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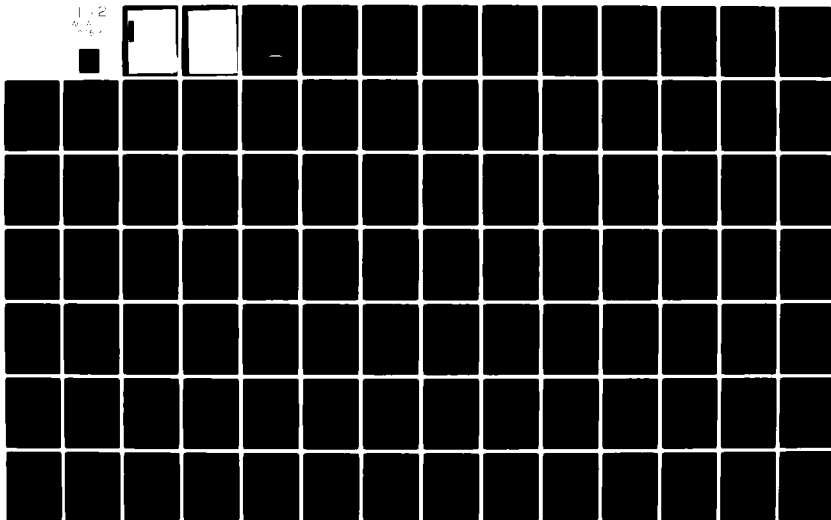
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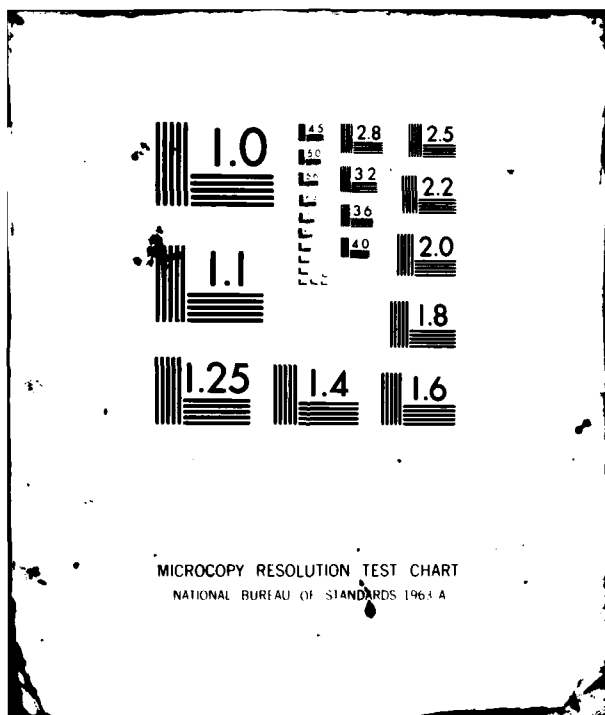
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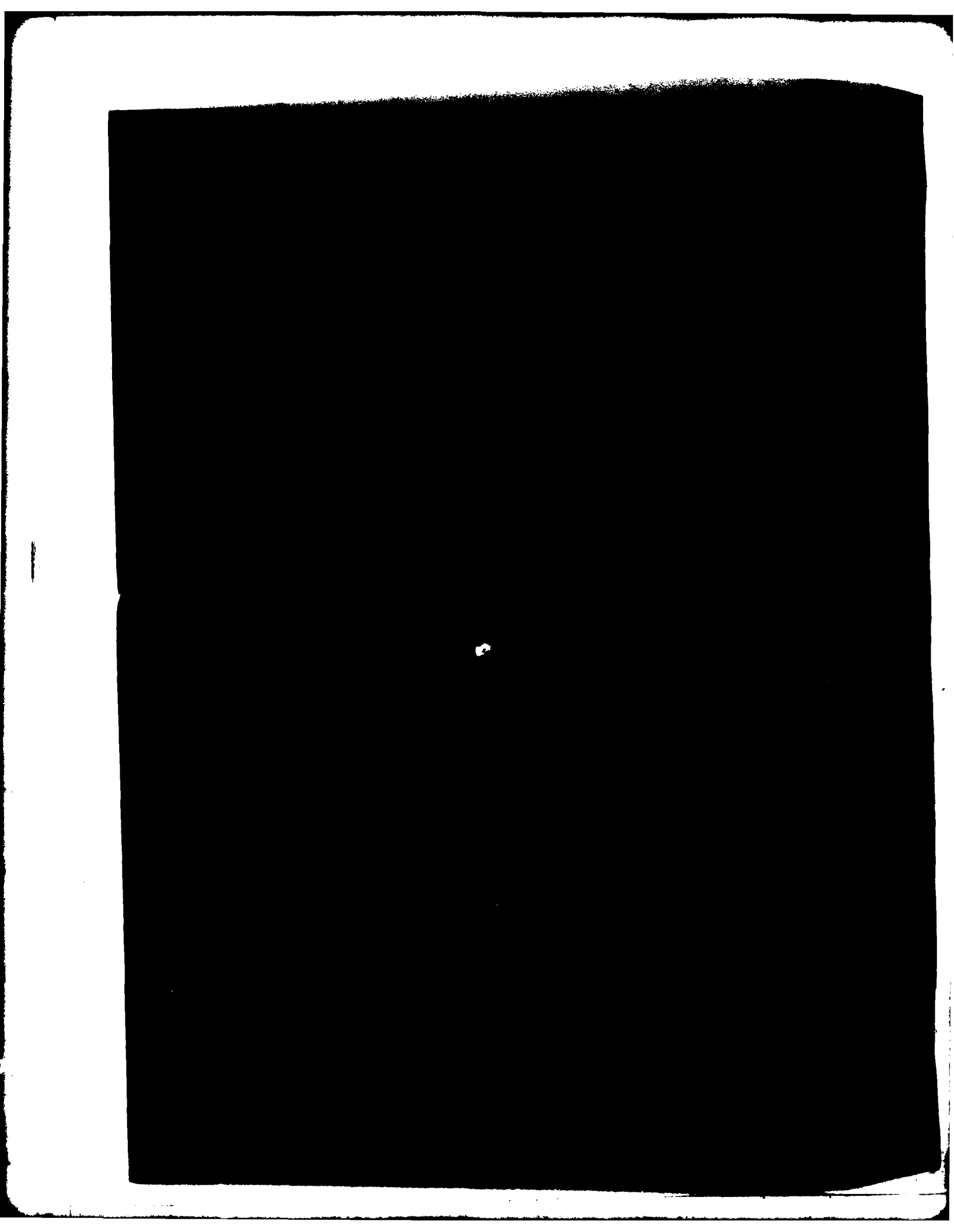
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DEPARTMENT OF THE NAVY
NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER
Bethesda, Md. 20034

