINATES HOLDING ARRAY FOR (NODE, CLASS)
C2(2)	COORDINATES HOLDING ARRAY FOR (NODE, CLASPR)
C3(3)	COORDINATES HOLDING ARRAY FOR ANY 3 COORDINATES
CLAS	FLOW CLASS CURRENTLY UNDER CONSIDERATIONS
CLAS	MANAGEMENT CLASS CURRENTLY UNDER CONSIDERATIONS
CLASPR	CLASS AND PRIORITY CURRENTLY UNDER CONSIDERATIONS
CSUM	SUM OF THE CUBE OF MATERIEL IN A FLOW RATE FOR DENSITY DERIVATIONS
FCRTYP	NAME OF CURRENT RATES DATASET TYPE (EXRAT OR FCRAT)
IPRI	INDEX OF PRIORITY IN PRIORY CURRENTLY UNDER CONSIDERATION
IXRLC	INDEX TO ARRAY RLC IN /LC/ OF THE COORDINATES OF THE CURRENT RATES DATASET
M	INDEX IN MGTCL OF THE MANAGEMENT CLASS CURRENTLY UNDER CONSIDERATION

TABLE III-22. VARIABLES IN LABELED COMMON /SUPC/ (CONTINUED)

NAME	DESCRIPTION
	OTHER VARIABLES (CONTINUED)
MMAX	MAXIMUM NUMBER OF MANAGEMENT CLASSES POSSIBLE IN THE MODEL
NM	NUMBER OF MANAGEMENT CLASSES IN USE IN THE MODEL
PRI	PRIORITY CURRENTLY UNDER CONSIDERATION
RIXDT	INDEX IN DTABLE ARRAY OF RATE UNDER CONSIDERATION; ALSO THE COORDINATE OF THE RATE ATTRIBUTES DATASET RATATT
WSUM	SUM OF THE WEIGHT IN A FLOW RATE FOR DENSITY CONSIDERATIONS

TABLE III-23. XI, XN, XIS VARIABLE NAMES IN /SUPC/

POSITION	MNEMONIC	DEFINITION
1	DPASR_ *	DEMAND PASSING RATE
2	IFSR_	ISSUE FROM STOCK RATE
3	BOR_	BACK ORDER RATE
4	RPASR_	RECEIPT PASSING RATE
5	IABOR_	ISSUE AGAINST BACKORDER RATE
6	FDIR_	FILL DUE-IN RATE
7	RCPTR_	RECEIPT RATE
8	DAR_	DEMAND ARRIVAL RATE
9	BOPR_	BACKORDER AND PASS RATE
10	TIR_	TURN-IN RATE

* MNEMONICS HAVE A SUFFIX OF I FOR XI, N FOR XN, AND S FOR XIS

TABLE III-24. NAMES OF PDS DATASET ELEMENTS IN /SUPC/

MNEMONIC VARIABLE	HOLDING ARRAY POSITION
EXRAT DATASET	
EXDMDI	XRAT(1)
DAREXP	XRAT(2)
FIPGI(1)	XRAT(3)
FIPGI(2)	XRAT(4)
FIPGI(3)	XRAT(5)
FCRAT DATASET	
ND	RATPS(1)
NR	RATPS(2)
NRCTS	RATPS(2)
IDPTR(1)	RATPS(3)
IRPTR(1)	RATPS(3)
IRCTP(1)	RATPS(3)
DARP(1)	RATPS(3)
FCSTKS DATASET	
AOHL	STKS(1)
ADIL	STKS(2)
ADOL	STKS(3)
DOHL	STKS(4)
DOHF	STKS(5)
DAR	STKS(6)
SDAR	STKS(7)
DPASR	STKS(8)
IFSR	STKS(9)
BOR	STKS(10)
REPLR	STKS(11)
SREPLR	STKS(12)
RCPTR	STKS(13)
FDIR	STKS(14)
POST	STKS(15)
IABOR	STKS(16)
RTBAS	STKS(17)
BOPR	STKS(18)
TIR	STKS(19)

TABLE III-24. NAMES OF PDS DATASET ELEMENTS IN /SUPC/ (CONTINUED)

MNEMONIC VARIABLE	HOLDING ARRAY POSITION
FCDMD DATASET	
PFILD1	DMD(1)
PFILD2	DMD(2)
PFILD3	DMD(3)
PFILDI	DMD(4)
DFILL	DMD(4)
FDLY	DMD(5)
DACC	DMD(6)
FCRCPT DATASET	
PFILB1	RCPT(1)
PFILB2	RCPT(2)
PFILB3	RCPT(3)
PFILBI	RCPT(4)
BFILL	RCPT(4)
RFDLY	RCPT(5)
RACCS(1)	RCPT(6)
MGTSF DATASET	
FM(1)	SFM(1)
MGTCL DATASET	
NMCL	ZMCL(1)
XMCL(1)	ZMCL(2)

CHAPTER IV

CONTINUOUS SUPPLY VERBS

ACSUP

General Description

This is a nonsimple verb which is designed to represent rate/level supply processing at a node which receives demands from other nodes or exogenously and accepts receipts from other nodes. The verb is designed to back order and pass high priority demands that are not filled. Low priority demands that are not filled are back ordered only.

Assembler Inputs

Arguments. None.

Parameter Slots.

PS1 - Logic to handle diversion of receipts

PS2 - Define linkage

Examples

Verb ACSUP can be used inside an RLOOP to process all exogenous rates EXRAT and corresponding FCRAT rates at a node.

```
RLOOP (P=*EXRAT  $
       1=CLAS, CLRXN,
         ACSUP (1 = CDIVR (P = * 2GS, 2, 1)  $
                2 = RLRLK (P = * NODE, 1.),
                    RLDLK (P = * NODE, 0.))
```

GASP Files Used. None.

Permanent Attributes Accessed

FCSTKS (node, class) - stock status

FCRAT (node, claspr) - pointers to rates at node

FCDMD (node, claspr) - demand processing parameters

FCRCPT (node, claspr) - receipt processing parameters

PRIORY (node) - priorities.

Verb Inputs

From Calling Program.

In /SUPC/:

C1 - coordinate array for node and class

C2 - coordinate array for node and claspr

PRI - priority

From PS1.

In /SUPC/:

Adjustments to RCPTRI and RPASRI

From PS2. None.

Verb Outputs

To PS1.

In /SUPC/:

RCPTRI - receipt rate

RPASRI - receipt passing rate

To PS2.

In /SUPC/:

PRI - priority

CLASPR - class and priority

Programs Called

Verbs. CSUP, PLOOP, PRSPL, CDMDS, WBFIL, PRYBR, CBOP, CBO, CRCPT, UDRAT.

Other. None directly.

Input/Output Files Used. None.

Nonsimple Verb Listing.

```
/* ACSUP,N,2-
+ RATE/LEVEL SUPPLY PROCESSING AT A DSS ACCOUNT - FOR MODELS DSS3 AND
+ DSS4.
+
+ PS1 - DIVERSION OF RECEIPTS
+ PS2 - DEFINE LINKAGES
+
    CSUP (P = 1$                               + MAIN SUPPLY MODULE
          1 = PLOOP (1 = PRSPL,                + PRIORITY SPLITTER
                         CDMDS (P = 1$         + PROCESS DEMAND
                           (ACSUP-2)
```

```
                                  1 = WBFIL  $       + DEMAND SAT (WEIBULL)
                                  2 = PRYBR (1 = CBOP  $
                                                     + BO/PASS HIPRI NOFILL
                                             2 = CBO   )),
                                                     + BO LOPRI NOFILL
                           CRCPT (P = 1 $            + RECEIPT PROCESSING
                                  1 = WBFIL $        + FILL BO (WEIBULL)
                                  2 = **1 ),         + DIVERSION
                           UDRAT (P = 2, 1, 0)) $    + UPDATE FCRAT STACKS
                2 = PLOOP (1 = **2))                 + DEFINE PL LINKS BY PRI

      */
```

(ACSUP-3)

CBOP

General Description

Back orders and passes. Derives back order rate as difference between demand arrival rate and the sum of passed as non-stockage list and issued. Then adds this rate to the passing rate. (For use in PS1 of CDMDS.) Rates are determined by the following equations:

```
BORI   = DARI - DPASRI - IFSRI
DPASRI = DPASRI + BORI
BOPRI  = BORI
```

where

```
BORI   = back order rate
DARI   = demand arrival rate
DPASRI = demand passing rate
IFSRI  = issue from stock rate
BOPRI  = back order passing rate
```

Assembler Inputs

Arguments. None.

Parameter Slots. None.

Examples

CBOP can be used in PS1 of CDMDS. The example shown passes high priority demands that can't be filled and back orders low priority demands.

```
PLOOP (1 = PRSPL,
         CDMDS (P = 1 $
                1 = WBFIL $
                2 = PRYBR (1 = CBOP $    + HI PRI
                           2 = CBO ))    + LO PRI
```

GASP Files Used

None.

Permanent Attributes Accessed

None.

(CBOP-1)

Verb Inputs

From Calling Program.

In /SUPC/:

DARI - demand arrival rate

DPASRI - demand passing rate

IFSRI - issue from stock rate

Verb Outputs

To Calling Program.

In /SUPC/:

BORI - back order rate

DPASRI - demand passing rate

BOPRI - back order and pass rate

Programs Called

Verbs. None.

Other. None.

Input/Output Files Used

None.

(CBOP-2)

CBO

General Description

Derives back ordering rate as difference between demand arrival rate and sum of passing and issuing rates. (For use in PS1 of CDMDS.) Rate is determined by the following equation:

BORI = DARI - DPASRI - IFSRI

BOPRI = 0.

where

BORI = back order rate

DARI = demand arrival rate

DPASRI = demand passing rate

IFSRI = issue from stock rate

BOPRI = back order and passing rate.

Assembler Inputs

Arguments. None.

Parameter Slots. None.

Examples

CBO can be used in PS1 of CDMDS.

```
CDMDS (P = 1 $
       1 = WBFIL $  + DEMAND SATISFACTION
       2 = CBO )
```

GASP Files Used

None.

Permanent Attributes Accessed

None.

Verb Inputs

From Calling Program.

In /SUPC/:

DARI - demand arrival rate

DPASRI - demand passing rate

IFSRI - issue from stock rate

(CBO-1)

Verb Outputs

To Calling Program.

In /SUPC/:

BORI - back order rate

BOPRI - back order and pass rate.

Programs Called

Verbs. None.

Other. None.

Input/Output Files Used

None.

(CBO-2)

CDIVR (DESTN, IXR, MSW)

General Description

Diverts a portion of a continuous receipt flow to DESTN. The flow is that for class C2(2) and node C2(1). It is assumed expressed in the variable RCPTRI(M) in /SUPC/. The fraction diverted is found in FCDIVR(C2(1),C2(2), DESTN).1. The delay whose index is in FCDIVR.2 is incurred, the diverted rate is entered into RATATT.1 of return flow stack IXR for node DESTN. The assumption that RCPTRI(M) is the rate to be split makes this module suitable for use in PS2 of CRCPT.

Assembler Inputs

Arguments.

DESTN - alpha name of destination node for diverted receipts

IXR - index to the receipt rate for node DESTN to be incremented by diversions

MSW - if zero, use CLASM for coordinates, if positive, set M = MSW and use coordinates as input.

Parameter Slots. None.

Examples

CDIVR is suitable for use to adjust the receipt rates in PS2 of CRCPT.

```
CRCPT (P = 1 $
          1 = WBFIL $
          2 = CDIVR (P = *NODEB, 2, 1))
```

GASP Files Used

None.

Permanent Attributes Accessed

FCDIVR (node, claspr, destn) -

1 - fraction of flow diverted

2 - rate/level delay index for diversions

FCRAT (destination node, claspr)

IRR - pointer to receipt rate for destination node in DTABLE

(CDIVR-1)

Verb Inputs

From Calling Program

In /SUPC/:

RCPTRI - receipt rate

RPASRI - receipt passing rate

From DBOXST. None.

