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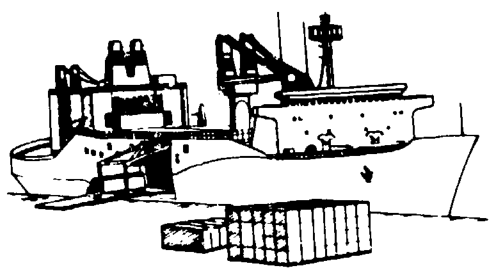
MTMCTEA REPORT
SE 87-3d-15

PORT OPERATIONAL PERFORMANCE SIMULATOR (POPS)

VERSION 1.0
USERS MANUAL



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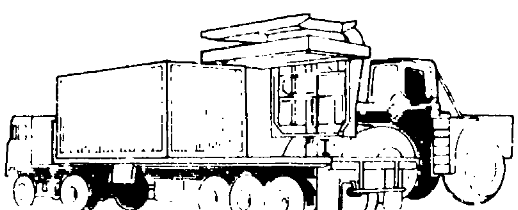

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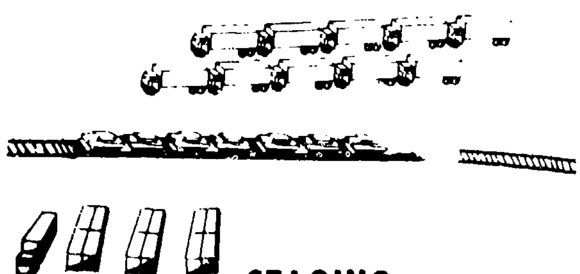

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MILITARY TRAFFIC MANAGEMENT COMMAND
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MTMCTEA REPORT SE 87-3d-15

PORT OPERATIONAL PERFORMANCE SIMULATOR (POPS)

Version 1.0

Users Manual

May 1987

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MILITARY TRAFFIC MANAGEMENT COMMAND

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FOREWORD

This users manual describes the port operational performance simulator (POPS) model and contains pertinent information for use of the model to determine the capability of seaports to transship military cargo. The model yields values of daily port throughput capability in terms of short tons (STON) and measurement tons (MTON) based on a weak-link analysis of the transportation subsystems normally associated with operation at seaports.

The POPS system programs are written in the BASIC programming language and are resident on a floppy disk formatted for IBM-compatible personal computers (PCs). The system architecture consists of four chained (automatically loaded and sequentially executed) programs and three data files. The user must prepare a port data file that summarizes the transportation facilities available at the port. To aid the user, a sample port data file is provided on the disk and discussed in the text. The user also has the option of interactively changing the values of operational parameters during program execution. This manual provides instructions on creating the data files and summarizes the steps required to execute the programs.

The programs generate throughput capability data for the port in a series of tables, which are printed sequentially for each terminal comprising the port. During program execution, the user has the option of interactively selecting the resulting output. Sample tables are discussed in this manual.

Trade names cited in this report do not constitute an official endorsement or approval of the use of such commercial hardware or software.

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I. INTRODUCTION

The Military Traffic Management Command Transportation Engineering Agency (MTMCTEA) developed the port operational performance simulator (POPS) computer model to assist planners in estimating the cargo throughput capability of marine terminals. The model yields throughput capability values for three transportation subsystems - shipping, staging, and terminal processing (cargo reception or clearance) - in terms of STON and MTON per day.

The procedure used for estimating capability is based on a weak-link analysis, in which each subsystem is analyzed separately and then compared to find the least capable subsystem. Since the output of the port can be no greater than that of the limiting subsystem, the weakest subsystem defines the maximum throughput capability of the terminal. The throughput capability of the port can be determined by summing the capabilities of the weak-link subsystems of each terminal comprising the port complex.

Specific estimates of marine terminal capability apply only to a very narrow set of conditions and operating parameters. The throughput capabilities of terminal subsystems are significantly impacted by several factors unrelated to terminal characteristics. Such factors include the class of cargo, type of ship, and mode of land transportation. Since these factors change continuously, average values related to specific transshipments must be used in calculating the average long-term throughput capability of marine terminals. The POPS programs allow the user to interactively change these factors for each new run.

Section II of this manual provides an overview of the system architecture of the POPS programs and brief descriptions of the required data files and the possible computer-generated output. Detailed discussions on data files preparation, program execution procedures, and program output are provided in sections III, IV, and V, respectively. The user is encouraged to read all sections of this manual before attempting to use the software to analyze the throughput capability of actual ports. However, for demonstration purposes, the user can turn to section IV and execute the POPS programs using the sample port data file "SAMPLE", which is on the POPS operating disk.

POPS programs are designed to be user friendly and to operate in a very interactive environment. The development of the programs has been an evolutionary process, and much remains to be accomplished. Although many enhancements to the methodology and programs are planned, the current programs yield useful estimates of marine terminal capability. Questions and comments regarding the POPS programs should be forwarded to MTMCTEA.

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II. SYSTEM ARCHITECTURE

A. GENERAL

The system architecture of the POPS programs and the associated data files are shown in figure II-1. As shown, the system is composed of four chained programs, which require input from the three data files. The output generated by the programs consists of a series of tables, which summarize the capability of the various transportation subsystems.

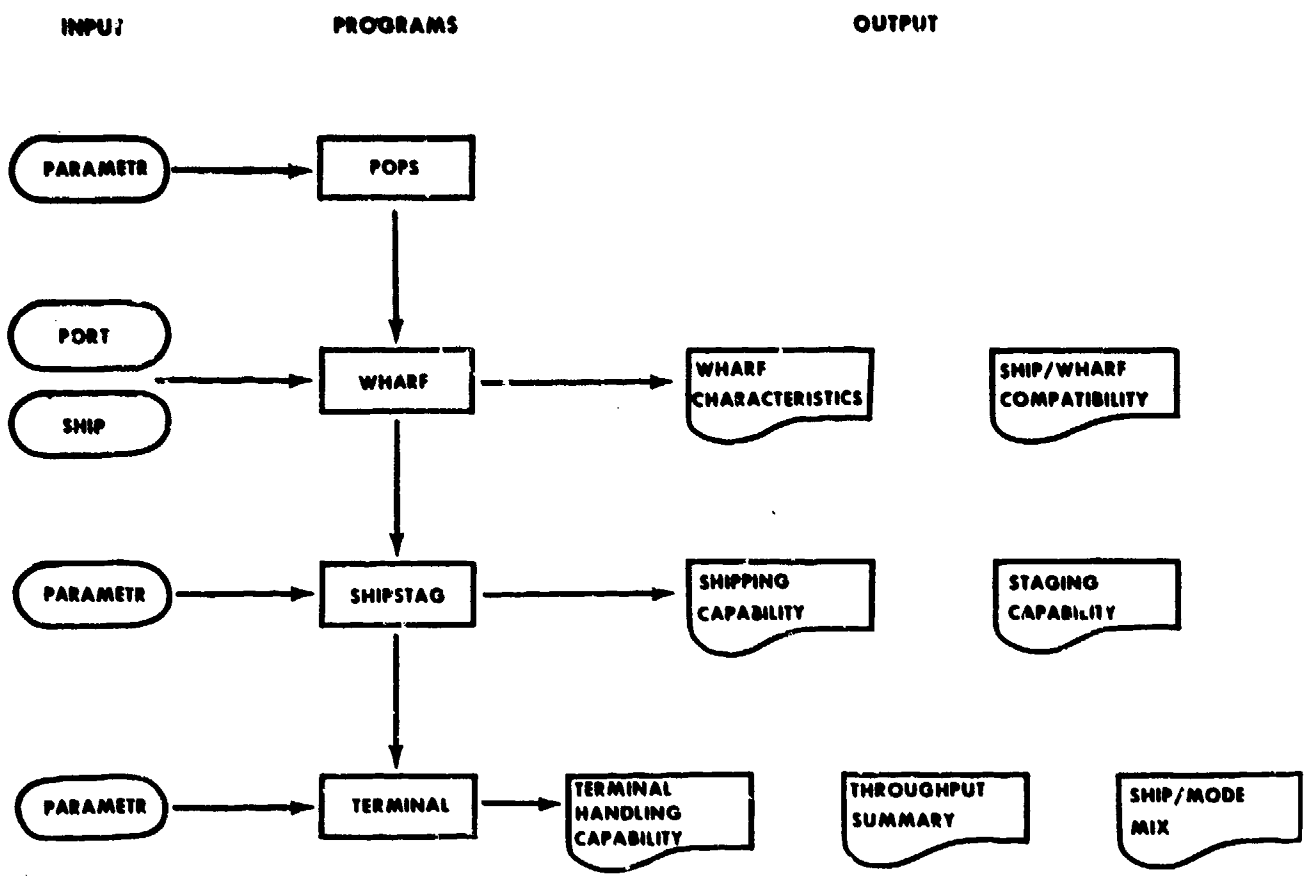

Figure II-1. POPS system architecture.