BERTHING AND UTILITIES REQUIREMENTS
FORECASTING (BURF) PROGRAM
OF THE
NAVSHIPS LONG RANGE WORKLOAD PLANNING SYSTEM (LRPS)

by

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and
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ABSTRACT

The Berthing and Utilites Requirements Forecasting (BURF) Program is a management tool designed to determine the berthing requirements for the naval shipyards over a long-range period. The berthing utilities considered by the program are linear space (ft), electric current (ac at 450 volts), fresh and salt water (gpm), and steam power (lb/hr). Given the ships to be berthed in a shipyard for any one day, the system will assign selected ships to berths and forecast the resulting utilities requirements at that yard for that day. By choosing appropriate peak days over the long-range period, an overall forecast for a yard can be produced.

ADMINISTRATIVE INFORMATION

This effort has been carried out by the Navy Logistics Analysis Group, Code 1863, of the Operations Research Division. It has been sponsored by NAVSHIPS, Code 70T, NAVSHIPS Work Request WR-2-5081.

1. INTRODUCTION

1.1 BACKGROUND

The Long Range Shipyard Workload Planning System (LRPS)* is a linked series of computer programs which provides a realistic simulation of resource requirements for the projected naval ship workload. It provides a means to analyze the nation's shipbuilding and ship-repair capability and to identify problem areas.