From RLDLY.

Function Value - delayed diverted rate.

Verb Outputs

To DBOXST.

Arguments -

OBOX - name of PDS dataset

C1 - coordinates to use, current node

DIVAMT - diverted amount to be removed from oldest OBOX cell.

To RLDYL.

Arguments -

DIVDLY - diversion delay index

DIVRAT - rate of diverted flow.

To ABOXST.

Arguments -

OBOX - name of PDS dataset

C1 - coordinates of PDS dataset, destination node

Third - level of materiel diverted for due-ins at destination node.

To FCSTKS (destination, node, class).

2 - actual due in level incremented.

To UDDRA1.

Arguments -

DDRAT - delayed diverted rate to increment receipt rate

Second - destination node number, negative

Third - index of rate stack to search for node in DTABLE

Fourth - top switch of zero indicates no action if destination node cannot be found in rate stack.

(CDIVR-2)

Programs Called

Verbs. None.

Other. ABOXST, RLDLY, RLNIX, UDRRA1, PERMDS.

Input/Output Files Used

None.

(CDIVR-3)

CDMDS
S/S/S4
3/74

CDMDS (MSW)

General Description

Processes a demand rate (continuous flow) by splitting it into three parts - passed, filled, and back ordered. The flow so split is that for class CLAS, priority PRI, and subclass M, specified in /SUPC/. Also, accumulates rates of demand from more than one individual nodes into overall rates for this node.

The demand arrival rate is determined from the rate stack in DTABLE and altered by the splitting factors in MGTSF. The passing rate and issue from stock rate are calculated as:

DPASRI = (1 - DACC) * DARI

IFSRI = PFILDI * (DARI - DPASRI)

where PFILDI is the probibility of fill from PS1.

Assembler Inputs

Arguments.

MSW - if equal to 0, use CLASM instead of CLAS from /SUPC/

- if positive, indicates management class M to use.

Parameter Slots.

1 - obtain fill rate in ZSWT

2 - process unfilled stockage list demand (e.g., back ordered)

Examples

CDMDS can be used in PS1 of CSUP after the priority PRI has been set in /SUPC/. It can also be used separately to process incoming demands at a support node as shown here:

```
RLOOP (P = * FCRAT  $
       1 = CLAS, MSET,
           CDMDS (P = 0  $
                  1 = TFILL  $     + DEMAND SATISFAC.
                  2 = CPNBO),      + PASSED DEMANDS
```

In this case RLOOP sets the coordinates required from the FCRAT datasets.

(CDMDS-1)

GASP Files Used. None

Permanent Attributes Accessed

FCDMD (node, claspr) - all elements

FCSTKS (node, class) -

AOHL - actual on hand level

IFSR - issue from stock rate

BOR - back order rate

Verb Inputs

From Calling Program.

In /SUPC/:

C1 - coordinates (node, class)

C2 - coordinates (node, claspr)

From PS1.

In /ZMAWSY/:

ZSWT - fill rate

From PS2.

In /SUPC/:

BORI - back order rate

BOPRI - back order and passing rate

From IRSTK.

Function Value: location in DTABLE of demand rate for this node

Verb Outputs

To IRSTK.

Arguments:

KRLNOD - node number

DARP(IXD) - demand arrival rate pointer word to DTABLE

To PS1.

In /VRBGSP/:

PARAM (NPRMS,●) - demand fill rate curve factors

In /ZMAWSY/:

IZSWT - index of PARAM array values to use for fill rate distribution

(CDMDS-2)

To PS2.

In /SUPC/:

DARI - demand arrival rate

DPASRI - demand passing rate

IFSRI - issue from stock rate

To Calling Program.

In /SUPC/:

DPASRI and DPASRN - demand passing rate

DARI and DARN - demand arrival rate

IFSRI and IFSRN - issue from stock rate

BORI and BORN - back order rate

BOPRI and BOPRN - back order and passing rate

Programs Called.

Verbs. None

Other. GETSET, PERMDS, VALEL, CLASS, IRSTK.

Input/Output Files Used. None.

CICPD

General Description

Simulates response of ICP and depot system to demands in terms of a delay by (customer, priority, supply class, mgt class). Assumes variables M, RATPS, IXRLC in /SUPC/ have been set. The output rate for the current M-class is set into IFSR1 in /SUPC/, while the output aggregated over all M-classes is accumulated in IFSRS in /SUPC/. Also assumes M-class splitting factors have been set into SFM in /SUPC/.

Assembler Inputs

Arguments. None.

Parameter Slots.

1 - IFSR1 (M) may be altered before being sent on. One example is to send part of the issue rate in full container loads from a depot.

Examples

CICPD can be used to respond to a demand rate with a delayed issue rate. It must be preceded by verbs which set M, DLYM, RATPS, and IXRLC in /SUPC/.

```
RLOOP (P = * FCRAT  $     + LOOP ON INCOMING RATES
       1 = CLSPC, CLAS, MDLY, MSET,
           CICPD (1 = FCASN (1 = FCLOD . . . )),
           TOCCP (P = 1)  + SEND RECEIPT RATE
```

GASP Files Used. None.

Permanent Attributes Accessed

FCDMD (node, claspr) -

5 - delay index for fill time

Verb Inputs

From Calling Program.

In /SUPC/:

M - index of management class to use

RATPS - variables from FCRAT dataset including pointer words to rate stacks in DTABLE

IXRLC - index to coordinates of FCRAT in RLC array in /LC/

CLASM - management class code

DLYM - management class delay indexes

From IRSTK.

Function Value - index to rate in DTABLE

From RLDLY.

Function Value - delayed issue from stock rate

From PS1.

In /SUPC/:

IFSRI may have been altered.

Verb Outputs

To PS1.

In /SUPC/:

IFSRI - issue from stock rate

IXRLC - index to FCRAT coordinates in RLC

To IRSTK.

Arguments:

KRLNOD - node number to search for in rate stack

DARP - demand arrival rate pointer to DTABLE stack

To RLDLY.

Arguments:

First - index to rate/level delay to use

Second - issue rate to be added to delay dataset

To MDLY Dataset.

Mth element - index to delay for M class

To Calling Program.

In /SUPC/:

IFSRI - issue from stock rate for current M class

IFSRS - accumulated issue from stock rate for all M classes handled in this pass

Programs Called

Verbs. None.

Other. CLASS, IRSTK, PERMDS, RLDLY, SETEL, VALEL.

Input/Output Files Used. None.

CISSU (IRR, TOPSW)

General Description

Continuous supply issue verb for all M classes. Converts sum of issue-against-back order and issue-from-stock rates for a demand source to a return flow rate. IABORS and IFSRS in /SUPC/ are the rates whose sum, delayed by FCDMD.6 is converted to the top entry in the rates stack pointed to by FCRAT.(3+ND+IRR), for class CLAS and priority PRI and node (RLC(1.IXRLC).

Assembler Inputs

Arguments.

IRR - index to the receipt rate pointed to in FCRAT to update

TOPSW - top switch; if 0, no action will be taken if KRLNOD entry is not found; if not zero, update top entry in rate stack if KRLNOD entry is not found.

Parameter Slots. None.

Examples

CISSU can be used to issue materiel which has been combined from one or more management classes.

```
MLOOP (1 = CDMDS (P = 0 $
                  1 = CPNBO)),
SUMXI,              + SUMS OVER M CLASSES
CISSU (P = 2, 1.),  + ISSUES FROM SINGLE CLASS
CPASS.
```

GASP Files Used

None.

Permanent Attributes Accessed

None.

Verb Inputs

From Calling Program.

In /SUPC/:

IABORS - issue against back order rate

IFSRS - issue from stock rate

NRCTS - number of receipt rates in FCRTYP dataset

IRCTP - array of indexes to receipt rate entries in DTABLE stack

ND - number of demand rates in FCRTYP dataset

In /RLSYS/:

KRLNOD - rate/level node number

From UDRR. None.

Verb Outputs

To UDRR.

Arguments -

First - value to update rate with

Second - update rate following KRLNOD entry in stack

Third - pointer to stack in DTABLE to update

Fourth - top switch, as input in CISSU.

Programs Called

Verbs. None.

Other. UDRR.

Input/Output Files Used

None.

CISUI (MSW, IXR, TOPSW)

General Description

Continuous supply issue verb for an individual customer. Issues rate IFSRI(M) in /SUPC/ through return stack pointed to from FCRTYP(RLC(*,IXRLC)). (IXR+ND+2). IFSRI is thought of as an issue rate to an individual customer. (IFSRN is issue rate to more than one customer.) M can be the index of a class number in a MGTCL dataset. When this is so, it has usually been set elsewhere by modules such as MSET and MLOOP. This case can be handled by setting argument MSW=0. If M is not assumed to be set elsewhere, a value can be specified to permit valid references to array IFSRI by setting argument MSW to the desired value, e.g. 1.

Assembler Inputs

Arguments.

MSW - set M = MSW if M greater than 0.

IXR - index to receipt rate pointer in FCRTYP dataset, i.e., receipt rate path for issues

TOPSW - indicates whether the return rate to be updated is the next one after the one for the current node (TOPSW=0.) or the top one in the stack even if there is none for the current node (TOPSW=1.).

Parameter Slots. None.

Examples

CISUI can be used at a supply node which is supporting a number of nodes, indicated by their FCRAT datasets

```
RLOOP (P = *FCRAT $
       1 = CLAS, MSET,
           CDMDS (P = 0 $
                  1 = TFILL $
                  2 = CPNBO),
           CISUI (P = 0, 2, 1.),      + ISSUE STOCK
                      (CISUI-1)
```

CPASI (P = 0, 1), + PASS DEMANDS
+ NOT FILLED

GASP Files Used

None.

Permanent Attributes Accessed

None.

Verb Inputs

From Calling Program.

In /SUPC/:

M - management class index

NR - number of receipt rate paths

ND - number of demand rate paths

IFSRI - issue from stock rate

IRPTR - pointer to receipt rate stack in DTABLE

From UDRR. None.

Verb Outputs

To UDRR.

Arguments -

First - IFSRI to update receipt rate

Second - update successor entry to KRLNOD entry in rate stack

Third - pointer to rate stack to update

Fourth - top switch as input to CISUI

Programs Called

Verbs. None.

Other. UDRR.

Input/Output Files Used

None.

CLAS

General Description

Sets variables in /SUPC/ for class and node number. Determines coordinates of FCRTYP rate dataset to set C1 and C2 coordinate arrays with node, class, and priority. FCRTYP may be either EXRAT or FCRAT.

Assembler Inputs

Arguments. None.

Parameter Slots. None.

Examples

CLAS can be used inside an RLOOP to set /SUPC/ variables for each rate dataset found in the loop.

```
RLOOP (P = *FCRAT $
            1 = CLAS, MSET,
                CDMDS, ... )
```

GASP Files Used

None.

Permanent Attributes Accessed

PRIORY (node) - priority codes at node

Verb Inputs

From Calling Program.

In /SUPC/:

IXRLC - index to coordinates of FCRTYP rate dataset in RLC array

FCRTYP - name of rate dataset type to obtain coordinates of.

Verb Outputs

To Calling Program.

In /SUPC/:

C1 - coordinate array (node, class)

C2 - coordinate array (node, claspr)

CLAS - class code

(CLAS-1)

PRI - priority code

IPRI - index to priority in PRIORY dataset

CLASPR - class * 100 + priority

Programs Called

Verbs. None.

Other. PERMDS.

Input/Output Files Used

None.

CLRXN

General Description

Clears array XN in /SUPC/. XN is the array which accumulates stock status variables over one or more customers to a node.

Assembler Inputs

Arguments. None.

Parameter Slots. None.

Examples

CLRXN can be used inside an RLOOP to clear FCSTKS holding variables for each new EXRAT dataset that is looped on.

```
RLOOP (P = * EXRAT $
       1 = CLAS, CLRXN,
           CSUP ...    )
```

GASP Files Used

None.