All programs and data files related to the POPS system reside on one floppy disk. Since data files are added to this operating disk and available disk space is correspondingly reduced, the user should duplicate the system files onto other disks before proceeding. This can be done in DOS using the command COPY B:*.* to copy files from the original disk in drive B to a new, formatted disk in drive A.

B. PROGRAMS

The four programs are written in the BASIC programming language and can be run on the IBM-PC or compatible computer. The programs are chained together, which enables the user to run successive programs without leaving and reentering the system. Details concerning program execution are summarized in section IV.

The master program "POPS" is a menu system program, which initiates program execution and allows the user to interactively determine analysis parameters, output options, and the level of user-supplied logic to be used in assigning ships and cranes to berths. The execution of the three remaining programs is governed by these interactive selections.

C. DATA FILES

The three data files the programs require consist of an operating parameter file, "PARAMETR"; a vessel characteristic file, "SHIP"; and a port data file, which the user creates and names. The parameter data file can be interactively revised at the user's option during program execution. The EDLIN feature in DOS is used to create or edit the two remaining data files.

Although the vessel characteristic file can be edited to meet specific requirements of the user, use of the original default file minimizes the need for user-supplied data. The user must create the port data file prior to program execution. Separate data files are required for each port, although each file can contain any number of terminals. During program execution, the user is asked to supply the name of the port data file.

Details concerning the development of data files are provided in section III.

D. PROGRAM OUTPUT

The output generated by the POPS programs is formatted in a series of tables, which are printed sequentially for each terminal. Separate tables provide the throughput capability of the various transportation subsystems. A summary table of terminal throughput capability is also available.

During program execution, the user selects the tables to be printed. Sample tables showing the available output from the programs are provided in section V.

III. DATA FILES

A. GENERAL

This section outlines the procedures required to develop the three data files the POPS programs require. Although the parameter data file can be interactively updated during program execution, the user must know how to use the EDLIN function in DOS to create the port data file and to edit the ship characteristic file

B. PARAMETER DATA FILE

The parameter data file is revised during execution of POPS. It contains values for shipping rates, ship and cargo mixes, storage data, terminal handling rates, and other operational parameters. New parameter values input during program execution are used in the current program run and in all future runs until the user again revises the values. The parameters and their default values are displayed on the screen during program execution. The user can choose to use the default value by pressing the return key or to input a new value by typing the value and then pressing the return key. The cursor need not be relocated within the entry cell prior to entering new data. The default parameter values shown on the screen are notional scenario values and, as such, are not applicable to all scenarios.

C. VESSEL DATA FILE

The vessel file, "SHIP," is on the operating disk and need not be of concern to the user. The user does, however, have the ability to change the vessel characteristics listed in the file by using the EDLIN function in DOS. The vessel characteristics used in this file are shown in table III-1. MTMCTEA plans to add a NATO ship data file, which could be used as an alternative ship file by the POPS programs.

D. PORT DATA FILE

The port file is created by the user using the EDLIN features in DOS. The user must be in the DOS system to use EDLIN. When in DOS, the computer prompt is A. To return to DOS from BASICA, the user types in SYSTEM. A brief overview of the EDLIN features is provided in appendix A; however, the user should reference the DOS manual to learn to use EDLIN.

A separate port file, which is normally named after the port, is created for each port complex. File names should be limited to eight alphanumeric characters. Information in the file is organized by port terminals, and each port file can have data on an unlimited number of terminals.

TABLE III-1
VESSEL CHARACTERISTICS

Type of Vessel (SHIPNMS)	Max Draft (DRAFT)	Apron Width Reqd (APRON)	Vessel Length (LENGTH)	Straight Stern Ramps (STRRAMPS)	Container Cranes Reqd (CONTCRANE)	Number of Hatches (HATCHN)	Shore Ramps Reqd (SRAMPS)	Ramp Ht Above Keel (HTRAMP)	Length Stern Ramp (LSRAMP)	Length Side Ramp (LSDRAMP)
Breakbulk										
C4 Mariner-class	31	20	564	no	no	7	no	0	0	0
C4-S-66a	31	20	512	no	no	7	no	0	0	0
C3-S-38a	28	20	492	no	no	6	no	0	0	0
C4-S-1qb and 1s	32	20	565	no	no	5	no	0	0	0
C3-S-33a	31	20	483	no	no	5	no	0	0	0
C3-S-37d	30	20	495	no	no	3	no	0	0	0
C3-S-37c	32	20	495	no	no	5	no	0	0	0
C4-S-69b	31	20	579	no	no	5	no	0	0	0
C4-S-66a	32	20	540	no	no	6	no	0	0	0
C5-S-37e	30	20	592	no	no	6	no	0	0	0
Seatrain										
GA and PR-class	27	20	560	no	no	0	no	0	0	0
Barge										
LASH barge	9	20	115	no	no	0	no	0	0	0
SEABEE barge	11	20	175	no	no	0	no	0	0	0
LASH C8-S-81b	35	10	820	no	no	0	no	0	0	0
LASH C9-design	38	10	898	no	no	0	no	0	0	0
SEABEE C8-S-82a	39	10	876	no	no	0	no	0	0	0
RORO										
Callaghan	27	20	694	yes	no	0	no	38	42	59
Comet	22	20	499	yes	no	0	no	34	38	40
C7-S-95a/Maine-class	32	60	735	no	no	0	no	50	115	0
Ponce-class	28	100	700	no	no	0	yes	0	0	0
Great Land-class	28	100	791	no	no	0	yes	0	0	0
Cygnus/Pilot-class	26	60	634	no	no	0	no	44	115	0
Meteor	24	20	540	yes	no	0	no	34	45	45
AmEagle/Condor	30	66	635	no	no	0	no	37	79	0
MV Ambassador	21	20	554	yes	no	0	no	39	43	0
FSS-class	34	60	946	no	no	0	no	49	110	37
Container										
C6-S-1w	29	20	661	no	yes	0	no	0	0	0
C7-S-68e	32	26	701	no	yes	0	no	0	0	0
C8-S-85b	33	26	669	no	yes	0	no	0	0	0
Combination										
C5-S-78a	24	20	605	no	yes	0	no	0	0	0
C5-S-37e	30	20	592	no	yes	0	no	0	0	0
C4-S-1U	32	20	564	no	yes	0	no	0	0	0

Care must be exercised when developing these files since small errors or incomplete data entry will provide erroneous results or most likely stop program execution. Port data files should be checked closely if program execution is terminated by an error condition or if messages, such as "DIVISION BY ZERO" or "OVERFLOW," occur on the screen during program execution.

The port data file consists of a series of data lines that summarize the transportation characteristics of the terminal. The data elements required in the files are summarized in figure III-1 and explained in tables III-2 and III-3. The first line of the file specifies the port name and the number of terminals at the port and in the data file. The next line begins the description of the first terminal. The first terminal line specifies the name of the terminal and the number of data lines to be entered for each subsystem at the terminal (for example, two gates require two lines of data in the file). Data pertaining to each subsystem are added sequentially to the file, beginning with the characteristics of the wharves/berths. Each subsystem can have as many data lines as needed. The data lines for successive terminals continue in the data file until all terminals are described.

Line	Name	Remarks
1	PORTNM$, NB	Port name, number of terminals
2	Q$, CHDRAFT ANCHDF N T S H G EM [illegible] ER DK TIDE TBL1$, TBL2$	Name of terminal, harbor characteristics, and number of data lines
3	WHRFNM$, WCRAFT WAPRON WLNGTH WCRANE WCONTCN WSTRNR WRAILA WSPAMP WHARPRON WDKSTR WLITES$, WTSHED$	Wharf 1 berth characteristics
4	MCRANE NOCRN BLOCRN LLOCRN CLOCRN	Crane characteristics and wharf assignment
5	STYPE$, SQ S S S S S S HGHT	Staging areas and container stacking height
6	HWYNAME$, GATE LANES HWYSURF HWYSPD VEHINT PERTRAF CROSS HALT	Terminal/Local roadway factors
7	GATENAME$, GLANES DELAY	Terminal gate factors
8	TRMPNAME$, TRAMPS	Truck end-ramp characteristics
9	RTRKNAME$, TPERDAY RCPERTR	Railroad characteristics
10	RRMPNAME$, RTKLNGTH	Rail end-ramp characteristics
11	DOCKNAME$, VANDOCKS BOXDOCKS TSHED$, APTRK$, WHRFDCK$	Warehouse dock characteristics

Figure III-1. Port data file elements.