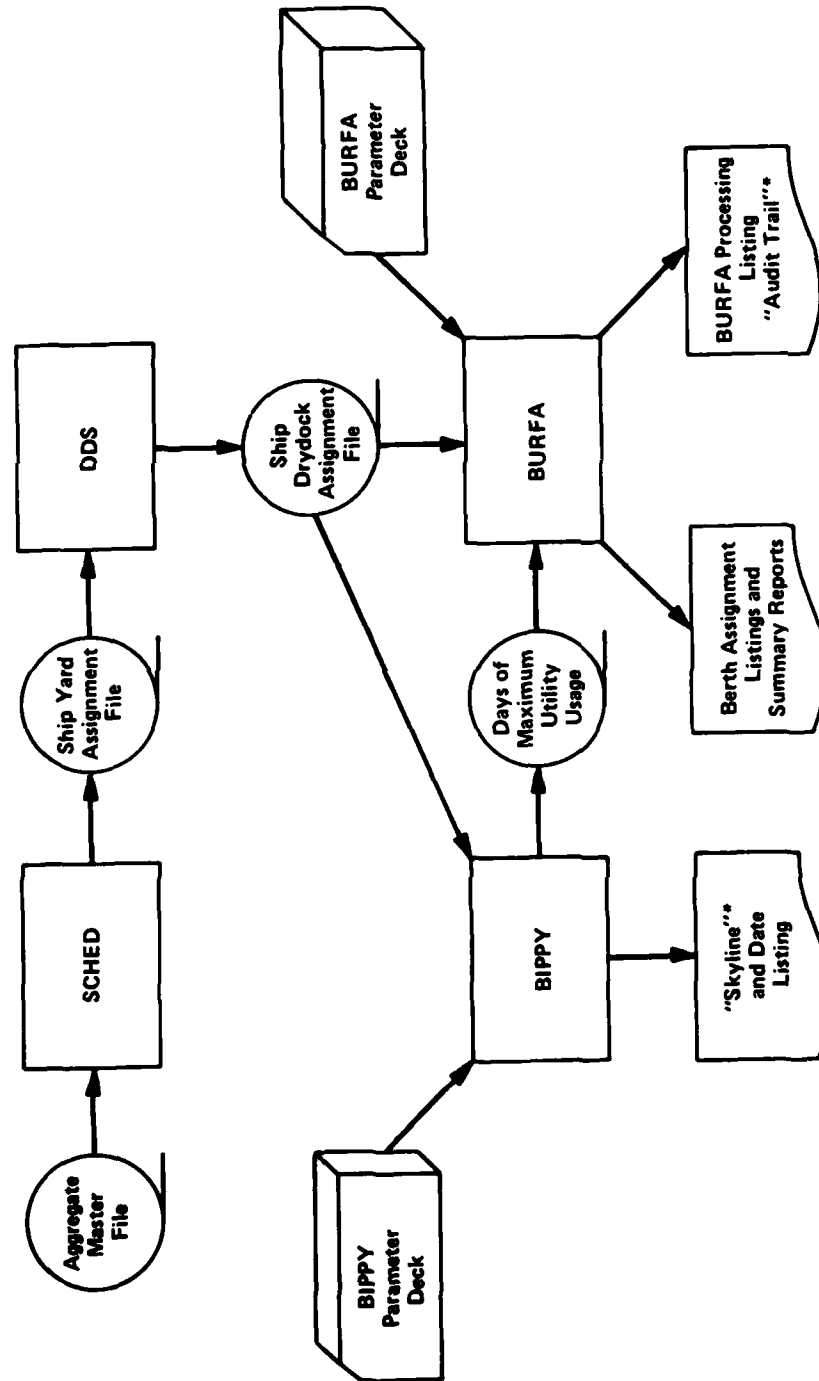
The task of the main program (SCHED) is to make assignments of the ships available for maintenance to naval and private shipyards. These ship/yard assignments are restricted by each ship's homeport proximity and the ship workload mix. Naval shipyard resources are scheduled for half-year intervals to take into account each ship's maintenance availabilities. The product of SCHED is a ship/yard workload assignment file reflecting these restrictions. This file is the major input to the other LRPS programs.