Permanent Attributes Accessed

None.

Verb Inputs

From Calling Program. None.

Verb Outputs

To Calling Program.

In /SUPC/:

XN - cleared to zero.

Programs Called

Verbs. None.

Other. CLEAR.

Input/Output Files Used

None.

CLSPC

General Description

Clears /SUPC/ arrays XI, XN, and XIS.

Assembler Inputs

Arguments. None.

Parameter Slots. None.

Examples

CLSPC can be used at a node to insure that all stock status arrays are cleared when verb CSUP is not being used.

```
SUPRT.  RLNOD (P = *SUPRT, 12.),
        CLSPC,
        RLOOP (P = *FCRAT $
               1 = CLAS, MSET,
                   CDMDS (P = 0 $
                          1 = TFILL $
                          2 = CPNBO),
                   CISUI (P = 0, 2, 1),
                   CPASI (P = 0, 1)),
        *SUPRT.2
```

GASP Files Used

None.

Permanent Attributes Accessed

None.

Verb Inputs

From Calling Program. None.

Verb Outputs

To Calling Program.

In /SUPC/:

XI - array cleared to zero

XN - array cleared to zero

(CLSPC-1)

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XIS - array cleared to zero

WSUM - set to zero

CSUM - set to zero

Programs Called

Verbs. None.

Other. CLEAR.

Input/Output Files Used

None.

(CLSPC-2)

CPALL

General Description

Passes all authorized stockage list (ASL) demand, back orders none. For use in PS2 of CDMDS.

The verb sets

BORI = 0.

BOPRI = 0.

DPASRI = DARI

where
BORI = back order rate
BOPRI = back order passing rate
DPASRI = demand passing rate
DARI = demand arrival rate.

Assembler Inputs

Arguments. None.

Parameter Slots. None.

Examples

CPALL can be used in PS2 of CDMDS to pass all demands.

```
CDMDS (P = 1 $
       1 = TFILL $
       2 = CPALL  )
```

GASP Files Used

None.

Permanent Attributes Accessed

None.

Verb Inputs

From Calling Program.

In /SUPC/:

DARI - demand arrival rate.

Verb Outputs

To Calling Program.

In /SUPC/:

BORI - back order rate

BOPRI - back order and pass rate

DPASRI - demand passing rate.

Programs Called

Verbs. None.

Other. None.

Input/Output Files Used

None.

(CPALL-2)

CPASI (MSW, IXD)

General Description

Updates rate of passed demand for the node and flow class at FCRTYP (RLC (*, IXRLC)). Demand path IXD is used. DPASRI(M) is the passing rate put into the flow. DPASRI is thought of as the passing rate for an individual account, as opposed to DPASRN, which is the passing rate for an aggregation of accounts. M represents a particular class in an MGTCL dataset, or it may be just an index to permit valid references to DPASRI. The former connotation is indicated when argument MSW = 0, the latter when MSW ≠ 0. When MSW = 0, the value of M already in /SUPC/ is used. It is assumed to have been set earlier by a module such as MSET or MLOOP.

Assembler Inputs

Arguments.

MSW - switch to indicate use of M in /SUPC/

IXD - index of demand path in FCRTYP to use

Parameter Slots.

1 - Define rate/level links

Examples

CPASI is used to pass demands for a single class from a node that are not filled at this node. The index to coordinates in RLC must be set, such as in RLOOP:

```
RLOOP (P = * FCRAT  $
        1 = CLAS, MSET,
            CDMDS (P = 0  $     + DEMAND PROCESSING
                   1 = TFILL  $
                   2 = CPNBO ),
            CISUI (P = 0, 2, 1.),  + ISSUE STOCK
            CPASI (P = 0, 1))      + PASS DEMANDS NOT FILLED
```

GASP Files Used. None.

Permanent Attributes Accessed. None.

(CPASI-1)

Verb Inputs

From Calling Program.

In /SUPC/:

IXRLC - index to coordinates of FCRTYP in RLC

ND - number of demand paths in FCRTYP

RATPS - elements of rate pointers in FCRTYP

From PSI. None.

From UDDR. None.

Verb Outputs

To PSI.

In /RLSYS/:

LKDST - link dataset type name

LKCDS - coordinates of LKDST

IXDRAT - index to first demand rate pointer in LKDST

IXRRAT - index to first receipt rate pointer in LKDST

To UDDR.

Arguments -

First - demand passing rate

Second - node number of demand rate in stack

Third - pointer word to demand rate from FCRTYP

Fourth - bottom switch, 1 requests that first (bottom) entry of the stack is updated if the entry for the specified node can not be found.

Programs Called

Verbs. None.

Other. UDDR.

Input/Output Files Used. None.

CPASS (IXR)

General Description

Updates rate of passed demand for the node and CLASS/PRI at FCRTYP (RLC(*,IXRLC)), where IXRLC is in /SUPC/. This consists of applying UDDR to DPASRS in /SUPC/ for demand path IXR.

Assembler Inputs

Arguments.

IXR - index to demand path in FCRAT to be updated

Parameter Slots.

1 - define links for rates pointed to from FCRAT .3 (demand rates) and FCRAT. (IXR + 2 + ND) (receipt rate)

Examples

CPASS can be used to update the demand passing rate at a support node. DPASRS must have been calculated

```
RLOOP (P = * FCRAT  $
       1 = CLAS, SFM,
           MLOOP (1 = CDMDS (P = 0  $      + LOOP THR M-CLASSES
                              1 = CPNBO  )),
           SUMXI,                 + SUM OVER M-CLASSES
           CISSU (P = 3, 1.), + ISSUE THRU R3
           CPASS (P = 1  $
                  1 = RLDLK (P = * NODEUU, 0.))),
```

GASP Files Used. None.

Permanent Attributes Accessed. None.

Verb Inputs

From Calling Program.

In /SUPC/:

IXRLC - index to coordinates of FCRAT in array RLC in /LC/

ND - number of demand path pointers in FCRAT

DPASRS - demand passing rate

(CPASS-1)

From UDDR. None.

Verb Outputs

To UDDR.

Arguments -

DPASRS - demand passing rate

KRLNOD - node for which demand rate is to be updated

DARP - pointer to first demand path in FCRAT

Fourth - bottom switch, 0 indicates no action if KRLNOD entry is not found in stack.

Programs Called

Verbs. None.

Other. UDDR.

Input/Output Files Used. None.

(CPASS-2)

CPNBO

General Description

Passes and does not back order ASL demand that cannot be filled from stock. (For use in PS1 of CDMDS.) Demand passing rate (DPASRI) is determined by

DPASRI = DARI - IFSRI

where DARI = demand arrival rate

IFSRI = issue from stock rate.

Assembler Inputs

Arguments. None.

Parameter Slots. None.

Examples

```
CDMDS (P = 0 $
       1 = TFILL $
       2 = CPNBO )   + NO BACK ORDER ON PASSED
                     + DEMANDS
```

GASP Files Used

None.

Permanent Attributes Accessed

None.

Verb Inputs

From Calling Program.

In /SUPC/:

DARI - demand arrival rate

IFSRI - issue from stock rate.

Verb Outputs

To Calling Program.

In /SUPC/:

BORI - back order rate

DPASRI - demand passing rate

BOPRI - back order and pass rate.

Programs Called

Verbs. None.

Other. None.

Input/Output Files Used

None.

(CPNBO-2)

CRCPT (MSW)

General Description

This module processes receipts for continuous supply representation. The receipt stream for class CLAS and priority PRI is split into passed, inventoried, and issued-against-backorders rates. These rates from individual nodes are also accumulated across sources, that is different receipt paths to the node. The following equations update the receipt rate, passing rate, fill-due-ins rate, and issue against back orders rate:

RCPTRI = RCPTRI + incoming rate in DTABLE

RPASRI = RPASRI + (1 -RACCS) * incoming rate in DTABLE

FDIRI = RCPTRI - RPASRI

IABORI = PFILBI * FDIRI

where PFILBI is the back order fill rate from PS1.

Assembler Inputs

Arguments.

MSW - If zero, use class CLASM for accessing
If positive, set M = MSW.

Parameter Slots.

1 - Derive back order fill rate for current receipts

2 - Divert or otherwise adjust receipt stream

Examples

CRCPT is usally used in PS1 of CSUP to process receipts

```
CRCPT (P = 1  $                          + USE FIRST M CLASS
       1 = WBFIL  $                      + CALCULATE FILL RATE
       2 = CDIVRT (P = * NODEA, 2,1))
                                         + DIVERT RECEIPTS TO NODE B
```

GASP Files Used. None.

Permanent Attributes Accessed

FCRCPT (node, claspr) - all elements

FCRAT (node, claspr) - receipt rate pointer words

(CRCPT-1)

Verb Inputs

From Calling Program.

In /SUPC/:

C1 - coordinate array (node, class)

C2 - coordinate array (node, claspr)

CLAS - class designation

PRI - priority

From PS1.

In /ZMAWSY/:

ZSWT - back order fill rate

From PS2.

In /SUPC/:

Adjustments to RCPTRI and RPASRI

From IRSTK.

Function Value - index to receipt rate for KRLNOD in DTABLE

Verb Outputs

To PS1.

In /ZMAWSY/:

IZSWT - index of distribution to use in array PARAM

In /VRBGSP/:

PARAM (IZSWT,°) - distribution values for back order file

To PS2.

In /SUPC/:

RCPTRI - receipt rate

RPASRI - receipt passing rate

To Calling Program.

In /SUPC/:

RCPTRN and RCPTRI - receipt rates for all sources and individual source

RPASRN and RPASRI - receipt passing rate

FDIRN and FDIRI - fill due-in rate

IABORN and IABORI - issue against back order rate

(CRCPT-2)

Programs Called

Verbs. None.

Other. CLASS, IRSTK.

Input/Output Files Used. None.

CREPL (IXD)

General Description

Continuous supply replenishment verb. Generates replenishment rate on basis of current value of REPLR in PDS dataset FCSTKS (RLNOD, CLASM).11.

Assembler Inputs

Arguments.

IXD - index of demand path for replenishment

Parameter Slots. None.

Examples

CREPLR can be used to update the demand rate from a node with REPLR from /SUPC/

```
MLOOP (1 = CSUP (P = 0 $
                  1 = CTI  (P = 0),
                      CREPL      ,
                      CRCPT (P = 0) $ )
```

GASP Files Used

None.

Permanent Attributes Accessed

FCRAT (node, class) -

IXD + 3 - index to demand rate stack in DTABLE.

Verb Inputs

From Calling Program.

In /SUPC/:

REPLR - replenishment rate

In /RLSYS/:

KRLNOD - rate/level node number

Verb Outputs

To UDDR.

Arguments -

(CREPL-1)

First - rate to update stack entry with REPLR

Second - update successor entry to KRLNOD entry in stack

Third - pointer to rate stack in DTABLE

Fourth - bottom switch, update bottom entry in stack if KRLNOD entry is not found

<u>To Calling Program</u>. None.

<u>Programs Called</u>

<u>Verbs</u>. None.

<u>Other</u>. CLASS, GETSET, PERMDS, UDDR.

<u>Input/Output Files Used</u>

None.

CRTI (IXR)

General Description

Receives turn-in shipments (like those generated by CSTI) and enters them into the IXR-th receipt stream of FCRTYP for the current node and the flow class given in ATRIB(4).

Assembler Inputs

Arguments.

IXR - index to the receipt path to be used for receipt of turn-ins

Parameter Slots. None.

Examples

CRTI is placed in a subnode which can then be addressed by CSTI when a stock turn-in is generated.

```
NODEA.  RLNOD (P = * NODEA, 1.),
        CSTI (P = * NODEB, 2  $
              1 = RTURN (P = 0), * NODEB.2)
NODEB.
   + RECEIPT OF TURN-INS
 /2/ RLNOD (P = * NODEB, 2.),
     CRTI (P = 2)              + TURN-INS ADDED TO R2
```

GASP Files Used. None.