The user should organize the required data for the port before attempting to create the port data file. Forms that can be used to organize port data to facilitate file creation are provided in appendix B. The user is encouraged to make copies of these pages and to complete the forms before attempting to create port data files on the computer.

A sample port data file, which is available on the operating disk, is shown in figure III-2. The user can use this file, which is called "SAMPLE", to experiment with the POPS programs and as a guide in preparing port files. To use "SAMPLE", respond to the interactive question, "Port Data File Name:", by typing in SAMPLE.

TABLE III-2
SUMMARY OF DATA ELEMENTS IN PORT DATA FILES

PORTNM$	= Port name
NB	= Number of terminals
Q$	= Name of terminal
CHDRAFT	= Minimum channel depth
ANCHDF	= Maximum anchorage depth
N	= Number of wharf data lines
T	= Number of equipment data lines
S	= Number of staging data lines
H	= Number of highway data lines
G	= Number of gate data lines
EM	= Number of truck end-ramp data lines
R	= Number of railroad track data lines
ER	= Number of railcar end-ramp data lines
DK	= Number of warehouse dock data lines
TIDE	= Tidal range (ft)
TBL1$	= Name of wharf characteristic table
TBL2$	= Name of wharf/ship compatibility table
WHRFNM$	= Wharf/berth name
WDRAFT	= Depth alongside (MLW - low tide)
WAPRON	= Apron width (if open, input 110)
WLNGTH	= Berth length
WCRANE	= Number of wharf cranes
WCONTCN	= Number of container cranes
WSTRNR	= Number of straight stern ramps
WRAILA	= Length of berth with rail access
WSRAMP	= Number of Ponce/Greatland ramps
WHARPRON	= Apron height above MLW
WDKSTR	= Deck strength (pounds per square foot - psf)
WLITES$	= Apron lights (y or n)
WTSHED$	= Transit shed (y or n)
MCRANE	= Crane capacity (STON)
NOCRN	= Number of cranes
BLOCRN	= Wharf assignment (number of wharf data line) for breakbulk shipping. If zero, computer assigns.
LLOCRN	= Wharf assignment (number of wharf data line) for barge shipping. If zero, computer assigns.
CLOCRN	= Wharf assignment (number of wharf data line) for container shipping. If zero, computer assigns.
STYPE$	= Storage surface type: op = open paved, og = open gravelled, os = open other, c = covered
SQ	= Staging area (sq ft)
S	= Wharf assignment of staging area (number of wharf data line). If zero, computer assigns.
HGHT	= Container stacking height (ft)
HWYNAME$	= Highway name
GATE	= Gate accessed (number of gate data line)
LANES	= Number of lanes
HWYSURF	= See table III-3
HWYSPD	= See table III-3
VEHINT	= See table III-3

TABLE III-2 - cont

PERTRAF	= See table III-3
CROSS	= See table III-3
HALT	= See table III-3
GATENAME$	= Gate name
GLANES	= Number of lanes at gate (direction of concern only)
DELAY	= Truck delay at gate (1 to 3 minutes average per vehicle)
TRMPNAME$	= Truck end-ramp name
TRAMPS	= Number of handling positions at ramp
RTRKNAME$	= Name of railroad track
TPERDAY	= Trains per day over track
RCPERTR	= Railcars per train
RRMPNAME$	= Railcar end-ramp name
RTKLNGTH	= Tangent length of track serving end ramp
DOCKNAME$	= Name of warehouse/transit shed
VANDOCKS	= Number of van handling positions
BOXDOCKS	= Number of boxcar handling positions
TSHED$	= Transit shed (y or n)
APTRK$	= Apron track on wharf adjacent to transit shed (y or n)
WHRFDCK$	= Name of wharf adjacent to transit shed (must match WHRFNM$ exactly). If none, enter NONE.

TABLE III-3
HIGHWAY CAPACITY FACTORS

Class of Roadway	Surface	Surface Factor	Average Speed (mph)		Vehicle Intervals (ft)	
			Rural	Urban	Rural	Urban
Type I	Concrete	1.00	30	20	325	200
	Bituminous	0.85	30	20	325	200
Type II	Bituminous treated	0.70	20	15	250	150
	Gravel	0.40	20	15	250	150
Type III	Earth	0.20	15	10	200	120

Road Location	Percent of Traffic	Operational Factors	
		Cross Movements	En Route Halts
Rural	66.7	0.90	0.75
Urban	33.3	0.60	1.00

```
SAMPLE PORT,  3
TERMINAL 1,  35   57  2  1  2  3 2 2 2 2 2 6  V-1,   V-2
1 & 2,    37  32   1140  0  0  0   1140  0  14  600   Y, Y
3,        35 110    925  0  0  0         0  0  14  600   Y, Y
100  5  0  0  0
op, 560160  0  0 0 0 0 0  0
c,   250153  0 0 0 0 0 0  0
Highway 1, 1 3 .8 20 300 .33 .60 .80
Highway 3, 2 2 .8 20 300 .33 .60 .80
Highway 2, 2 1 .6 30 250 .66 .75 .90
Gate 1, 2  1.5
Gate 2, 3  2.0
Truck Ramp 1, 2
Truck Ramp 2, 1
Track 1, 10  20
Track 2, 5  12
Rail Ramp 1, 800
Rail Ramp 2, 1200
Dock 1, 10 5 Y,Y,1 & 2
Dock 2, 20 4 N,N,NONE
TERMINAL 2, 35  57  2 2 3 2 2 2 2 2 2 3 V-3, V-4
USL A & B,     35 110  1443  0  2  0        0  0  14 1000  Y, Y
APL C & D,     37 110  1300  0  3  0        0  0  14 1000  Y, N
45  3  0  0  0
45  2  0  0  0
c,     38000  1 0 0 0 0 0   0
op,  1542235  1 0 0 0 0 0   8
op,  1029205  2 0 0 0 0 0   8
Highway 3, 2 1 .6 30 250 .66 .75 .90
Highway 4,  1 3 .8 20 300 .33 .60 .80
Gate 3,  1 2.5
Gate 4,   2 2.0
Truck Ramp 3, 4
Truck Ramp 4,  1
Track 3, 15  15
Track 4,  10  20
Rail Ramp 3,  1600
Rail Ramp 4,     240
Dock 3,   12   4   Y , Y, USL A & B
Dock 4,    16   5   N , N, NONE
TERMINAL 3, 35 57  4  5  8 2 2 2 2 2 2 6 V-5, V-6
2&3,      37    110    1015   0   2   0    0  0  14   1000  Y, N
4-6,      42    110    2700   0   3   0    0  0  14   1000  Y, N
8&9,      42    110    1355   0   3   0 1200  0  14    600  Y, Y
10,       35     32     839   0   0   1  839  0  14    600  Y, Y
40  5  0  0  0
15  5  0  0  0
100  4  0  0  4
240  2  0  0  0
140  3  0  0  0
c,            76205  4  0  0  0  0  0    0
c,            76189  3  0  0  0  0  0    0
op,         1377780  4  0  0  0  0  0    8
op,         2175975  3  0  0  0  0  0    8
op,         1975065  0 0 0  0  0  0   24
op,          594776  1  2  0  0  0  0   24
op,          692500  1  0  0  0  0  0   24
op,       80000       3 0  0  0  0  0    0
Highway 5, 1 2 .6 25 275 .5 .75 .90
Highway 6,  1 3 .8 22 325 .8 .75 .90
Gate 5, 4 3.5
Gate 6,  1 1.0
Truck Ramp 5, 1
Truck Ramp 6, 5
Track 5,  8  12
Track 6, 10  5
Rail Ramp 5,  1200
Rail Ramp 6,   1600
Dock 5, 8  2  Y, Y, None
Dock 6,  30 10 Y, Y, None
```

Figure III-2. A sample port data file.

IV. PROGRAM EXECUTION

A. GENERAL

This section outlines the steps involved in initiating and executing the POPS programs.

Prior to execution, the user should create a port data file or, for demonstration purposes, use the sample port file named "SAMPLE". The user should now perform the following sequential steps:

1. Insert an operating disk containing DOS and BASICA into drive A and POPS system disk into drive B and turn PC on.

2. When A> is displayed, enter BASICA and press return.

3. When flashing cursor is displayed, enter LOAD"B:POPS and press return.

4. When OK is displayed, enter RUN and press return.

The program is now executing, and the user should respond to the interactive questions. Program execution can be stopped at any time by pressing the CTRL&BREAK keys simultaneously. To restart the program or to begin the analysis of a new port, return to step 3 above and repeat procedure. Program execution can be paused at any time by pressing the CTRL&NUMLOCK keys simultaneously. To resume program execution, press any key.