In the LRPS process of assigning a ship to a yard and to a drydock within the yard, a need arose to forecast the utilities required by the ship workload at the shipyard berths. A Berthing and Utilities Requirements Forecasting Program (BURF) was designed to meet this need. The utilities at the berths considered by BURF are space (linear ft), electric current (ac at 450 volts), fresh and salt water (gpm), and steam power (lb/hr). BURF projects these required utilities during peak time periods and forecasts their excesses and/or deficiencies with respect to present year conditions.

1.2 RELATION OF BURF TO LRPS

The subsystems of LRPS whose outputs are necessary to the Berthing and Utilities Requirements Forecasting System are described briefly below. The relationship of the BURF program to the major LRPS subsystems is shown in Figure 1.

* Informally documented in NSRDC, AML Technical Note, AML-1-1969, January 1969, By Eric Jorgensen



*Note: The term "Skyline" is explained in Section 4.1; the term "Audit Trail" is explained in Section 5.2.

Figure 1 - Relationship of BURF Subsystems to Overall LRPS Systems.
Showing I/O for Major Routines

1.2.1 The SCHED Program

The SCHED program matches the resources at the naval and private shipyards with the individual ship overhaul requirements. The principal output of this process is a ship/yard assignment file. This file specifies the ship to be overhauled, the overhaul yard, and the time the ship will be in the yard. This file also contains ship-overhaul information relevant to other forecasting programs of LRPS. One such study is the Detailed Drydocking Study (DDS)*.

1.2.2 The DDS Program

The Detailed Drydocking Simulation program (DDS) investigates the allocation to ships of drydock facilities in the shipyard. Ship multiple drydocking and the pre-assignment of ships to drydocks are also considered in this study. The ship/yard assignment file generated by the SCHED program is used as input to the DDS program. DDS generates a ship/drydock schedule or file containing a listing of the ships assigned to drydocks. This file also contains a listing of the ships for which no drydock space was available.

1.2.3 The BURF Program

The BURF program is another data-refinement link in LRPS. BURF uses as its input the ship/drydock schedule produced by DDS. From this schedule BURF prepares a list of ships with their berthing dates for a given shipyard. Berthing dates for a ship are defined as the time intervals a ship spends at a berth and not in a drydock while at the shipyard. These berthing dates are determined from time variables which are the date a ship enters the shipyard, the date a ship enters the drydock, the date a ship leaves the drydock, and the date a ship leaves the shipyard, as specified on the ship/drydock schedule.

* Informally documented in NSRDC, CMD Technical Note, CMD-51-71, December 1971, by Jay Mandelbaum

Using the time variables given on the ship/drydock schedule and a ship class berthing utility consumption table, referred to as the Berthing Impact Points Table, the dates of maximum berth utilities usage (peak dates) are determined for a given shipyard. The ships which appear on the ship/drydock schedule and the ships predicted as unscheduled work are the only ships considered for berthing on those peak dates. Assignments of these ships to berths in the shipyard are made with two restraints, electric current and linear space.

BURF produces a summary report which forecasts the utilities required at the berths for each peak date.

2. BURF SYSTEM LOGIC

The BURF system is composed of two independent sub-systems, the Berth Impact Points Per Yard (BIPPY) Program and the Berthing and Utilities Requirements Forecasting Assignment (BURFA) Program. The logic of each of these programs is discussed in the following paragraphs. The essential components of the overall BURF Program and the input/output of the SCHED, DDS, BIPPY, and BURFA programs were shown in Figure 1.

2.1 LOGIC OF THE BIPPY PROGRAM

Program BIPPY determines the dates on which a given yard can expect peak utility loads from berthed ships. This result is derived from two sources of information: the list of scheduled berthing periods for ships in the shipyard, provided on tape by the DDS program; and an estimate of the total utility load for each class of ship, provided on cards as a Berthing Impact Table in which each ship is assigned a number between 0 and 100. This number, the berthing impact points for that ship class, is an indication of the relative total utility load. It does not differentiate among the various kinds of utilities. These numbers are supplied by NAVSHIPS. With these two sets of data BIPPY determines, for each day in the period under consideration, the total impact points for all ships berthed in the shipyard and reports the peak dates. The start and end dates of the period are supplied by the user. Only ships with scheduled yard availabilities are considered by BIPPY.