Permanent Attributes Accessed.

Rate dataset of name FCRTYP (node, claspr) -

ND - number of demand paths

IRCTP (ND + IXR) - receipt rate pointer

Verb Inputs

From Calling Program.

In /VRBGSP/:

Attributes of the shipment are in ATRIB as follows

4 - flow class number *1000

5 - amount

(CRTI-1)

7 - name of rate pointers dataset type whose receipt rate is to be updated.

From UDDRA1. None.

Verb Outputs

To UDDRA1.

Arguments -

AOHL/TSTEP - increment to receipt rate

Second - 0 indicates update of entry for KRLNOD

Third - index to receipt rate stack in DTABLE

Fourth - top switch, 0 indicates no action if KRLNOD entry is not found

To Calling Program. None.

Programs Called

Verbs. None.

Other. UDDRA1.

Input/Output Files Used. None.

CSMAP

General Description

This module maps continuous supply variables from one node to one or more other nodes under the direction of the NODMP datasets. This can be used to merge a node with another one for aggregation purposes during a model run.

Assembler Inputs

Arguments. None.

Parameter Slots. None.

Examples

CSMAP should be used within an RLOOP so that the node and class coordinates are available in Cl.

```
RLOOP (P = * EXRAT  $       + LOOP ON EXOG. RATES
             1 = CLAS, CLRXN,
                 ACSUP(         ), + SUPPLY PROCESSING
                 CSMAP  ), + MAP TO NEW NODE
                           + WHEN NODMP DATASET
                           + EXISTS
```

GASP Files Used. None.

Permanent Attributes Accessed

NODMAP (old node) - all elements
FCSTKS (old node, class) - all elements
EXRAT (old node, class) - all elements
OBOX (old node, class) - all elements
FCSTKS (mapped nodes, class) - all elements
EXRAT (mapped nodes, class) - all elements
OBOX (mapped nodes, class) - all elements
FCDMD (old node, claspr) - all elements
FCDMD (mapped nodes, claspr) - all elements
FCRPT (old node, claspr) - all elements

FCRPT (mapped nodes, claspr) - all elements

MDLY (old node, claspr, source of supply node) - all elements

MDLY (mapped nodes, claspr, source of supply node) - all elements

Verb Inputs

From Calling Program.

In /SUPC/:

CI - coordinate array (node, class)

From RLDREV. None.

From DMAP. None.

Verb Outputs

To RLDREV.

Arguments -

First - array of fractional cell values from old node OBOX

Second - TOLD from old node OBOX

Third - number of cells in old node OBOX

Fourth - value of 1 indicates other than materiel boxcars

Fifth - array of cell values from mapped node OBOX

Sixth - TOLD from mapped node OBOX

Seventh - number of cells in mapped node OBOX

To DMAP.

Arguments -

First - array of MDLY elements from old node

Second - array of MDLY elements from mapped node

Third - fraction of old node values being mapped

To Calling Program. None.

Programs Called

Verbs. None.

Other. PERMDS, IUNPK2, DMAP, RLDREV, CLASS.

Input/Output Files Used. None.

(CSMAP-2)

AD-A040 805 BDM CORP VIENNA VA F/G 15/5

MODELS OF THE US ARMY WORLDWIDE LOGISTIC SYSTEM (MAWLOGS). VOLU--ETC(U)

FEB 77 DAAG39-76-C-0134

UNCLASSIFIED BDM/W-76-211-TR-VOL-3-PT- NL

2 OF 2
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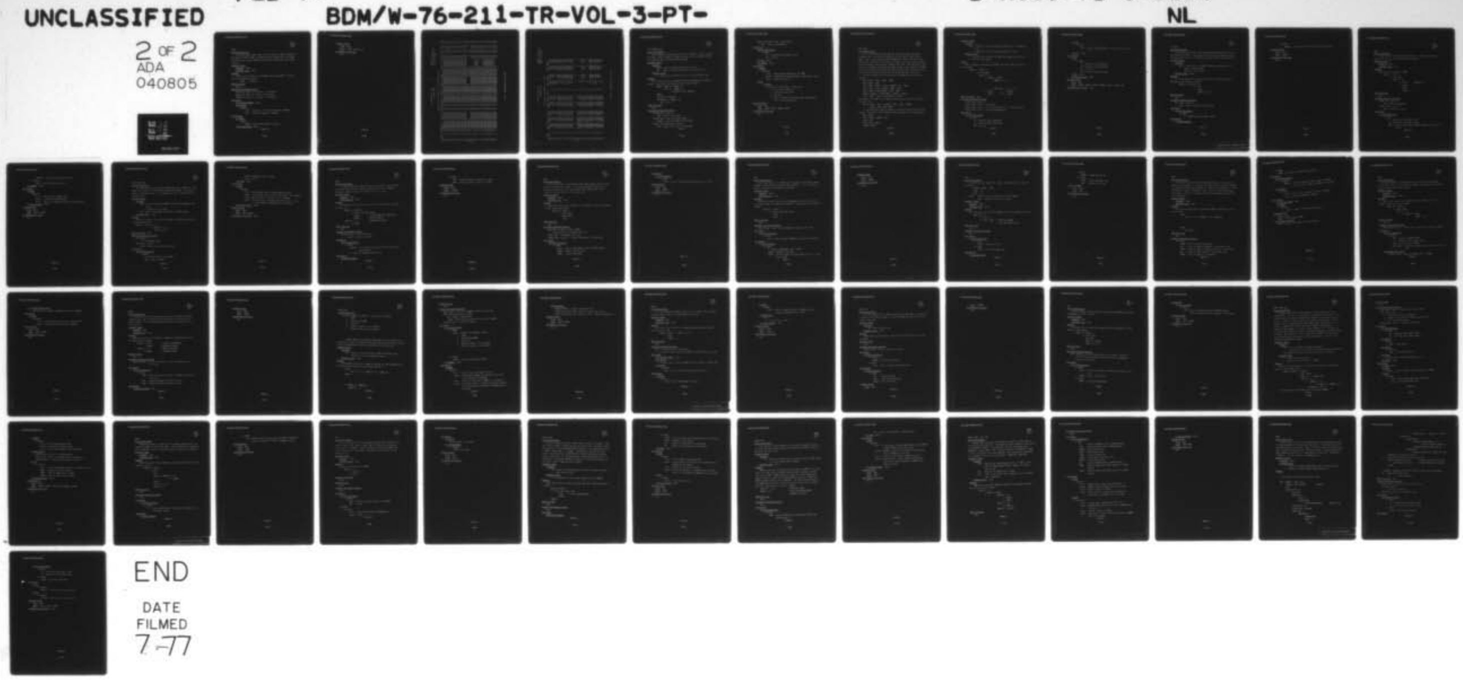

END

DATE
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CSRPT

General Description

Continuous supply report verb. Prints reports on supply variables in PDS datasets FCSTKS, FCDMD, and FCRCPT for each supply node in the model. Two reports are printed, examples of which are included with this module write-up.

Assembler Inputs

Arguments. None.

Parameter Slots. None.

Examples

CSRPT can be included in the standard report node ZRPRT or anywhere else in the model description.

ZRPRT. ..., CSRPT, ...

GASP Files Used

None.

Permanent Attributes Accessed

FCSTKS (all nodes, all classes) - all elements

FCDMD (all nodes, all classes - all elements

FCRCPT (all nodes, all classes) - all elements.

Verb Inputs

From Calling Program. None.

From IDSLON.

Arguments -

First - pointer to first word of dataset in DSPOOL

Third - number of elements in dataset.

Verb Outputs

To IDSLON.

Argument -

Second - name of PDS dataset to loop on.

To Calling Program. None.

(CSRPT-1)

Programs Called

Verbs. None.

Other. CLEAR, IDSLON, LIN.

Input/Output Files Used

None.