B. INTERACTIVE SCREEN ENTRIES

The user directs subsequent program execution by responding to interactive questions, which are shown on successive screens. These screens and the associated questions are discussed in this section in the order of their occurrence. The user is encouraged to consult the following instructions during program execution.

1. Screen 1 (fig IV-1)

a. Port Data File Name. The user must supply the name of a previously created port data file. If (H) is entered, the computer will respond with a listing of all files on the operating disk. Once the desired port file is selected from the listing, the user should return to screen 1 and type in the file name exactly as it appeared in the catalog of files. For demonstration purposes, the user should type in "SAMPLE" for port data file name and press the return key.

b. Use Default Values (Y/N): Y. The default answer is (Y)es, so the user can simply press the return key if the default values are desired. This instructs the programs to print all output, to generate results using default operating parameters, and to assign cranes to berths for shipping operations. The user also loses the option of overriding computer berth assignments. If (N)o is entered, screen 2 appears and the user can override these default selections.

```
PORT DATA FILE NAME:        sample
USE DEFAULT VALUES (Y/N):   n
OUTPUT TO PRINTER (Y/N):    Y
CHANGE PRINTER TYPE (Y/N):  N



Do you have changes (y/n) :
```

Figure IV-1. Screen 1.

c. Output to Printer (Y/N): Y. The default answer is (Y)es, so the user can simply press the return key to direct output to the printer. This is the preferable option when using the SAMPLE port and going through this report for demonstration purposes.

If (N)o is entered, output is directed to the screen, but most tables are difficult to read because table width exceeds screen width. This option may be selected to accelerate program execution when testing new data files for errors.

d. Change Printer Type (Y/N): N. The default is (N)o, and the user can simply press the return key if the printer type does not need to be changed. If (Y)es is entered, the user will be given a chance to change the printer selection later during program execution on screen 4.

e. Do You Have Changes (Y/N)? After all questions on screen 1 are answered, the user will be asked if changes are necessary. If the user is satisfied with the responses to the screen 1 questions, then (N)o is the proper response to these questions. If the user wishes to change any of the responses, he/she responds (Y)es to this question and then has the option of changing the previous responses.

2. Screen 2 (fig IV-2)

If the user answers (N)o to the "use default value" question on screen 1, screen 2 appears. The user then has the option of updating screen 2.

a. Print All Output (Y/N): N. The default (N)o can be entered by pressing the return key. If (N)o is entered, screen 3 appears and the user is asked to specify the tables to be printed. If the user responds with (Y)es, screen 3 does not appear and all tables are printed for each port terminal.

b. Parameter Changes (Y/N): Y. The default (Y)es can be entered by pressing the return key. If (Y)es is entered, several parameter screens appear and the user has the option of changing any or all of the parameter

```
                              PRINT ALL OUTPUT (Y/N):      Y

                              PARAMETER CHANGES (Y/N):     N

                              CRANE ASSIGNMENT (Y/N):      N

                              BERTH ASSIGNMENT (Y/N):      N


Do you have any changes (y/n) :
```

Figure IV-2. Screen 2.

values. If the user responds with (N)o, the program uses the default values of the operational parameters.

c. Crane Assignment (Y/N): N. The default value (N)o can be entered by pressing the return key. This directs the program to assign mobile cranes (those not given assignment in the port data file) for breakbulk and barge shipping operations. If the user responds with (Y)es, he/she is asked a series of questions during program execution to determine how the unassigned cranes should be allocated to the berths.

d. Berth Assignment (Y/N): N. The default value (N)o can be entered by pressing the return key. This indicates that the user does not want to override the computer's determination of those ships that can be berthed at each berth. If the user responds with (Y)es, he/she is asked a series of questions, which allow the user to assign the number of each vessel type that is berthed at each berth, during program execution.

3. Screen 3 (fig IV-3)

If the user answered (Y)es to the "print all output" question on screen 2, screen 3 does not appear and all tables are printed. If the user returned the default (N)o, screen 3 appears and the user then has the option of selecting specific tables for printing. The user can choose to print a table by simply pressing the return key. Pressing the (N)o key and then the return key prevent tables from being printed.

4. Screens 4 Through 7

If the user returned the default (N)o to the "parameter changes" question on screen 2, screens 4 through 7 do not appear and the default operating parameter values are used in the programs. If the user entered (Y)es, the screens appear sequentially, giving the user the option of revising any or all parameters. Once parameter value changes are made, the new values are used in all future program runs until the user again elects to make changes. The parameter values shown on the screens are not applicable to all scenarios and should be changed accordingly. A description of the parameter values follows.

```
                    Input (N) for tables not to be printed.


                          Y    Terminal Characteristics Table

                          Y    Wharf/Ship Compatibility Table

                          Y    Shiploading Capability Tables

                          Y    Staging Capability Table

                          Y    Terminal Handling Tables

                          Y    Throughput Summary Table

                          Y    Ship/Mode Mix Table

Do you have changes (y/n):
```

Figure IV-3. Screen 3.

a. Screen 4 (fig IV-4)

(1) Ship Operational Rates. Except for the container lift rates, these rates are in terms of STON and MTON per hour. The container rate is in terms of lifts per hour. Fixed wharf container cranes and mobile cranes used for container handling are given separate values.

(2) Ship Mix Percentages. These percentages represent the percent of cargo that is carried by each type of ship and, therefore, are based on ship sailings. The rates can be calculated from a known vessel mix, from movement tables prepared by the Military Sealift Command (MSC) for operational plans, or from simulated flows, using vessel inventories provided in Annex J (Mobility) of the Joint Strategic Capabilities Plan (JSCP).

(3) Berth Utilization Factor. This factor represents the percent of time that ships are being worked at the wharves. It reflects productivity losses resulting from the influence of harbor congestion on vessel berthing operations. Typically assumed values for this factor are 0.90 for ports with 10 or fewer berths and 0.70 for ports with 11 or more berths.

(4) Minimum Mobile-Crane Size. These crane sizes represent the minimum-size mobile cranes (in terms of STON capacity) that the POPS programs will select from the port data file for breakbulk, barge, and container vessel operations.

b. Screen 5 (fig IV-5)

(1) Ship Cargo Mix. These factors allow the user to identify the mix of cargo to be shipped on each type of vessel. The actual percentages of cargo are naturally different for each vessel; however, average values can be

```
SHIP OPERATIONAL RATES (STON/HR,MTON/HR):
    BREAKBULK RATES
      SHIP CRANE (15.0,37.5)              15.0        37.5
      DOCKSIDE CRANES (20.0,50.0)         20.0        50.0
    BARGE (20.0,50.0)                     20.0        50.0
    RORO RATES (200,800)                 200.0       800.0
    CONTAINER LIFT RATES (21,8)           21.0         8.0

SHIP MIX PERCENTAGES:
     BREAKBULK (35.3%)          35.3
     BARGE (10.0%)              10.0
     RORO  (15.6%)              15.6
     CONTAINER  (39.1%)         39.1

BERTH UTILIZATION FACTOR (0.9)     0.9

MINIMUM MOBILE-CRANE SIZE:
     BREAKBULK (100 STON)   100.0
     BARGE (20 STON)         20.0
     CONTAINER (100 STON)   140.0

Do you have any changes (y/n):
```

Figure IV-4. Screen 4.

assumed to represent reasonable average mixes for different military units, or for shipments of resupply materiel or ammunition.

(2) Storage Data. This factor represents the average dwell time (in days) that cargo will be staged at the port. Cargo is staged at seaports of embarkation (SPOEs) to ensure its availability when vessels arrive at the port. Based on limited ship inventories, vessels cannot be left idle while waiting for cargo to arrive at the port. At seaports of debarkation (SPODs), cargo should be cleared from the port as soon as possible and a dwell time of 1 day is reasonable.

(3) Space Utilization Factors. These factors represent the percentage of the total available space that actually can be used for staging cargo. They account for losses such as aisle and maneuvering space and losses due to cargo segregation and security.