Certain refinements are made to this peak-determination approach to make it more realistic and useful. The most important one utilizes an average of the loading curve, i.e., of the curve of total berthing impact points for a shipyard vs. time. The loading curve typically shows sharp peaks of one-day duration. These occur when one ship berths and another unberths on the same day. However, it is unrealistic to expect both ships to impose a full load on the shipyard's utilities on that day. Peak day determination is therefore based on a running

average of the impact-point curve over N days, where N is defined by the user to be between 1 and 10. The effect of this averaging is to smooth the loading curve. Selection of a day at the center of a running-average peak will usually avoid the overlap date, which normally occurs at the beginning or end of the span of the running average. The logic flow of BIPPY is shown in Figure 2.

2.2 LOGIC OF THE BURFA PROGRAM

BURFA refines the information contained on the data file produced by DDS by considering only the ships requiring berthing during the periods of peak utility-consumption. It then forecasts the berthing utility requirements based on these selected ship records. BURFA uses a series of tables and associated table-look-up logic in the assignment of ships to berths and in the forecasting of berth utility requirements. The following tables are input as parameters (see Appendix B):

Berth-orientated tables

- Berth identification table (PIER array)
- Berth nesting table (NEST array)
- Berth ship-type preference tables
(PIERCL and ICLASP arrays)

Ship-type orientated tables

- Ship-type identification table (SHPCLS array)
- Ship assignment table (SHPASG array)
- Ship-type maintenance-probability table
(PROB array)

BURFA has the following three phases of processing:

- (1) Selection of the "ship workload" for peak utility-usage periods, i.e., the selection of both scheduled and unscheduled ships which are berthed during any of the peak utility-usage periods.
- (2) Assignment of an individual ship to a berth. The restrictions for ship assignment to berths are linear-space and electric current availabilities. Other utilities are only used for forecasts.
- (3) Tabulation of the utilities required by the ships berthed at the yard and the utilities actually available at the berths.