** MAWLOGS MODEL DSS4 **

SUMMARY OUTPUT

ANALYST., BRM
DATE. 10/ 18/ 1975
RUN NAME.FEAR SLICE
TNOW 159.980

RATE/LEVEL SUPPLY REPORT NO.1 - POLICIES AND STATUS

	-- POLICY	VARIABLES -					---------- STOCK	STATUS ----------							
NOD	FLOW CLASS	DOHF	SDAR	SPEPLP	POST	RTBA	DOHL	AOHL	DDIL	ADIL	ADOL	NET/D	RCH	RDI	N/EL
43	23	66	8.0923E+04	2.9652E+04	62	15	5.2782E+06	3.9320E+06	1.8311E+06	4.0776E+06	1.0833E+06	81.10	.74	2.23	.97
43	4	80	3.9419E+04	1.4949E+04	62	15	3.1107E+06	2.4049E+06	9.2959E+05	2.2378E+06	5.8606E+05	97.52	.77	2.41	1.00
43	9	45	1.3076E+04	7.4330E+03	87	15	5.8314E+05	2.8602E+05	6.4917E+05	5.9367E+05	1.9479E+05	49.63	.49	.91	.56
46	23	66	5.6010E+04	1.3189E+03	61	15	3.5989E+06	2.9963E+06	8.0491E+04	3.5119E+06	4.1333E+05	97.58	.83	43.63	1.65
46	4	80	2.7287E+04	1.1499E+03	66	15	2.1212E+06	1.8160E+06	7.6195E+04	1.9426E+06	2.2566E+05	116.21	.86	25.49	1.61
46	9	45	9.1555E+03	1.8233E+03	93	15	4.0220E+05	2.1850E+05	1.6928E+05	4.4737E+05	7.3972E+04	58.03	.54	2.64	1.04
56	9	81	1.2777E+05	2.0904E+05	86	75	1.0393E+07	1.7982E+06	1.7904E+07	1.3827E+07	4.6684E+06	86.01	.17	.77	.39
56	4	50	2.3025E+05	2.2692E+05	61	75	1.1615E+07	6.8498E+05	1.3785E+07	1.4270E+07	6.5582E+06	36.96	.06	1.04	.33
56	23	44	1.7405E+05	1.8875E+05	63	75	7.6308E+06	7.3322E+05	1.1926E+07	1.1495E+07	5.2225E+06	43.09	.10	.96	.36
57	9	146	7.7321E+04	1.8905E+05	84	75	1.1306E+07	4.7495E+05	1.5858E+07	1.1613E+07	2.6983E+06	122.91	.04	.73	.35
57	4	80	2.3410E+05	2.8183E+05	60	75	1.8633E+07	8.4501E+06	1.6853E+07	2.2093E+07	7.5464E+06	89.65	.45	1.31	.65
57	23	47	1.6992E+05	1.3176E+05	61	75	8.0433E+06	4.9336E+06	7.9830E+06	1.1414E+07	3.8831E+06	76.66	.61	1.43	.76
60	9	76	1.2777E+05	1.9993E+05	85	75	9.6523E+06	1.8414E+06	1.7017E+07	1.3141E+07	4.5192E+06	82.13	.19	.77	.39
60	4	88	2.3025E+05	3.8284E+05	60	75	2.0297E+07	1.7153E+06	2.3037E+07	2.2247E+07	7.2786E+06	73.43	.08	.97	.39
60	23	62	1.7405E+05	3.2166E+05	62	75	1.0764E+07	1.7645E+06	2.0053E+07	1.8772E+07	6.7676E+06	84.68	.16	.94	.45
61	9	146	1.2619E+05	2.1528E+05	84	75	1.8431E+07	1.7452E+06	1.8067E+07	1.4207E+07	3.3418E+06	98.98	.09	.79	.35
61	4	80	2.3981E+05	3.7718E+05	60	75	1.9113E+07	1.3283E+06	2.2458E+07	2.3185E+07	8.6676E+06	61.78	.07	1.03	.38
61	23	47	1.7389E+05	1.8522E+05	61	75	8.2410E+06	7.1805E+05	1.1227E+07	1.1266E+07	4.4569E+06	46.30	.09	1.00	.39
19	23	64	8.6000E+04	0.	70	15	5.5203E+06	3.9084E+06	0.	2.7332E+06	0.	P	.71	R	1.20
19	4	80	4.2000E+04	0.	68	15	3.3608E+06	2.5744E+06	0.	1.3826E+06	0.	P	.77	P	1.18
19	9	61	1.4000E+04	0.	97	15	8.5442E+05	4.1610E+05	0.	2.0519E+05	0.	P	.49	P	.73
64	9	7	9.3222E+05	4.9730E+04	60	75	6.5687E+06	3.6847E+05	3.0023E+06	3.2434E+06	0.	3.00	.06	1.08	.38
64	4	5	1.4686E+06	9.6841E+04	38	75	6.4974E+06	1.7433E+05	3.7128E+06	6.2236E+06	0.	3.24	.03	1.68	.63
64	23	6	1.0640E+06	5.7971E+04	40	75	5.9036E+06	7.6874E+05	2.2916E+06	3.8138E+06	0.	3.96	.13	1.66	.56
65	23	68	1.2127E+05	2.6376E+05	59	60	8.3008E+06	5.4108E+05	1.5494E+07	1.3505E+07	4.1940E+06	102.81	.08	.87	.42
65	4	80	2.4434E+05	5.5721E+05	51	60	1.9621E+07	1.9733E+06	2.8199E+07	2.8987E+07	9.2882E+06	95.05	.10	1.03	.45
65	9	83	5.5086E+04	1.3114E+05	35	60	4.5573E+06	4.2750E+05	4.5498E+06	7.0752E+06	1.9601E+06	93.94	.09	1.56	.61
66	23	6	4.4563E+05	6.3532E+04	27	60	2.3932E+06	3.4313E+05	1.7292E+06	3.1028E+06	0.	4.68	.14	1.79	.83
66	4	5	8.4181E+05	1.0316E+05	27	60	3.6839E+06	9.3775E+05	2.7564E+06	4.6237E+06	0.	4.30	.25	1.68	.86
66	9	7	2.2031E+05	4.6061E+04	28	60	1.5493E+06	6.5441E+04	1.2685E+06	2.3917E+06	0.	8.49	.04	1.89	.87
67	9	83	3.2618E+05	7.2163E+05	32	60	2.6805E+07	6.8984E+06	2.3395E+07	3.9953E+07	1.1154E+07	95.45	.26	1.71	.71
67	4	80	9.6183E+04	1.6670E+05	50	60	7.3090E+06	2.3372E+05	8.3898E+06	8.4268E+06	3.9475E+06	28.74	.03	1.00	.30
67	23	68	3.2413E+05	6.3201E+05	59	60	2.1625E+07	7.0051E+05	3.7083E+07	3.0252E+07	1.1596E+07	49.38	.03	.82	.33
68	9	45	1.1686E+04	1.1940E+04	83	45	5.2678E+05	2.3595E+05	9.8523E+05	5.4256E+05	3.0398E+05	38.40	.45	.55	.31
68	4	80	3.4866E+04	4.1940E+04	58	45	2.7812E+06	1.9795E+05	2.4370E+06	1.7408E+06	9.1534E+05	77.06	.71	.71	.54
68	23	66	7.1456E+04	8.0433E+04	60	45	4.7113E+06	3.1456E+06	4.7860E+06	3.3060E+06	1.7693E+06	62.77	.67	.69	.49
69	23	68	7.3355E+04	1.0462E+05	61	45	4.6072E+06	2.6777E+04	6.3605E+06	4.8250E+06	2.6100E+06	15.15	.01	.76	.20
69	4	80	1.5102E+05	2.8223E+05	52	45	1.1610E+07	3.4158E+05	1.4696E+07	1.3347E+07	5.5950E+06	34.59	.03	.91	.31
69	9	83	2.4039E+04	3.3450E+04	31	45	1.8662E+06	9.6842E+05	1.0254E+06	2.2790E+06	7.8801E+05	53.47	.52	2.22	.85
70	9	7	8.2581E+05	2.0718E+05	27	60	6.0429E+06	2.8822E+05	5.6689E+06	9.8401E+06	0.	19.11	.05	1.74	.86
70	4	5	1.7990E+05	2.6296E+04	26	60	7.7160E+05	1.6941E+05	6.9081E+05	1.1476E+06	0.	4.33	.22	1.66	.90

Figure -- Sample Report No. 1 from CSRPT

** MAWLOGS MODEL DSS4 **

SUMMARY OUTPUT

ANALYST., BRM
DATE. 10/ 18/ 1975
RUN NAME.FEAR SLICE
TNOW 159.980

RATE/LEVEL SUPPLY REPORT NO.2 - FLOWS

NOD	FLOW CLASS	---- D E M A N D S ---- DAR	DPASR	REPLR	--- R E C E I P T S --- RCPTR	FDIR	TIR	- I S S U E S - IFSP	IABOR	--BACKORDERS--- BOR	BOPR
43	23	85400	11989	58831	31257	29384	0	14648	11127	60399	1636
43	4	41600	1791	30131	5145	5141	0	9700	2153	31819	1710
43	9	13800	3817	14025	1495	1396	0	1246	839	10795	2059
46	23	62400	8730	7313	23037	21354	0	11813	2424	43018	1165
46	4	30400	1282	5572	400	400	0	7591	53	22749	1223
46	9	10200	2810	6379	85	79	0	982	17	7919	1510
56	9	127400	27792	247422	85980	80263	0	1641	47012	106044	8077
56	4	227200	36280	362859	129798	120601	0	47	91019	225068	34195
56	23	162600	28747	249839	91433	84058	0	442	65737	137270	3859
57	9	76400	16429	239698	61877	57143	0	882	21361	59124	35
57	4	256510	28011	311146	209849	196292	0	16977	111652	239020	27498
57	23	162600	56643	100627	116236	101768	0	14287	58772	100334	8664
60	9	127400	30042	234660	87787	82660	0	566	43181	104059	7267
60	4	227200	10409	538696	227029	206080	0	603	105983	223944	7756
60	23	162600	20945	306563	186349	169942	0	1386	103024	141335	1066
61	9	127400	27394	344820	69541	65295	0	4550	24778	95512	57
61	4	256510	29941	513140	193070	181705	0	203	113255	255794	29428
61	23	162600	57867	228190	102013	90925	0	110	61697	114511	9888
19	23	0	0	0	0	0	0	0	0	0	0
19	4	0	0	0	0	0	0	0	0	0	0
19	9	0	0	0	0	0	0	0	0	0	0
64	9	1205744	1205715	115225	5349	5349	0	30	0	0	0
64	4	1973906	1973860	156563	24514	24514	0	46	0	0	0
64	23	1156559	1156544	114257	10543	7450	0	15	0	0	0
65	23	96800	15197	245856	132358	125099	0	156	63211	82585	1138
65	4	228000	33078	528037	320546	315288	0	629	166850	225570	31277
65	9	59000	18269	86983	56347	52250	0	91	19365	46673	6033
66	23	736300	736297	44507	31566	31566	0	3	0	0	0
66	4	1294693	1294419	65542	59701	59701	0	273	0	0	0
66	9	289399	289382	23237	18025	6349	0	17	0	0	0
67	9	374000	115125	362074	296722	268289	0	5853	100728	290580	37558
67	4	164000	23855	279993	69804	67353	0	6	50941	162699	22559
67	23	392000	61550	803495	226009	216542	0	24	139583	335043	4616
68	9	12200	3401	17692	1629	1387	0	963	1294	9682	1846
68	4	36400	1623	60564	6857	6785	0	7454	5563	28875	1552
68	23	74600	10539	115252	11287	10369	0	10356	8239	55200	1495
69	23	148000	23238	225360	24080	23143	0	0	19828	126505	1743
69	4	234000	34037	442278	103445	100154	0	9	69222	232143	32188
69	9	46000	14124	20266	14745	12716	0	997	6671	35463	4584
70	9	530134	530036	85802	69088	31191	0	97	0	0	0
70	4	303848	303788	24501	12949	12949	0	60	0	0	0

Figure -- Sample Report No. 2 from CSRPT

CSTI (DESTN, IXR)

General Description

Verb to generate continuous stock turn-in shipments. Turn-in stocks to DESTN. Fraction FCDIVR.1 of AOHL is turned in via a shipment through PS1. DBOX and ADIL at DESTN node are updated.

Assembler Inputs

Arguments.

DESTN - name of destination node for turn-ins

IXR - index of receipt rate path to use for turn-ins.

Parameter Slots.

1 - send discrete shipment of turn-ins to destination node.

Examples

CSTI can be utilized to generate turn-in shipments from one node to another. Verb CRTI is designed to receive these shipments.

```
NODEA.  RLNOD (P = *NODEA, 1.),
        CSTI  (P = *NODEB, 2 $
                  1 = RTURN (P = 0), *NODEB.2)
NODEB.
+ RECEIPT OF TURN-INS
/2/ RLNOD (P = *NODEB, 13.),
    CRTI  (P = 2).
```

GASP Files Used

None.

Permanent Attributes Accessed

FCSTKS (node, class).1 -

AOHL - actual on hand level

FCDIVR (node, class, destination node).1 -

DIVFAC - fraction of AOHL to be diverted

FCSTKS (destination node, class).2 -

ADIL - actual due in level, incremented

(CSTI-1)

FCRCTP (destination node, claspr).5+IXR -

RACC - receipt accommodation

Verb Inputs

From Calling Program.

In /SUPC/:

C1 - coordinate array (node, class)

PRI - priority

From PS1. None.

From ABOXST. None.

Verb Outputs

To ABOXST.

Arguments -

First - name of boxcar dataset to use, OBOX

Second - coordinates of boxcar dataset at destination node

Third - quantity turned in.

To PS1.

In /MAWVRB/:

Attributes of the shipment, in HOLD, are:

4 - flow class * 1000 + 15

5 - amount being turned in

6 - priority

7 - name of rate pointers dataset type through which flow is being represented.

Programs Called

Verbs. None.

Other. ABOXST, CLASS, PERMDS, RLNIX.

Input/Output Files Used

None.

(CSTI-2)

CSUP (MSW)

General Description

This is the general control node for continuous supply operations. Parameter slot 1 is used to set the auxiliary variables in common area /SUPC/. PS2 is used to define supply demand and receipt links for a node. CSUP updates stock status for a class of supply in terms of rates of demand, ordering, passing, back ordering, receipt, and issue. CSUP calculates stock status in a different way during the model warmup, that is before time TWARM. Also at the beginning of warmup, the order ship time (OST) measuring boxcars are filled with the due-out level for the perceived order ship time.

The basic elements of the stock status are updated by the following equations:

ADOL = ADOL + TSTEP * (BOR - IABOR)

DOHL = DOHF * SDAR

AOHL = AOHL + TSTEP * ((FDIR - IABOR) + TIR - IFSR)

ADIL = ADIL + TSTEP * (REPLR + BOPR - FDIR)

SDAR = SDAR + (TSTEP/RTBAS) * (DAR - SDAR)

SREPLR = SREPLR + (TSTEP/RTBAS) * (REPLR - SREPLR)

POST = (POST - TSTEP) + (TSTEP/POST) * POSTC

where POSTC is the OST for the materiel which has just come in as a replenishment rate

REPLR = (DOHL - AOHL) + (SREPLR * POST - (ADIL - ADOL))
/POST + IFSR + BOR - BOPR

The variable names used are defined in Table III-9 for the FCSTKS PDS dataset. The special warmup equations which replace some of the above are:

AOHL = DOHL

ADIL = (REPLR + BOPR) * POST

SDAR = DAR

REPLR = DAR - DPASR

SREPLR = REPLR

(CSUP-1)

Assembler Inputs

Arguments.