(4) Facility Use Factor. This factor allows the user to identify the percentage of the port expected to be available for military use. The entire port may not be available, because of necessary commercial activity or facility losses resulting from military conflict or interdiction.

c. Screen 6 (fig IV-6)

(1) Stacking Height. These values represent the average stacking height (in feet) for various commodities. Naturally, vehicles are not stacked so this value represents the average height of a vehicle. Stacking heights for

```
SHIP CARGO MIX:
    BREAKBULK/BARGE
      ROADABLE VEHICLES (43 %)            43.0
      NONROADABLE VEHICLES (7 %)           7.0
      CONTAINER (15 %)                    15.0
      NONCONTAINER (35 %)                 35.0
    RORO
      ROADABLE VEHICLES (85 %)            85.0
      NONROADABLE VEHICLES (15 %)         15.0
    CONTAINER
      CONTAINER (100 %)                  100.0

STAGING DATA:
    STAGING DWELL TIME (3 DAYS)            3.0

    SPACE UTILIZATION FACTOR:
      OPEN (70%)           70.0
      COVERED (65 %)       65.0

FACILITY USE FACTOR(100%)      50.0

Do you have any changes (y/n):
```

Figure IV-5. Screen 5.

container staging are specified, by the user, in the port data file. Normally, 8 feet is used for single-height stacks, 16 feet for double stacks, and 24 feet for three-high stacks. A value of 12 can be used to represent a 50-50 mixture of single-height and double stacks [(8 feet x 0.5) + (16 feet x 0.5)].

(2) Motor Vehicle Parameters. These parameters represent the average carrying capacity (in STON and MTON) of motor vehicles. The convoy values are the average STON and MTON measurements of the military unit equipment being shipped.

(3) Railcar Parameters. These parameters represent the average carrying capacity (in STON and MTON) of railcars.

(4) Container Capacity. These values represent the average carrying capacity of a twenty-foot equivalent (TEU) container.

d. Screen 7 (fig IV-7)

(1) Truck Handling Rates. These rates allow the user to specify the loading times for flatbeds, heavy equipment haulers (HETs), and van semitrailers. A loading rate of four trucks per hour equals a handling time of 15 minutes per truck (60 minutes per four trucks).

(2) Railcar Handling Rates. These rates allow the user to specify the loading times for flatcars and boxcars. The end-ramp rate is for circus-style operations and must include time to install/remove blocking and

```
STACKING HEIGHT:
  OPEN
    GENERAL (7.5 ft)          7.5
    VEHICLE (7.6 ft)          7.6
  COVERED (10.0 ft)          10.0

MOTOR VEHICLE PARAMETERS (STON, MTON)
  CONVOY(3.5,17)          3.5        17.0
  FLATBED(20,60)         20.0        60.0
  VAN(16,40)             16.0        40.0
  CHASSIS(16,40)         16.0        40.0

RAILCAR PARAMETERS (STON, MTON)
  FLATCAR(50,150)        50.0       150.0
  BOXCAR(30,75)          30.0        75.0
  COFC(24,60)            24.0        60.0

CONTAINER (TEU) CAPACITY (8 STON,20 MTON)         8.0        20.0


Do you have any changes (y/n):
```

Figure IV-6. Screen 6.

```
TRUCK HANDLING RATES(Trucks/Hr):
  END RAMPS(4)            4.0
  VAN DOCKS(1)            1.0

RAILCAR HANDLING RATES(Railcars/Hr):
  END RAMPS(4)               4.0
  BOXCAR DOCKS(0.33)         0.3

LENGTH OF FLATCARS(60FT)        60.0

PRODUCTIVE WORK HOURS(20)       20.0

MODE MIX:
  ROADABLE VEH: CONVOY/FLATCAR(100%,0%)        100.0       0.0
  NONROADABLE VEH: HETS/FLATCARS(0%,100%)        0.0     100.0
  GEN CARGO: VAN/BOX(25%,25%)                   25.0      25.0
             FLATBED/FLATCAR(25%,25%)           25.0      25.0
  CONTAINER: CHASSIS/COFC(50%,50%)              50.0      50.0


Do you have any changes (y/n):
```

Figure IV-7. Screen 7.

bracing or chain tiedowns. A boxcar rate of 0.33 boxcar per hour results in a handling time of 3 hours per boxcar (1 hour per 0.33 boxcar).

(3) Length of Railcars. This value is used in the POPS programs to determine the railcar capacity of rail spurs serving end ramps. The value should represent the average length (in feet) of flatcars being handled at the end ramps.

(4) Productive Work Hours. This value allows the user to specify the number of productive work hours available each day for port transshipment operations. Normally, for mobilization operations, 20 hours of productive time is assumed to be available during each 24-hour day. Although any value may be used, the user may want to use 8, 10, or 12 hours per day to determine the capability of a single shift.

(5) Mode Mix. These values allow the user to specify the mode of land transportation used for the cargo being transshipped through the port terminal. The user selects the modes by specifying the percent of cargo shipped on each mode. For example, roadable vehicles are normally convoyed or transported on flatcars. If two-thirds of the vehicles are to be convoyed and one-third shipped on flatcars, the user should select a mix of 67 percent convoy and 33 percent flatcars.

e. Screen 8 (fig IV-8)

If the user answered (N)o to the "change printer type" question on screen 1, screen 8 does not appear and the previously selected printer type is used. If the user responded (Y)es to the question, then screen 8 appears and the user has the option of selecting one of the printers. The selection is made by typing in the alphanumeric characters associated with the desired printer type and pressing the return key.

```
For EPSON 100 printer, select   EP1
For EPSON 80 printer, select    EP2
For IBM printer, select         IBM

SELECT PRINTER TYPE:  ?
```

Figure IV-8. Screen 8.

V. PROGRAM OUTPUT

A. GENERAL

During program execution, the user has the option of selecting specific program output or having all tables printed for each terminal comprising the port complex. Screen 3, previously described in section III, outlines the tables that can be generated by the POPS programs. The tables are printed in sequential order, and the same tables are printed for each terminal.

B. DESCRIPTION OF OUTPUT TABLES

1. Wharf Characteristic Table (table V-1)

This table provides a listing of wharf characteristics. Based on these characteristics, the POPS programs can determine the types of ships that can be berthed at each wharf/berth.

2. Wharf/Ship Compatibility Table (table V-2)

This table indicates for each type of ship, the number of vessels that can be accommodated at each berth or the exception codes that indicate why given types of ships cannot be berthed. The table also provides the operational limitations that may hinder shipping operations. During program execution, the user has the option of overriding this computer-generated information.

3. Shipping Capability Tables (tables V-3 through V-7)

Shipping capability is summarized in a series of tables. The capability of the port terminal to accommodate exclusive breakbulk, barge, RORO, and container shipping is highlighted in separate tables. Additionally, a summary table is generated that combines the individual shipping capabilities to yield a mixed shipping capability. The mixed capability is based on the ship mix supplied by the user.

When determining the mixed shipping capability for berths with specialized container cranes, such as PACECO cranes, the POPS programs include in this capability only the container capability. For berths that have no specialized container cranes but are allocated mobile cranes for container operation, the POPS programs include all shipping capabilities in the mixed shipping capability.

4. Staging Capability Table (table V-8)

Staging capacity is summarized in a single table. To determine this capacity, the computer allocates the open and covered staging areas to each berth according to information the user provided in the port data file. The program allocates all areas not allocated by the user based on the relative capability of the berths. Once allocated, the program determines the capacity of the areas for each type of ship and then, using the ship mix supplied by the user, combines the capacities to determine the mixed staging capacity of the terminal.

TABLE V-1
SAMPLE PORT
BERTH CHARACTERISTICS OF TERMINAL 1

Characteristics	Berths 1 & 2	Berths 3
Length (ft)	1,140	925
Depth alongside at MLLW (ft)	37	35
Deck strength (psf)	600	600
Apron width (ft)	32	Open
Apron height above MLLW (ft)	14	14
Number of container cranes	0	0
Number of wharf cranes	0	0
Apron lighting	Yes	Yes
Straight-stern RORO facilities	No	No
Apron length served by rail (ft)	1,140	0

Notes:
1. Terminal open storage area is 12 acres
2. Terminal covered storage area is 250153 square feet

TABLE V-2
SAMPLE PORT
SUMMARY OF BERTHING CAPABILITIES OF TERMINAL 1

Vessel	Berths 1 & 2	Berths 3
Breakbulk		
C4 Mariner-class	1	1
C4-S-58a	2	1
C3-S-38a	2	1
C4-S-1qb and 1u	1	1
C3-S-33a	2	1
C3-S-37d	2	1
C3-S-37c	2	1
C4-S-69b	1	1
C4-S-66a	2	1
C5-S-37e	1	1
Seatrain		
GA and PR-class	1	1
Barge		
LASH barge	8	6
SEABEE barge	5	4
LASH C8-S-81b	1	1
LASH C9-design	a,f,g	a,f,g
SEABEE C8-S-82a	a,g	a,g
RORO		
Callaghan	d,o	1,d,i
Comet	d,o	1,d,i
C7-S-95a/Maine-class	b	1
Ponce-class	b,h	h
Great Land-class	b,h	h
Cygnus/Pilot-class	b	1
Meteor	d,o	1,d,i
AmEagle/Condor	b	i,j
MV Ambassador	d,o	1,d
FSS-class	b	c
Container		
C6-S-1w	1,e	1,e
C7-S-68e	1,e	1,e
C8-S-85b	1,e	1,e
Combination		
C5-S-78a	1,e	1,e
C5-S-37e	1,e	1,e
C4-S-10	1,e	1,e

a = maximum vessel draft limited to berth depth
b = inadequate apron width
c = inadequate berth length
d = no straight stern-ramp facilities
e = no container-handling equipment
f = inadequate berth depth, adequate anchorage depth
g = inadequate channel depth
h = no shore-based ramps available
i = insufficient ramp clearance at low tide
j = insufficient ramp clearance at high tide
k = excessive ramp angle at low tide
m = excessive ramp angle at high tide
n = parallel ramp operation only
o = insufficient apron width for side-ramp operation

Note: Ramp clearance and ramp angle based on maximum vessel draft.