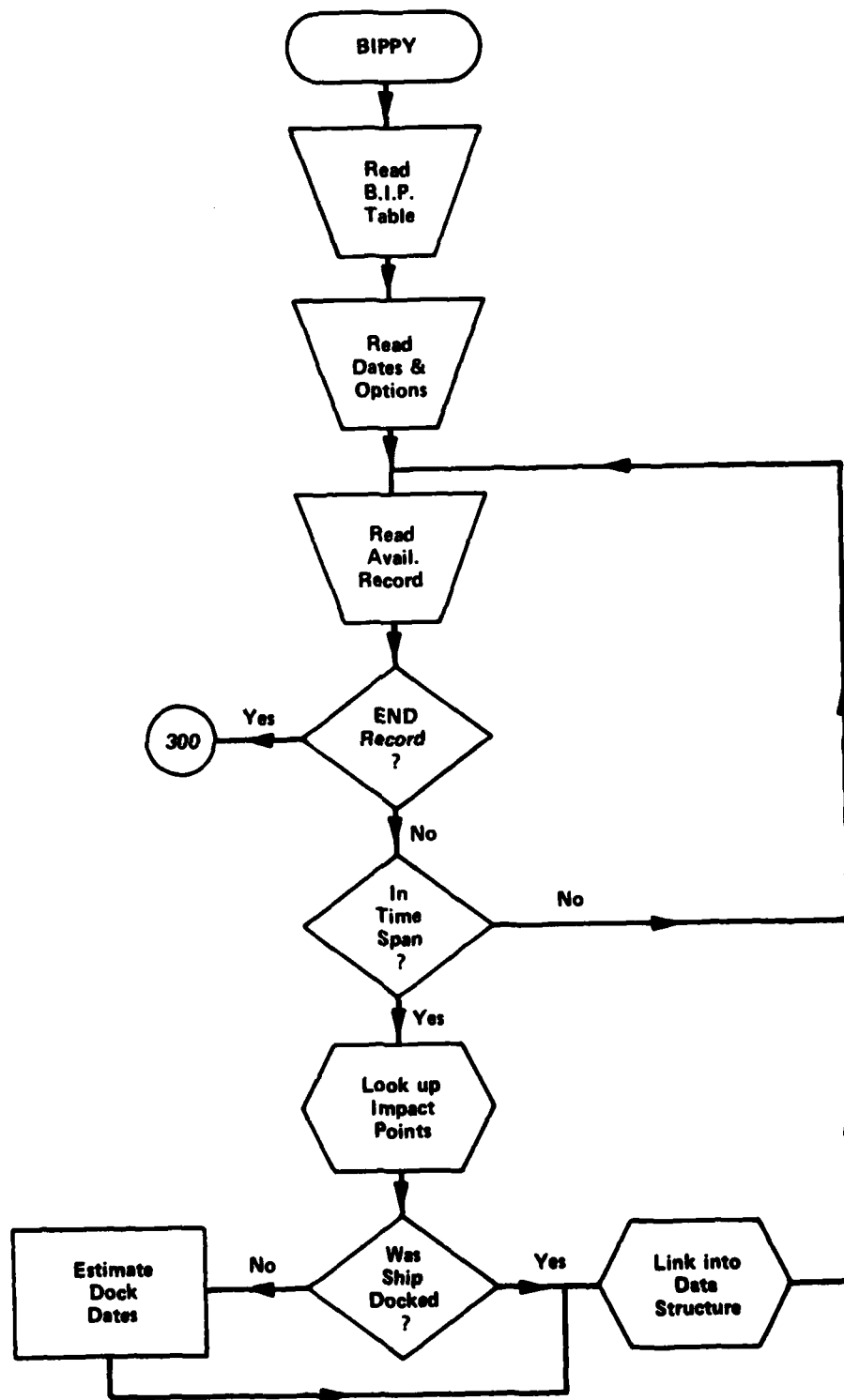


Figure 2 - BIPPY Logic Flowchart

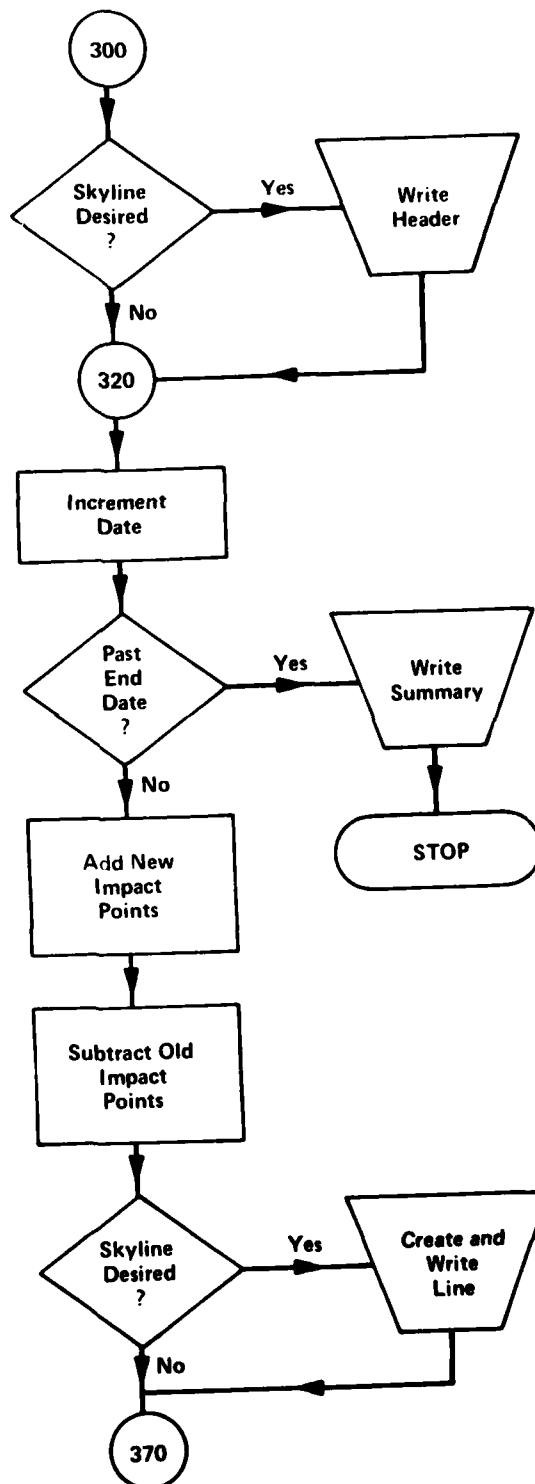


Figure 2 - BIPPY Logic Flowchart (continued)

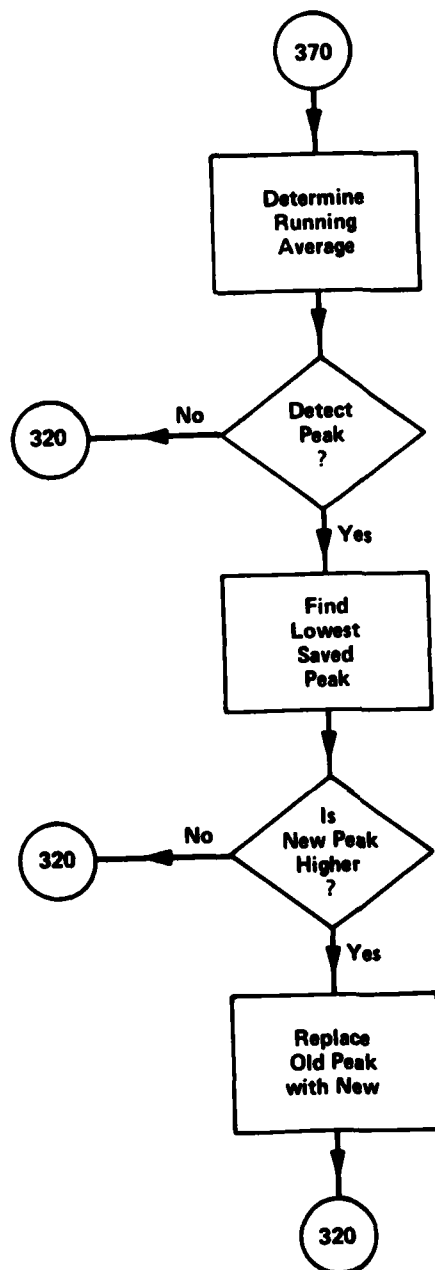