MSW - If MSW = 0, the verb accesses FCSTKS data for a management class.

If MSW ≠ 0, the verb accesses FCSTKS for a class.

Parameter Slots.

1 - set auxiliary variables in /SUPC/ and update external rate

2 - define links (setup)

Examples

CSUP is generally used within an RLOOP which determines the class to be considered.

```
RLOOP (P = *EXRAT  $
       1 = CLAS, CLRXN,
           CSUP (P = 1  $
                 1 = PLOOP (1 = PRSPL,
                            CDMDS (P = 1  $
                              .
                              .
                              .
                            CRCPT (P = 1  $ . . .))  $
                 2 = RLRLK (        ),    + DEFINE
                     RLDLK (        ))))  + LINKS
```

GASP Files Used. None.

Permanent Attributes Accessed

FCSTKS (node, class) or

FCSTKS (node, clasm) - all elements

EXRAT (node, class) - fraction of rate that is in a priority group

FCRCPT (node, claspr) - receipt accommodations

Verb Inputs

From Calling Program.

In /SUPC/:

C1 - node and class coordinates

C2 - node and claspr coordinates

PRI - priority

(CSUP-2)

<u>From PS1</u>.

In /SUPC/:

STKS - array of FCSTKS elements, possibly altered by verbs in PS1.

<u>From PS2</u>. None.

<u>Verb Outputs</u>

<u>To PS1</u>.

In /SUPC/:

C1 - node and class coordinates

C2 - node and class coordinates

PRI - priority

STKS - array of FCSTKS elements

<u>To PS2</u>. None.

<u>To Calling Program</u>. None.

<u>Programs Called</u>

<u>Verbs</u>. None.

<u>Other</u>. ABOXST, DBOXST, GETSET, PERMDS, SETSET, CLASS, CLEAR.

<u>Input/Output Files Used</u>. None.

(CSUP-3)

CTI (MSW)

General Description

This verb sets the turn-in rate from PDS dataset EXTI (node, class).2 into XN(M,10) in /SUPC/. The value of the M to be used should have been set previously if MSW = 0. Otherwise the value of MSW will be used for M.

Assembler Inputs

Arguments.

MSW - 0, use M as set in /SUPC/ to designate management class index in dataset MGTCL.

Positive, set M to MSW.

Parameter Slots. None.

Examples

CTI can be used to set the turn-in rate in PS1 of CSUP for use in aggregating over M-classes in CSUP.

```
MLOOP (1 = CSUP (P = 0 $
                  i = CTI,
                      CREPL,
                      CRCPT (P = 0 )))
```

GASP Files Used

None.

Permanent Attributes Accessed

EXTI (node, class).2 -

TIRI - turn-in rate for individual node.

Verb Inputs

From Calling Program.

In /SUPC/:

C1 - coordinate array (node, class).

Verb Outputs

To Calling Program.

In /SUPC/:

TIRN(M) - turn-in rate from all sources for the M-class.

Programs Called

Verbs. None.

Other. PERMDS.

Input/Output Files Used

None.

(CTI-2)

DUPDI

General Description

Special verb to reflect duplicate ordering at a node by incrementing due-in level and the level in OST measuring boxcars.

Assembler Inputs

Arguments. None.

Parameter Slots. None.

Examples

DUPDI can be used in PS2 of CDMDS

```
RLOOP (P = *FCRAT $
       1 = CLAS, MSET,
           CDMDS (P = 0 $
                  1 = TFILL $      + DEMAND FILL
                  2 = CPALL,
                      DUPDI,
                      PASSL ))
```

GASP Files Used

None.

Permanent Attributes Accessed

FCDMD (node, claspr).6 -

DAC - demand accommodation

FCSTKS (node, class).2 -

ADIL - actual due-in level.

Verb Inputs

From Calling Program.

In /SUPC/:

C1 - coordinate array (node, class)

C2 - coordinate array (node, claspr)

IXRLC - index to coordinates of FCRTYP dataset in RLC array in /LC/

(DUPDI-1)

IFSRI(M) - issue from stock rate for Mclass

In /DSS4L/:

IFSRL - issue from stock rate loss

From ABOXST. None.

Verb Outputs

To ABOXST.

Arguments -

First - name of boxcar dataset, OBOX

Second - coordinates of OBOX dataset

Third - amount to be added to boxcar for OST measuring

To Calling Program. None.

Programs Called

Verbs. None.

Other. ABOXST, PERMDS.

Input/Output Files Used

None.

LARPL (MSW, IXD)

General Description

This model multiplies the normal replenishment rate, REPLR, by a look ahead forecast factor to inflate the replenishment demand. The factor is stored in PDS dataset LAFC.1. The demand rate, IXD, is updated with the inflated value.

Assembler Inputs

Arguments.

MSW - if 0, use M value in /SUPC/ to determine management class to use
- if positive, set M = MSW.

IXD - index to the demand rate pointer in FCRAT dataset

Parameter Slots. None.

Examples

LARPL can be used in PS1 of CSUP to update the replenishment rate at a supply support node.

```
MLOOP (1 = CSUP (P = 0  $
                 1 = LARPL (P = 0, 1),
                     CRCPT (P = 0)))
```

GASP Files Used. None.

Permanent Attributes Accessed.

LAFC (node).2 -

LAF - look ahead factor

FCRAT (node, claspr) -

IXD+2 - pointer to rate stack to update

Verb Inputs

From Calling Program.

In /SUPC/:

M - M class index to use if MSW = 0

CLAS = class of supply

CLASM = management class of supply

PRI = priority

From UDDR. None.

Verb Outputs

To UDDR.

Arguments -

First - replenishment rate to update demand rate with

Second - the successor entry to this node entry is to be updated

Third - pointer word to rate stack to use in DTABLE

Fourth - bottom switch, 1 indicates that botom entry in stack is to be updated if KRLNOD entry is not found.

To Calling Program. None.

Programs Called

Verbs. None.

Other. UDDR, PERMDS.

Input/Output Files Used. None.

MDENS

General Description

This verb accumulates weight and cube contributed by the issue from stock rate IFSRI for each management class for later use by RDENS in calculating average density in a receipt rate for a class.

Assembler Inputs

Arguments. None.

Parameter Slots. None.

Examples

This verb can be used after the issue from stock rate for an Mclass has been set.

```
RLOOP (P = *FCRAT $
       1 = CLSPC, CLAS, MDLY, MSET,
           CICPD,         + FILL BY NDOE, PRI, AND MCLASS
           MDENS),        + M CLASS DENSITY
TOCCP (P = 1 $            + UPDATE RECEIPT RATE
       1 = RDENS)
```

GASP Files Used

None.

Permanent Attributes Accessed

CLATTR (Mclass) - class attributes

1 - density (weight per volume)

Verb Inputs

From Calling Program.

In /SUPC/:

IFSRI(M) - issue from stock rate to an individual account for an Mclass

M - index to management class to use.

Verb Outputs

To Calling Program.

(MDENS-1)

In /SUPC/:

WSUM - cumulative weight of materiel in IFSRS

CSUM - cumulative cube of materiel in IFSRS.

Programs Called

Verbs. None.

Other . PERMDS.

Input/Output Files Used

None.

MDLY

General Description

This verb retrieves the PDS dataset MDLY (demand node, claspr, source node) into array DLYM in /SUPC/. If the dataset does not exist, one is created, assigning rate/level delay indexes from FCDMD (source node, clasmpr).5 for each Mclass at this source node.

Assembler Inputs

Arguments. None.

Parameter Slots. None.

Examples

MDLY can be used inside an RLOOP to set management class delay indexes in /SUPC/ before verb CICPD

```
RLOOP (P = *FCRAT $
       1 = CLSPC, CLAS,
           MDLY, MSET,
           CICPD      )
```

GASP Files Used

None.

Permanent Attributes Accessed

MDLY (RLC (1, IXRLC), claspr, RLNOD) -
Delay indexes for management class fill

MGTCL (node) - management class codes

FCDMD (node, clasmpr).5 - index of rate/level fill time delay

Verb Inputs

From Calling Program.

In /SUPC/:

IXRLC - index to coordinates in RLC of FCRTYP dataset

CLASPR - classm * 100 + priority

RLNOD - current node number

Verb Outputs

To Calling Program.

In /SUPC/:

DLYM - array of rate level delay indexes for fill time.

Programs Called

Verbs. None.

Other. PERMDS.

Input/Output Files Used

None.

(MDLY-2)

MSET

General Description

Sets Mclass index, M, in /SUPC/ as the location in PDS dataset MGTCL (RLNOD) in which current flow class, CLAS, appears. M = 0 is returned if CLAS is not found or the dataset is not found.

Assembler Inputs

Arguments. None.

Parameter Slots. None.

Examples

MSET can be used anywhere that a management class has been set into the variable CLAS, for example in an RLOOP or FCRAT datasets for management classes.

```
RLOOP (P = *FCRAT $
       1 = CLSPC, CLAS, MDLY, MSET,
           CICPD,
           TOCCP  )
```

GASP Files Used

None.

Permanent Attributes Accessed

MGTCL (node) - codes for all management classes at this node.

Verb Inputs

From Calling Program.

In /SUPC/:

CLAS - code for supply management class being considered.

Verb Outputs

To Calling Program.

In /SUPC/:

M - index of management class in GMTCL

CLASM - management class code

SFM(M) - splitting factor for this Mclass, set to 1. since CLAS = CLASM.

(MSET-1)

<u>Programs Called</u>

<u>Verbs</u>. None.

<u>Other</u>. PERMDS.

<u>Input/Output Files Used</u>

None.

(MSET-2)

PASSL

General Description

Pass unfilled loss demand from a node. The passing rate is altered as follows:

```
DPASRI = DPASRI - IFSRL
IFSRL  = 0.
DARL   = 0.
```

where IFSRL = issue from stock rate for loss demands

DARL = demand arrival rate for losses.

Assembler Inputs

Arguments. None.

Parameter Slots. None.

Examples

This verb can be used in PS2 of CDMDS to alter the demand passing rate.

```
CDMDS (P = 0 $
       1 = TFILL $
       2 = CPALL, PASSL )  + PASS ALL DEMANDS
                           + PLUS LOSSES NOT FILLED.
```

GASP Files Used

None.

Permanent Attributes Accessed

None.

Verb Inputs

From Calling Program.

In /SUPC/:

DPASRI - demand pass rate

In /DSS4L/:

IFSRL - issue from stock rate.

Verb Outputs

To Calling Program.

In /SUPC/:

DPASRI - demand passing rate

In /DSS4L/:

IFSRL - issue from stock rate

DARL - demand arrival rate.

Programs Called

Verbs. None.

Other. None.

Input/Output Files Used

None.

PRDST

General Description

This verb is designed for error checking purposes. It prints all datasets of the dataset type specified by number (not by name) in ATRIB(3). This verb can therefore be scheduled by a FILE card in node ZINIT. A dump of /DSTYPS/ is given if ATRIB(3) is zero. This will yield the dataset type numbers. Control is returned to the calling program after the print out is completed.

Assembler Inputs

Arguments. None.

Parameter Slots. None.

Examples

This verb can be placed in a subnode of ZRPRT referenced by a FILE verb in ZINIT.

```
ZINIT.
     FILE (P = 1 $ 1 = RTURN (P = 0), *ZRPRT.10),
       .
       .
       .
ZRPRT.
     /10/ PRDST.
```

GASP Files Used

None.

Permanent Attributes Accessed

In /DSTOR/:

DSTNAM - array of dataset type names
NELS - array of number of elements in each dataset type
NSETSD - array of number of datasets that exist of each type
ELN - array of element names for each dataset type
DSPOOL - array of values in all datasets

In /DPTRS/:

COORD - coordinates of dataset type specified.

Verb Inputs

From Calling Program.

In /VRBGSP/:

ATRIB(3) - index of requested dataset type in /DSTYPS/. If it is zero, a dump of /DSTYPS/ will be made.