( ) indicates vessels assigned by analyst

TABLE V-3
SUMMARY OF BREAKBULK SHIPPING CAPABILITY

Berth	Number of Hatches Worked (Dock Crane) (A)	Dock Crane Rate (Ton/Hr) (B)	Number of Hatches Worked (Ship Crane) (C)	Ship Crane Rate (Ton/Hr) (D)	Berth Utilization Rate (E)	Operational Factor* (F)	Daily Throughput Capability** (G)
1 & 2	2	20.0 STON	12	15.0 STON	0.90	5.53	1095 STON
	2	50.0 MTON	12	37.5 MTON	0.90	5.53	2737 MTON
3	2	20.0 STON	5	15.0 STON	0.90	5.53	572 STON
	2	50.0 MTON	5	37.5 MTON	0.90	5.53	1431 MTON
Total	4		17				1667 STON 4168 MTON

* Operational Factor = 20 hours per day x 0.96 (nighttime factor) x 0.96 (sustainment factor) x 0.6 (60 % of hatches simultaneously operated) x .5 (facility use factor)

** G = [(A x B) + (C x D)] x E x F

TABLE V-4
SUMMARY OF BARGE SHIPPING CAPABILITY

Berth	Barge Handling Positions (A)	Number of Wharf Cranes (B)	Wharf Crane Handling Rate (Ton/Hr) (C)	Number of Mobile Cranes (D)	Mobile Crane Handling Rate (Ton/Hr) (E)	Berth Utilization Rate (F)	Operational Factor* (G)	Daily Throughput Capability** (H)
1 & 2	8	0	20.0 STON	0	20.0 STON	0.90	9.22	0 STON
	8	0	50.0 MTON	0	50.0 MTON	0.90	9.22	0 MTON
3	6	0	20.0 STON	5	20.0 STON	0.90	9.22	829 STON
	6	0	50.0 MTON	5	50.0 MTON	0.90	9.22	2074 MTON
Total	14			5				829 STON 2074 MTON

* Operational Factor = 20 hours per day x 0.96 (nighttime factor) x 0.96 (sustainment factor) x .5 (facility use factor)

** H = [(B x C) + (D x E)] x F x G

TABLE V-5
SUMMARY OF RORO SHIPPING CAPABILITY

Berth	Number of RORO Berths (A)	RORO Handling Rate (Ton/Hr) (B)	Berth Utilization Rate (C)	Operational Factor* (D)	Daily Throughput Capability (AxBxCxD)
1 & 2	0	200 STON	0.90	9.22	0 STON
	0	800 MTON	0.90	9.22	0 MTON
3	1	200 STON	0.90	9.22	1659 STON
	1	800 MTON	0.90	9.22	6636 MTON
Total	1				1659 STON 6636 MTON

* Operational Factor = 20 hours per day x 0.96 (nighttime factor) x 0.96 (sustainment factor) x .5 (facility use factor)

TABLE V-6
SUMMARY OF CONTAINER SHIPPING CAPABILITY

Berth	Number of Container Cranes (A)	Container Crane Rate (Lifts/Hr) (B)	Number of Mobile Cranes (C)	Mobile Crane Rate (Lifts/Hr) (D)	Container Capacity (E)	Berth Utilization Rate (F)	Operational Factor* (G)	Daily Throughput Capability** (H)
1 & 2	0	21	0	8	8.00	0.90	12.96	0 STON
	0	21	0	8	20.00	0.90	12.96	0 MTON
								0 TEU
3	0	21	0	8	8.00	0.90	12.96	0 STON
	0	21	0	8	20.00	0.90	12.96	0 MTON
								0 TEU
Total	0		0					0 STON 0 MTON 0 TEU

* Operational Factor = 20 hours per day x 0.96 (nighttime factor) x 1.35 (TEU equivalent factor) x .5 (facility use factor)

** H = [(A x B) + (C x D)] x E x F x G

TABLE V-7
SUMMARY OF MIXED SHIPPING CAPABILITY

Berth	Breakbulk Shipping Capability (A)	Breakbulk Ship Mix Percentage (B)	RORO Shipping Capability (C)	RORO Ship Mix Percentage (D)	Container Shipping Capability (E)	Container Ship Mix Percentage (F)	Barge Shipping Capability (G)	Barge Ship Mix Percentage (H)	Daily Throughput Capability* (Ton/Day) (I)
1 & 2	1095 2737	1.000 1.000	0 0	0.000 0.000	0 0	0.000 0.000	0 0	0.000 0.000	1095 STON 2737 MTON
3	572 1431	0.580 0.580	1659 6636	0.256 0.256	0 0	0.000 0.000	829 2074	0.164 0.164	893 STON 2870 MTON
Total	1667 4168		1659 6636		0 0		829 2074		1988 STON 5607 MTON

*I = (A x B) + (C x D) + (E x F) + (G x H)

Although the POPS programs may calculate a container shipping capability based on specialized or nonspecialized container cranes, they will not calculate the container staging if the user excludes stacking height from the staging data lines in the port file.

The equations used to calculate the staging throughput capability follow:

$$SCB\ (STON) = SC \times ST \times SU \times FU/(DT \times 40)$$

$$(MTON) = SC \times ST \times SU \times FU \times CF/(DT \times 40)$$

$$SOBB,\ SOBR,\ SOBC\ (STON) = SO \times ST \times SU \times PC \times SF \times FU/(DT \times 40)$$

$$(MTON) = SO \times ST \times SU \times PC \times SF \times FU \times CF/(DT \times 40)$$

$$SOR,\ SOC\ (STON) = SO \times ST \times SU \times SF \times FU/(DT \times 40)$$

$$(MTON) = SO \times ST \times SU \times SF \times FU \times CF/(DT \times 40)$$

where,

SCB = Staging capacity of covered storage facilities

SOBB = Staging capacity of open areas supporting noncontainerized general cargo from breakbulk vessels and barges

SOBR = Staging capacity of open areas supporting unit equipment from breakbulk vessels and barges

SOBC = Staging capacity of open areas supporting containerized cargo from breakbulk vessels and barges

SC = Covered staging area, in square feet

SO = Open staging area, in square feet

TABLE V-8

STAGING THROUGHPUT CAPABILITY

Berth	Distributed Area		Breakbulk/Barge Capability				RORO Capability(SOR*)			Container Capability				Mixed Capability(SMX*)	
	Cov(SC)	Open(SO)	Cov(SCB*)		Open(SOB*)					Covered	(SOC*)				
	SQFT	SQFT	STON	MTON	STON	MTON	SQFT	STON	MTON	SQFT	TEU	STON	MTON	STON	MTON
1 & 2	122122	273465	1323	3307	1978	6082	0	0	0	0	0	0	0	3301	9389
3	128031	286695	1387	3467	2074	6376	33448	1589	6355	0	0	0	0	3337	9838
Total	250153	560166	2710	6775	4052	12458	33448	1589	6355	0	0	0	0	6638	19227

*SCB(STON) = SC x 0.01083 SCB(MTON) = SC x 0.02708

*SOB(TON) = SOBB(TON) + SOBR(TON) + SOBC(TON)
SOBB(STON) = SO x 0.00306 SOBB(MTON) = SO x 0.00766
SOBR(STON) = SO x 0.00277 SOBR(MTON) = SO x 0.01108
SOBC(STON) = SO x 0.00140 SOBC(MTON) = SO x 0.00356