From IDSLOO.

Arguments -

First - index to first element of dataset in DSPOOL

Third - number of elements in dataset.

Verb Outputs

To Calling Program. None.

To IDSLOO.

Argument -

Second - number of dataset type to loop on.

Programs Called

Verbs. None.

Other. IDSLOO, DMDST, PGHDR.

Input/Output Files Used

NPRNT - logical file number for printed output.

(PRDST-2)

PRSPL

General Description

Determines portion of demand coming into current node from EXRAT (node, clas) that is of priority PRI in /SUPC/, and assigns this as demand arrival rate for FCRAT (node, claspr).

Assembler Inputs

Arguments. None.

Parameter Slots. None.

Examples

PRSPL can be used inside an RLOOP on dataset EXRAT to split the exogenous rate into priority streams.

```
RLOOP (P = *EXRAT $
       1 = CLAS, CLRXN,
           CSUP (P = 1 $
                 1 = PLOOP (1 = PRSPL,
                            CDMDS ... )))
```

GASP Files Used

None.

Permanent Attributes Accessed

FCRAT (node, claspr) - pointer words to demand rate stacks in DTABLE.

Verb Inputs

From Calling Program.

In /SUPC/:

XRAT - elements of EXRAT dataset

C2 - coordinate array (node, claspr)

IPRI - priority index to PRIORY

FIPGI(IPRI) - fraction of exogenous rate that is of priority IPRI

From IRSTK (first call).

Function value - index to exogenous rate in DTABLE.

(PRSPL-1)

From IRSTK (second call).

Function value - index to demand arrival rate in DTABLE.

Verb Outputs

To IRSTK.

Arguments -

First - node number of entry in rate stack desired

Second - pointer word to rate stack in DTABLE.

Programs Called

Verbs. None.

Other. IRSTK, PERMDS.

Input/Output Files Used

None.

(PRSPL-2)

RDENS

General Description

Calculates density of flow for current rate by dividing total weight = WSUM by total cube = CSUM and places the value in the rate attribute dataset RATATT.2. If the dataset or density element does not exist, this verb creates it.

Assembler Inputs

Arguments. None.

Parameter Slots. None.

Examples

RDENS can be used in PS1 of TOCCP if MDENS has accumulated the values for WSUM and CSUM in /SUPC/

```
        MLOOP (1 = CICPD,            + ISSUE BY CLASS AND PRI
                   MDENS),           + ACCUMULATE DENSITY
        TOCCP (P = 1 $               + UPDATE ISSUE RATE
               1 = RDENS)            + CALCULATE DENSITY
```

GASP Files Used

None.

Permanent Attributes Accessed

RATATT (RIXDT).2 - density of materiel in flow for RIXDT entry in rate stack.

Verb Inputs

From Calling Program.

In /SUPC/:

RIXDT - index to entry in rate stack in DTABLE to calculate density for

CSUM - cumulative volume of materiel in flow

WSUM - cumulative weight of materiel in flow.

Verb Outputs

To Calling Program. None.

Programs Called

Verbs. None.

Other. PERMDS.

Input/Output Files Used

None.

RLSGN (IXR)

General Description

Generates exogenous shipments. An event with attributes

1 TNOW
2 Destination RLNODE
3 Priority
4 Weight of Mclass 1 to be shipped
5 Weight of Mclass 2 to be shipped
.
.
.

Causes UDRRA1 to be called and the amount of the shipment to be converted to a rate in the FCRAT return flow link specified from the current node to the destination node for the specified class and priority.

Assembler Inputs

Arguments.

IXR - index to the receipt rate in FCRAT (destination node, clasmpr) to use for exogenous shipments.

Parameter Slots. None.

Examples

RLSGN should be placed in a separate subnode that can be addressed by a FILE verb which reads in the attributes necessary.

```
ZINIT.
     FILE (P = 1 $ 1 = RTURN (P = 0), * NODEA.2)
NODEA.
      .
      .
      .
/2/ RLNOD (P = *NODEA,2),
    RLSGN (P = 1).
```

(RLSGN-1)

GASP Files Used

None.

Permanent Attributes Accessed

MGTCL (node) - codes for management classes at this node

FCRAT (destination node, clasmpr) -

ND - number of demand paths

IRPTR - pointer words for receipt rate stacks in DTABLE

CLATTR (clasm).1 - density of Mclass.

Verb Inputs

From Calling Program.

In /VRBGSP/:

ATRIB - attributes of exogenous shipment

1 TNOW

2 Destination RLNODE

3 Priority

4 Weight of Mclass 1 to be shipped

5 Weight of Mclass 2 to be shipped

.

.

.

In /RLSYS/:

RLNOD - current rate/level node number.

From UDRRA1. None.

Verb Outputs

To UDRRA1.

Arguments -

First - rate of flow to increment rate with

Second - indication to update the successor to the stack entry associated with KRLNOD

Third - pointer to rate stack in DTABLE to be searched

Fourth - top switch, value 1. indicates that entry farthest up stream should be incremented if KRLNOD entry is not found.

(RLSGN-2)

To PDS Datasets.

RATATT (RIXDT).2 - density of materiel flow

FCSTKS (destination node, class).2 - actual due-in level

FCRCPT (destination node, claspr).5 + IXR - receipt accommodation.

Programs Called

Verbs. None.

Other. PERMDS, UDDRA1.

Input/Output Files Used

None.

(RLSGN-3)

RLTGN

General Description

This verb generates exogenous turn-ins for all (node, class) combinations for which there exist a PDS dataset of type EXTI.

Assembler Inputs

Arguments. None.

Parameter Slots. None.

Examples

This verb can be included in an exogenous demand generator node to set the values in EXTI.

```
EXDGN.  RLDGN (P = *EXRAT, 1, 2, 0),
        RLTGN,
        * NXNOD    $
```

GASP Files Used

None.

Permanent Attributes Accessed

EXTI - all exogenous turn-in datasets

1 - index of random variable in PARAM that represents turn-in rate.

Verb Inputs

From Calling Program. None.

From IDSLON.

Function value - index to DSPOOL of first element in dataset EXTI.

From DISTR.

In /ZMAWSY/:

ZSWT - turn-in rate from distribution specified.

Verb Outputs

To IDSLON.

Arguments -

First - name of PDS dataset to loop on

To DISTR.

Argument

First - index of random variable in PARAM array that represents exogenous turn-in rate.

To PDS datasets.

EXTI

2 - current turn-in rate.

To Calling Program. None.

Programs Called

Verbs. DISTR.

Other. IDSLON.

Input/Output Files Used

None.

(RLTGN-2)

SETPR (PR)

General Description

Sets the variable PRI in /SUPC/ to PR and the index IPRI to the position of priority PR in dataset PRIORY. Variables CLASPR and C2(2) are also set to CLAS * 100 + PRI.

Assembler Inputs

Arguments.

PR - priority code to use

Parameter Slots. None.

Examples

SETPR can be used anywhere to specify a particular priority at a node or subnode.

GASP Files Used

None.

Permanent Attributes Accessed

PRIORY (*node*) - priority codes at this node.

Verb Inputs

From Calling Program.

In /RLSYS/:

RLNOD - rate/level node number

In /SUPC/:

CLAS - class of materiel being considered.

Verb Outputs

To Calling Program.

In /SUPC/:

PRI - priority code PR

IPRI - index to priority code

CLASPR - CLAS * 100 + PRI.

Programs Called

Verbs. None.

<u>Other</u>. PERMDS.

<u>Input/Output Files Used</u>

None.

SFM

General Description

Retrieves MCLASS-splitting factors from PDS dataset MGTSF(RLC(1.IXRLC). CLAS.RLNOD) into SFM in /SUPC/.

Assembler Inputs

Arguments. None.

Parameter Slots. None.

Examples

SFM can be used at a node that processes different management classes defined in MGTCL dataset.

```
RLOOP (P = *FCRAT $
       1 = CLSPC, CLAS,
           SFM, MDLY,
           MLOOP (1 = CICPD),
           TOCCP (P = 1 $ ))
```

GASP Files Used

None.

Permanent Attributes Accessed

MGTSF (demand origination node, claspr, source node) - factors to split a flow from origination node into flows in management classes at source node.

Verb Inputs

From Calling Program.

In /SUPC/:

IXRLC - index to coordinates of FCRTYP rate dataset in RLC array

CLASPR - class * 100 + priority

In /RLSYS/:

RLNOD - rate/level node number.

<u>Verb Outputs</u>

<u>To Calling Program</u>.

In /SUPC/:

SFM - array containing elements from MGTSF dataset (array is cleared to zero if dataset is not found).

<u>Programs Called</u>

<u>Verbs</u>. None.

<u>Other</u>. CLER1, PERMDS.

<u>Input/Output Files Used</u>

None.

SLOSS (MSW, IXD)

General Description

Simulate random losses from inventories and the ordering of their replenishment. The loss in a time period is computed in two stages. First a random number is drawn and compared with SLOSS.1 to see whether there is a loss. If there is, the fraction of the current inventory lost is determined by a call to VDISTR(QLOSS), where QLOSS, taken from SLOSS.2, is the index of a probability function described in PARAM. Replenishment is delayed by delay SLOSS.3. The due-in level FCSTKS(C1).2, is increased by the replenishment quantity, namely the delayed replenishment rate multiplied by TSTEP. The replenishment rate is entered into RATATT.1 for the demand rate associated with the successor to the current node in the rate stack pointed to by FCRAT(C2).(IXD+2).

Assembler Inputs

Arguments.

MSW - if 0, use CLASM for dataset coordinates
if positive, set M to MSW and use CLAS for dataset accessing

IXD - demand rate path to use for replenishment of losses.

Parameter Slots.

1 - define links in setup pass

2 - convert rating to flow (e.g., UDDMD).

Examples

SLOSS can be used anywhere in a node when coordinates C1 and C2 have been set for an FCRAT dataset.

```
NODEA.  RLOOP (P = *EXRAT $
                    1 = CLAS, CLRXN,
                        ACSUP (... ) + DEFINE LINKS
                        SLOSS (P = 1,2 $
                               1 = BRLKD (P = 2 $
                                              2 = RLDLK (P = *NODEB, 0.) $
                               2 = UDDMD (P = 2))))
```

+ A special loss replenishment link is defined to NODEB.

(SLOSS-1)

GASP Files Used

None.

Permanent Attributes Accessed

FCRAT (node, claspr) - pointer words to rate stacks

SLOSS (node, class) -

1 - probability of loss of inventory

2 - index to distribution in PARAM of quantity lost

3 - loss replenishment delay

FCSTKS (node, class).1 - actual on hand level.

Verb Inputs

From Calling Program.

In /SUPC/:

C1 - coordinate array (node, class)

C2 - coordinate array (node, claspr)

From UNIFRM.

Argument

ZSWT - random number

From VDISTR.

In /ZMAWSY/:

ZSWT - fraction of AOHL lost

From RLDLY.

Function Value - delayed replenishment rate

From ABOXST. None.

Verb Outputs

To UNIFRM. None.

To VDISTR.

Argument - index of quantity lost distribution in PARAM

To RLDLY.

Arguments

First - replenishment rate/level delay index

Second - loss replenishment rate

(SLOSS-2)

To ABOXST.

Arguments -

First - name of boxcar dataset OBOX

Second - coordinates of boxcar dataset

Third - level to add to OBOX for OST calculation

To PDS datasets.

FCSTKS (node, claspr).2 - incremented ADIL

FCRCPT (node, claspr) - adjusted receipt accommodations

RATATT (RIXDT).1 - demand rate increment for losses

To PS1.

In /RLSYS/:

LKDST - name of rate dataset type for link stack pointers

LKCDS - coordinates of rate dataset

IXDRAT - index to demand rates in FCRAT

IXRRAT - index to receipt rates in FCRAT

To Calling Program. None.

Programs Called

Verbs. DISTR.