*SOR(SQFT) = SO x 0.11667 SOR(STON) = SO x 0.00554 SOR(MTON) = SO x 0.02217

*SOC:
NO CONTAINER STAGING

*SMX:
1 & 2 SMX(TON) = SCB(TON) + [SOB(TON) x 1.000] + [SOR(TON) x 0.000] + [SOC(TON) x 0.000]
3 SMX(TON) = SCB(TON) + [SOB(TON) x 0.744] + [SOR(TON) x 0.256] + [SOC(TON) x 0.000]

ST = Stacking height of cargo: 10 feet for covered areas, 7.5 feet for general cargo in open areas, 7.6 feet for vehicles, and 8-32 feet for containers

SU = Percentage of space used: 65 percent for covered areas and 70 percent for open areas

FU = Facility use factor: percentage of port available for military use

DT = Dwell time, in days the cargo is staged at the port

40 = Square feet to MTON conversion factor

CF = MTON per STON conversion factor

SF = Surface factor: 1.0 for paved surface, 0.7 for graveled surface, and 0.5 for unimproved surface

PC = Percent of cargo on vessels and barges

5. Terminal Handling Tables

Terminal handling capability equals the sum of the truck and railcar processing capabilities. The maximum truck clearance capability of the terminal is based on a weak-link analysis of the highway, gate, and convoy/truck handling capabilities. Similarly, the maximum railcar clearance equals the lesser of the railroad capacity and the railcar handling capability. The maximum terminal handling capability equals the sum of the capabilities of the constraining subsystems of the truck and railcar systems.

a. Truck Processing Tables. The POPS programs generate separate tables for the highway (table V-9), gate (table V-10), and convoy/truck handling subsystems. The capability of the convoy/truck handling subsystem equals the sum of the convoy capacity and truck end-loading, flatbed/chassis, and van handling capabilities. These capabilities are shown separately in tables V-11 through V-14, respectively.

Although most of the truck processing tables are self-explanatory, a brief description of the convoy capacity and the flatbed/chassis handling capability tables is provided.

Since convoy vehicles are self-deployable, the two terminal subsystems that may restrict their flow are the highway and gate subsystems. The percentage of vehicles convoyed is determined by the user during execution of the POPS programs. This percentage is then applied to the highway and gate capacities. The most restricting subsystems define the maximum convoy capacity of the terminal.

The flatbed/chassis handling capability of the terminal pertains to trucks that can be handled on the wharf. For this subsystem, cargo is transferred directly between the vessel and the truck. This capability depends on the shipping capabilities, the land transport mode selections, and the competing cargo transfer operations on the wharf.

TABLE V-9
HIGHWAY CAPACITY

Highway	Number of Lanes (A)	Travel Speed (B)	Percent of Traffic (C)	Surface Factor (D)	Operational Factor (E)*	Average Truck Capacity (F)	Hours of Operation (G)	Vehicle Interval (H)	Multiple Lane Factor (I)	Highway Capacity (J)**
Gate 1										
Highway 1	3.00	20.000	0.330	0.800	0.240	9.773	20.000	300.000	0.867	11334 STON
	3.00	20.000	0.330	0.800	0.240	32.485	20.000	300.000	0.867	37675 MTON
Gate 2										
Highway 3	2.00	20.000	0.330	0.800	0.240	9.773	20.000	300.000	0.900	7847 STON
	2.00	20.000	0.330	0.800	0.240	32.485	20.000	300.000	0.900	26082 MTON
Highway 2	1.00	30.000	0.660	0.600	0.337	9.773	20.000	250.000	1.000	16552 STON
	1.00	30.000	0.660	0.600	0.337	32.485	20.000	250.000	1.000	55018 MTON
***Total										19181 STON
										63757 MTON

*Operational factor = cross movement factor x halt factor x facility use factor

**J = A x B x C x D x E x F x G x I x 5280 / H

***Total = Sum of restricting roadway serving each gate.

TABLE V-10
GATE CAPACITY

Gate	Number of Lanes (A)	Average Truck Capacity (B)	Hours of Operation (C)	Average Delay (D)	Operational Factor (E)*	Gate Capacity (F)**
Gate 1	2.00	9.773	20.000	1.500	0.438	6841 STON
	2.00	32.485	20.000	1.500	0.438	22740 MTON
Gate 2	3.00	9.773	20.000	2.000	0.417	7330 STON
	3.00	32.485	20.000	2.000	0.417	24364 MTON
TOTAL						14171 STON
						47104 MTON

*Operational factor = multiple lane factor x facility use factor

**F = A x B x C x E x 60 / D

TABLE V-11
CONVOY CAPACITY

Convoy Component % of Cargo (A)	Highway Capacity (B)	Gate Capacity (C)	Convoy Component % of Highway (D = A x B)	Convoy Component % of Gate (E = A x C)	Convoy Capacity (F)*
0.598	19181	14171	11470	8474	8474 STON
0.598	63757	47104	38125	28167	28167 MTON

*F = The lesser of (D) and (E).

TABLE V-12
FLATBED/CHASSIS HANDLING CAPABILITY

Wharf	Flatbed Handling Capability	Container Handling Capability
1 & 2	75	0 STON
1 & 2	186	0 MTON
3	43	0 STON
3	107	0 MTON
Total	117	0 STON
	293	0 MTON

TABLE V-13
TRUCK END-RAMP CAPABILITY

End Ramp	Handling Position (A)	Handling Rate (B)	Average Truck Capacity (C)	Hours of Operation (D)	End Ramp Capability (E)*
Truck Ramp 1	2.00	4.00	20.00	20.00	3200 STON
Truck Ramp 1	2.00	4.00	60.00	20.00	9600 MTON
Truck Ramp 2	1.00	4.00	20.00	20.00	1600 STON
Truck Ramp 2	1.00	4.00	60.00	20.00	4800 MTON
Total					4800 STON
					14400 MTON

*E = A x B x C x D

TABLE V-14
VAN HANDLING CAPABILITY

Dock	Van Handling Positions (A)	Average Handling Rate (B)	Truck Capacity (C)	Hours of Operation (D)	Operational Factor (E)*	Van Handling Capability (F)**
Dock 1	10.00	1.000	16.000	20.000	0.030	98 STON
Dock 1	10.00	1.000	40.000	20.000	0.030	244 MTON
Dock 2	20.00	1.000	16.000	20.000	0.250	1600 STON
Dock 2	20.00	1.000	40.000	20.000	0.250	4000 MTON
Total						1698 STON
						4244 MTON

*Operational factor = operational use factor x facility use factor

**F = A x B x C x D x E

b. <u>Railcar Processing Tables</u>. The POPS programs generate separate tables for the track capacity (table V-15) and railcar handling capability. The total railcar handling capability equals the sum of the end-ramp capacity and the flatcar/chassis and boxcar capabilities, which are shown separately in tables V-16 through V-18, respectively.

TABLE V-15
TRACK CAPACITY

Track	Trains per Day (A)	Railcars per Train (B)	Average Railcar Capacity (C)	Facility Use Factor (D)	Track Capacity (E)*
Track 1	10.00	20.00	49.32	0.50	4932 STON
Track 1	10.00	20.00	147.47	0.50	14747 MTON
Track 2	5.00	12.00	49.32	0.50	1480 STON
Track 2	5.00	12.00	147.47	0.50	4424 MTON
Total					6412 STON 19171 MTON

*E = A x B x C x D

TABLE V-16
RAILCAR END-RAMP CAPACITY

End Ramp	Travel Time (A)	Pickup/ Delivery Time (B)	Interchange Time (C=(A+B)/60)	Load/Unload Time (D)	Hours of Operation (E)	Railcars per Track (F)	Average Railcar Capacity (G)	End Ramp Capacity (H)*
Rail Ramp 1	5.00	36.67	0.69	3.33	20.00	13.33	50.00	3310 STON
Rail Ramp 1	5.00	36.67	0.69	3.33	20.00	13.33	150.00	9931 MTON
Rail Ramp 2	5.00	50.00	0.92	5.00	20.00	20.00	50.00	3380 STON
Rail Ramp 2	5.00	50.00	0.92	5.00	20.00	20.00	150.00	10141 MTON
Total								6691 STON 20072 MTON

*H = E x F x G / (C + D)

TABLE V-17
FLATCAR/COFC HANDLING CAPABILITY

Wharf	Flatcar Handling Capability	COFC Handling Capability
1 & 2	190	0 STON
1 & 2	474	0 MTON
3	0	0 STON
3	0	0 MTON
Total	190 474	0 STON 0 MTON

TABLE V-18
BOXCAR HANDLING CAPABILITY

Dock	Boxcar Handling Positions (A)	Handling Rate (B)	Average Boxcar Capacity (C)	Hours of Operation (D)	Operational Factor (E)*	Boxcar Handling Capability (F)**
Dock 1	5.00	0.330	30.000	20.000	0.090	89 STON
Dock 1	5.00	0.330	75.000	20.000	0.090	223 MTON
Dock 2	4.00	0.330	30.000	20.000	0.250	198 STON
Dock 2	4.00	0.330	75.000	20.000	0.250	495 MTON
Total						287 STON 718 MTON

*Operatinal factor = operational use factor x facility use factor

**F = A x B x C x D x E

6. Terminal Throughput Summary (table V-19)

The POPS programs also generate a summary table, which provides the throughput capability for each of the subsystems at the terminal. For shipping and staging, the table shows the relative capabilities of the facilities for each type of shipping. The table also provides mixed capabilities for shipping and staging, which are based on the ship mix supplied by the user. The table also shows the combined terminal capability, which equals the sum of the limiting subsystems of the truck and railcar processing subsystems.