Other. ABOXST, PERMDS, CLASS, RLDLY, UDDRA1, UNIFRM.

Input/Output Files Used

None.

(SLOSS-3)

SUMXI

General Description

Aggregates accross 1st index of XI into summary variables XIS. At theater and CONUS in the DSS flow model. This corresponds to summarizing across management classes to obtain the overall response to an account.

Assembler Inputs

Arguments. None.

Parameter Slots. None.

Examples

SUMXI can be used after an MLOOP to sum stock status values over all management classes.

```
RLOOP (P = *FCRAT $
       1 = CLAS,
           SFM,
           MLOOP (1 = CDMDS (P = 0 $
                                1 = CPNBO)),
           SUMXI,
           CISSU (P = 2, 1.),
           CPASS (P = 1)
```

GASP Files Used

None.

Permanent Attributes Accessed

None.

Verb Inputs

From Calling Program.

In /SUPC/:

XI - array equivalenced to stock status elements for an individual account.

Verb Outputs

To Calling Program

(SUMXI-1)

In /SUPC/:

XIS - summary array for stock status variables, aggregated across 1st index of XI which is management class.

Programs Called

Verbs. None.

Other. CLEAR.

Input/Output Files Used

None.

TFILL

General Description

Verb to calculate fill rate distribution value from a tabular distribution. Returns f(x), given x, where f(x) is expressed as a piecewise linear function in DTABLE. IZSWT is assumed to contain the PARAM index by which the table is identified. The table entries are pairs of the form (x,f(x)).

Assembler Inputs

Arguments. None.

Parameter Slots. None.

Examples

TFILL can be used in PS1 of CDMDS

```
CDMDS (P = 1 $
       1 = TFILL $
       2 = CBO   )
```

Statistics Collected

None.

GASP Files Used

None.

Permanent Attributes Accessed

None.

Verb Inputs

From Calling Program.

In /ZMAWSY/:

IZSWT - parameter index of table in array PARAM

ZSWT - x value

To XLINE.

Arguments -

First - index of distribution in PARAM array

Second - x value.

(TFILL-1)

Verb Outputs

From XLINE.

Function value - f(x) value

To Calling Program.

In /ZMAWSY/:

ZSWT - f(x) value.

Programs Called

Verbs. None.

Other. XLINE.

Input/Output Files Used

None.

(TFILL-2)

TOCCP (IXR)

General Description

Starts a receipt rate from a source node to a CCP or a customer. This verb converts IFSRS in /SUPC/ into the top return rate in the IXR-th return rate stack for the current NODE/CL/PRI reflected in the coordinates in RLC (*,IXRLC), where IXRLC is in /SUPC/. The pointer to the IXR-th return stack is assumed present in RATPS(IXR+2) in /SUPC/, having been defined during a setup pass. PS1 is made available for adjusting the rate or its attributes. For example, RDENS may be used in it to derive the density of the flow in terms of WSUM and CSUM in /SUPC/.

Assembler Inputs

Arguments.

IXR - index to the receipt rate to use for the issue from stock rate from this node.

Parameter Slots.

1 - rate adjustments may be made through PS1 (e.g., RDENS).

Examples

TOCCP can be used at a source of supply node after IFSRS has been set in /SUPC/.

```
RLOOP (P=*FCRAT $
1 = CLSPC, CLAS, MDLY, MSET,
        CICPD,     + FILL BY ACCT/PRI/CLAS
        TOCCP),
*NXNOD $
```

GASP Files Used

None.

Permanent Attributes Accessed

None.

Verb Inputs

From Calling Program.

In /SUPC/:

IFSRS - issue from stock rate accumulated over all M classes

RATPS - elements of rate dataset

ND - number of demand paths in rate dataset

NR - number of receipt paths in rate dataset

From UDRR. None.

Verb Outputs

To UDRR.

Arguments -

First - IFSR to update receipt rate with

Second - the successor to rate stack entry associated with KRLNOD will be updated

Third - pointer to rate stack to update

Fourth - top switch, value of 1. indicates that top stack entry is to be updated if KRLNOD entry is not found.

To PS1.

In /SUPC/:

IFSRS - issue from stock rate.

To Calling Program. None.

Programs Called

Verbs. None.

Other. UDRR.

Input/Output Files Used

None.

(TOCCP-2)

UDDMD (IXD)

General Description

This verb calls routine UDDR with a zero rate to update the demand rate with the rate increment present in the PDS dataset RATATT.1 for the specified rate stack entry.

Assembler Inputs

Arguments.

IXD - index to the demand rate stack pointer word in RATPS array, i.e., which demand path to update.

Parameter Slots. None.

Examples

UDDMD can be used to transfer a rate increment in RATATT to the rate stack for a node, where the RATATT value has been developed by another verb such as SLOSS. UDDMD should not be used for normal demand path updating since it ignores the standard demand rates such as DPASR and REPLR in /SUPC/ and uses only the RATINC. Care should also be taken so that UDDMD does not destroy a value in the rate stack that has already been set in the rates pass, such as in UDRAT.

```
SLOSS (P = 1, 2),          + CALCULATE LOSSES
UDDMD (P = 2)              + PLACE LOSS REPLENISHMENT
                           + DEMANDS IN PATH D2
```

GASP Files Used

None.

Permanent Attributes Accessed

None.

Verb Inputs

From Calling Program.

In /SUPC/:

DARP - array of demand and receipt pointer words from FCRTYP dataset

(UDDMD-1)

ND - number of demand paths in FCRTYP dataset

From UDDR. None.

Verb Outputs

To UDDR.

Arguments -

First - 0 rate value to update demand stack, causes RATINC in RATATT dataset to be used alone

Second - KRLNOD, positive value indicates that successor entry to KRLNOD is to be used

Third - pointer to rate stack in DTABLE to search

Fourth - bottom switch, 1. value indicates that bottom stack entry should be updated if KRLNOD entry cannot be found.

To Calling Program. None.

Programs Called

Verbs. None.

Other. UDDR.

Input/Output Files Used

None.

UDRAT (IRPLP, IXD, IXR)

General Description

Updates demand and return rates exiting a node for a class CLAS of priority PRI with index IPRI. The demand rate stack updated is that pointed to from DARP in /SUPC/. It is updated in terms of the passing rate DPASRI(M). Unless IRPLP = IPRI. In which case the sum DPASRI(M) + REPLR is used. The receipt rate stack updated is that pointed to by IRCTP(IXR). It is updated in terms of the sum IFSRI(M) + IABORI(M) + RPASRI(M).

Assembler Inputs

Arguments.

- IRPLP - index to the replenishment priority, if IRPLP = IPRI, then the replenishment REPLR is added to the demand passing rate
- IXD - index to the demand rate to update
- IXR - index to the receipt rate to update, if 0, only demand rate is updated.

Parameter Slots. None.

Examples

UDDMD can be used after CDMDS and CRCPT have calculated the proper value for the rates in /SUPC/.

```
CSUP (P = 1 $
      1 = PLOOP (1 = PRSPL,
                 CDMDS (P = 1 $
                        1 = WBFIL $
                        2 = CBOP ),
                 CRCPT (P = 1 $
                        1 = WBFIL ),
                 UDRAT (P = 2,1,0)))
```

GASP Files Used

None.

(UDRAT-1)

Permanent Attributes Accessed

None.

Verb Inputs

From Calling Program.

In /SUPC/:

M - index to management class in MGTCL dataset

IPRI - index to priority code in PRIORY dataset

DPASRI - demand passing rate

REPLR - replenishment rate

IFSRI - issue from stock rate

IABORI - issue against back order rate

RPASRI - receipt passing rate

ND - number of demand paths in FCRTYP dataset

DARP - array of demand and receipt pointers in FCRTYP dataset

IRPTR - array of demand and receipt pointers in FCRTYP dataset

Verb Outputs

To UDDR.

Arguments -

First - demand rate to update stack entry with

Second - KRLNOD, update successor entry to this node

Third - pointer to stack in DTABLE

Fourth - bottom switch, 1. value indicates update of bottom entry if KRLNOD entry is not found.

To UDRR.

Arguments -

First - receipt rate to update stack entry with

Second - KRLNOD, update the successor entry to KRLNOD entry in stack

Third - pointer to stack in DTABLE

Fourth - top switch, 0. value indicates no action if KRLNOD entry is not found.

(UDRAT-2)

<u>To Calling Program</u>. None.

<u>Programs Called</u>

<u>Verbs</u>. None.

<u>Other</u>. UDDR, UDRR.

<u>Input/Output Files Used</u>

None.

(UDRAT-3)

WRCKF

General Description

Special verb to turn off a war reserve node in the DSS models when the fill performance has fallen below a certain value. Checks war reserve fill performance against a threshold. When fill for all classes has fallen below their respective thresholds, PS1 + PS2 are executed to schedule advances of stage sequence and execution of setup passes for delinking. Threshhold is in WR(C1).1. Current fillrate is in FCDMD (C2).4.

Assembler Inputs

Arguments. None.

Parameter Slots.

1 - R-delay to schedule stage advance and delinking setup pass

2 - R-delay to schedule another stage advance, etc.

Examples

```
+
+ war reserve and theater safety level stocks
+
WRSL. RLNOD(P = *WRSL, 79.),
      STGBR(P = 79$ 1=*CONUS$          7=*CONUS),
      CLSPC,
      PLOOP(P=*FCRAT  $
            1=CLAS,MSET,
              CDMDS(P=0$
                    1=TFILL  $
                    2=STGBR(P=79$
                            3=CPALL,DUPDI,PASSL)),      +PASS ALL DMD
              CISUI(P=0,3,1.),
              STGBR(P=79$  5=*CONUS),
              CPASI(P=0,1  $
                    1=BRLKR(P=3$
                            3=STGBR(P=79$
```

(WRCKF-1)

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```
                                    6=DERLK(P=0))),   +DELETE ALL R LINKS
                        BRLKD(P=2$
                             1=STGBR(P-79$
                                    2=ADDLK(P=*CONUS,*WRSL,0.,-1)$
                                            +ADD WR LNK BEFORE CONUS,D1
                                    4=DEDLK(P=*WRSL))$ +DELETE DMD D1
                             2=STGBR(P=79$
                                    6=DEDLK(P=*WRSL))))), +DELETE 2ND LNKS
        STGBR(P=79$  3=*WRSL.2), *CONUS
/2/     MLOOP(1=CSUP(P=0,SETPR(P=1.),SLOSS(P=0,0)),
        WRCKF(1=RTURN(P=0),*WRSL.3$         +SCHEDULE DELETION OF DMD LNKS
             2=RTURN(P=242),*WRSL.3),      +SCHEDULE DELETION OF RTRN LNKS
        *CONUS
+
+ SUBNODE 3 - ADVANCE STAGE SEQ AND INITIATE SETUP PASS FOR DELINKING
/3/     ADSTG(P=79),RLMSU,*RLCTR
        +            END OF NODE WRSL
```

<u>GASP Files Used</u>. None.

<u>Permanent Attributes Accessed</u>

PRIORY (node) - priority codes for node classes

WR (node, claspr) -

1 - fill rate threshold

FCDMD (node, claspr).4 - demand fill rate

<u>Verb Inputs</u>

<u>From Calling Program</u>.

In /SUPC/:

C1 - coordinate array (node, class)

C2 - coordinate array (node, claspr)

In /RLSYS/:

RLNOD - rate/level node number

<u>Verb Outputs</u>

(WRCKF-2)

From Calling Program.

In /SUPC/:

C1 - coordinate array (node, class)

C2 - coordinate array (node, claspr)

In /RLSYS/:

RLNOD - rate/level node number

Verb Ouputs

To PS1.

In /MAWVRB/:

HOLD(1) - time for war reserve turn off

To PS2.

In /MAWVRB/:

HOLD(1) - time for war reserve turn off

Programs Called

Verbs. None.

Other. CLASS, IDSLON, PERMDS.

Input/Output Files Used. None.