At the bottom of the table, the final cargo throughput capability of the terminal is shown. This capability is based on a weak-link analysis of the mixed shipping and staging capabilities and the combined terminal capability.

7. Summary of Shipping/Mode Mix Percentages (table V-20)

This table summarizes several factors that provide insight into the terminal operations resulting from user-supplied operation parameters. The ship mix selected by the user and stored in the parameter file is shown alongside the actual shipping mix in terms of cargo moved by each type of ship. The actual ship mix shows the percentage of cargo moving through the terminal on each type of ship. The table also provides a similar comparison of the land transportation mode mix and summarizes the final mode mix of railcars and trucks along with the average vehicle capacities. The table then provides throughput capability factors, which are based on the capability of each of the major subsystems comprising the terminal. Factors generated for different terminals can be compared to determine the relative efficiencies of the terminals. The factors also demonstrate where operational or physical enhancements should be made to increase terminal throughput capability.

TABLE V-19
TERMINAL MIXED THROUGHPUT SUMMARY

Shipping	Staging	Terminal Capability	
Breakbulk Capability: 1427 STON/day 3566 MTON/day	Breakbulk/barge: Covered: 2710 STON/day 6775 MTON/day	Truck Handling: Highway Capacity: 19181 STON/day 63757 MTON/day	Convoy/Truck Handling: Convoy: 8474 STON/day 28167 MTON/day
Barge Capability : 136 STON/day 340 MTON/day	Open: 3521 STON/day 10824 MTON/day	Gate Capacity: 14171 STON/day 47104 MTON/day	Flatbed Handling: 4917 STON/day 14693 MTON/day
			Van Handling: 1698 STON/day 4244 MTON/day
RORO Capability : 425 STON/day 1700 MTON/day	RORO Capacity : 8568 ft/day 407 STON/day 1628 MTON/day	Railcar Handling:	
		Railroad Capacity:	Railcar Loading:
Container Capability: 0 TEUs/day 0 STON/day 0 MTON/day	Container Capacity: 0 TEUs/day 0 STON/day 0 MTON/day	6412 STON/day 19171 MTON/day	Flatcar: 6800 STON/day 20546 MTON/day Boxcar: 207 STON/day 718 MTON/day
Mixed Capability: 1988 STON/day 5607 MTON/day	Mixed Capacity: 6638 STON/day 19227 MTON/day	Combined Capacity: 20583 STON/day 66274 MTON/day	
	Total Cargo Throughput :	1988 STON/day 5607 MTON/day	

TABLE V-20

SUMMARY OF SHIPPING/MODE MIX PERCENTAGES

Ship Mix	Input Percentage	Actual Percentage
Breakbulk	0.35300	0.63611
Barge	0.10000	0.06073
RORO	0.15600	0.30316
Container	0.39100	0.00000

Mode Mix	Shipping Support Percentage	Actual Percentage
Convoy	0.55733	0.42500
Flatbed	0.06097	0.22170
Van	0.06097	0.06404
Chassis	0.05226	0.00000
Flatcar	0.15523	0.27949
Boxcar	0.06097	0.00977
COFC	0.05226	0.00000

Average Truck = 0.71074 % mode mix, 9.77313 STON, 32.48540 MTON
Average Railcar = 0.28926 % mode mix, 49.32456 STON, 147.46710 MTON

Terminal capacity per foot of wharf. (2065 ft total)

Shipping	=	1.0 STON/FT,	2.7 MTON/FT
Staging	=	3.2 STON/FT,	9.3 MTON/FT
Terminal Handling	=	10.0 STON/FT,	32.1 MTON/FT

APPENDIX A

EDLIN FUNCTIONS USED IN POPS

In POPS, the DOS Line Editor (EDLIN) is used to create, edit, and display data files created for each port or terminal. To start the EDLIN function, the user must be in DOS. If in BASICA, type in SYSTEM to access DOS. To create a port file, use the following procedure.

Enter Edlin_B: Name or port terminal
Press return and file will be created
Note that the prompt for EDLIN is an asterisk(*).

Once the format sheets from appendix B are completed with port data, the user can create a port file. To enter the port data, the EDLIN command "I" is used.

Enter I, press return
Screen will show 1:*
Enter first line of data according to format in appendix B
Press return
Screen will show 2:*
Continue data entry until completed, then press CTRL&BREAK simultaneously to discontinue data entry
To save data on disk, enter E; press return.

Be sure the disk has enough memory to save entire file.

Other EDLIN commands used most commonly in editing files are as follows:

L - Provides a list of the data entered and allows user to review information entered; 20L will list data starting at line 20.
D - Allows the user to delete data lines as necessary; 30d deletes line 30, and 30,32d deletes lines 30, 31, and 32.
I - Allows user to insert new data lines; 17I allows insertion of a new line at 17 and the previous line 17 becomes line 18.
Q - Allows the user to exit EDLIN without saving changes made during editing session; when Q is entered, the computer responds with abort edit (Y/N)?, respond Y to not save changes.

Left and right arrow keys - Allow the user to move back and forth in a data line.

F3 key - Allows the user to move to the end of the data line.

Other EDLIN commands, if needed by the user, are explained in the Disk Operating System (DOS) User Manual.

APPENDIX B

SAMPLE INPUT FORM FOR PORT DATA FILE

PORTNMS , NB

Q$, CHDRAFT ANCHDF N T S H G EM R ER DK TIDE TBL1$, TBL2$

WHARF DATA

WHRFNMS,	WDRAFT	WAPRON	WLNGTH	WCRANE	WCONTCN	WSTRNR	WRAILA	WSRAMP	WHARPRON	WDKSTR	WLITES$,	WTSHED$

EQUIPMENT DATA

NCRANE	NOCRN	BLOCRN	LLOCRN	CLOCRN

Port Name

STAGING DATA

STYPE$,	SQ	S	S	S	S	S	S	HGHT
______,	______	_	_	_	_	_	_	___
______,	______	_	_	_	_	_	_	___
______,	______	_	_	_	_	_	_	___
______,	______	_	_	_	_	_	_	___
______,	______	_	_	_	_	_	_	___
______,	______	_	_	_	_	_	_	___

HIGHWAY DATA

HWYNAME$,	GATE	LANES	HWYSURF	HWYSPD	VEHINT	PERTRAF	CROSS	HALT
______,	___	___	____	____	____	____	___	___
______,	___	___	____	____	____	____	___	___
______,	___	___	____	____	____	____	___	___
______,	___	___	____	____	____	____	___	___
______,	___	___	____	____	____	____	___	___
______,	___	___	____	____	____	____	___	___

GATE DATA

GATENAME$,	GLANES	DELAY
______,	____	___
______,	____	___
______,	____	___
______,	____	___
______,	____	___
______,	____	___

Port Name ____________________

TRUCK END-RAMP DATA

TRMPNAME$,	TRAMPS
________,	________
________,	________
________,	________
________,	________
________,	________
________,	________

RAILROAD TRACK DATA

RTRKNAME$,	TPERDAY	RCPERTR
________,	________	________
________,	________	________
________,	________	________
________,	________	________
________,	________	________
________,	________	________

RAILCAR END-RAMP DATA

RRMPNAME$,	RTKLNGTH
________,	________
________,	________
________,	________
________,	________
________,	________

Port Name

WAREHOUSE DOCK DATA

DOCKNAME$,	VANDOCKS	BOXDOCKS	TSHED$,	APTRK$,	WHRFDCK$
______,	______	______	______,	______,	______
______,	______	______	______,	______,	______
______,	______	______	______,	______,	______
______,	______	______	______,	______,	______
______,	______	______	______,	______,	______
______,	______	______	______,	______,	______

Port Name____________________

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