Figure 2 - BIPPY Logic Flowchart (continued)

Each phase is discussed in detail in Section 3 of this report.
The logic flow of BURFA is shown in Figure 3.

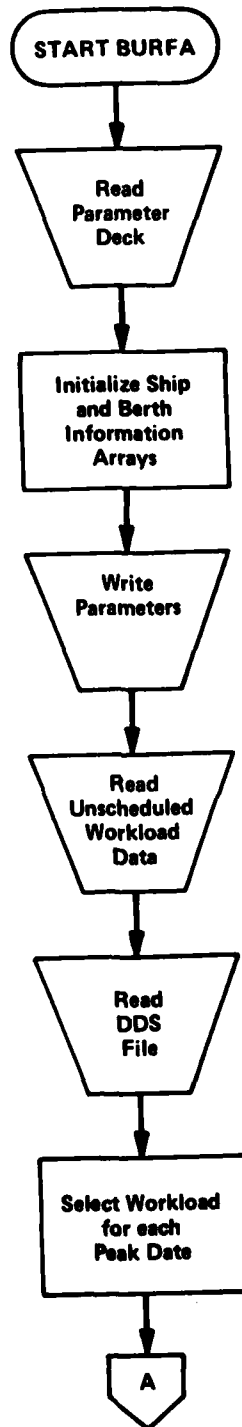


Figure 3 - BURFA Logic Flowchart

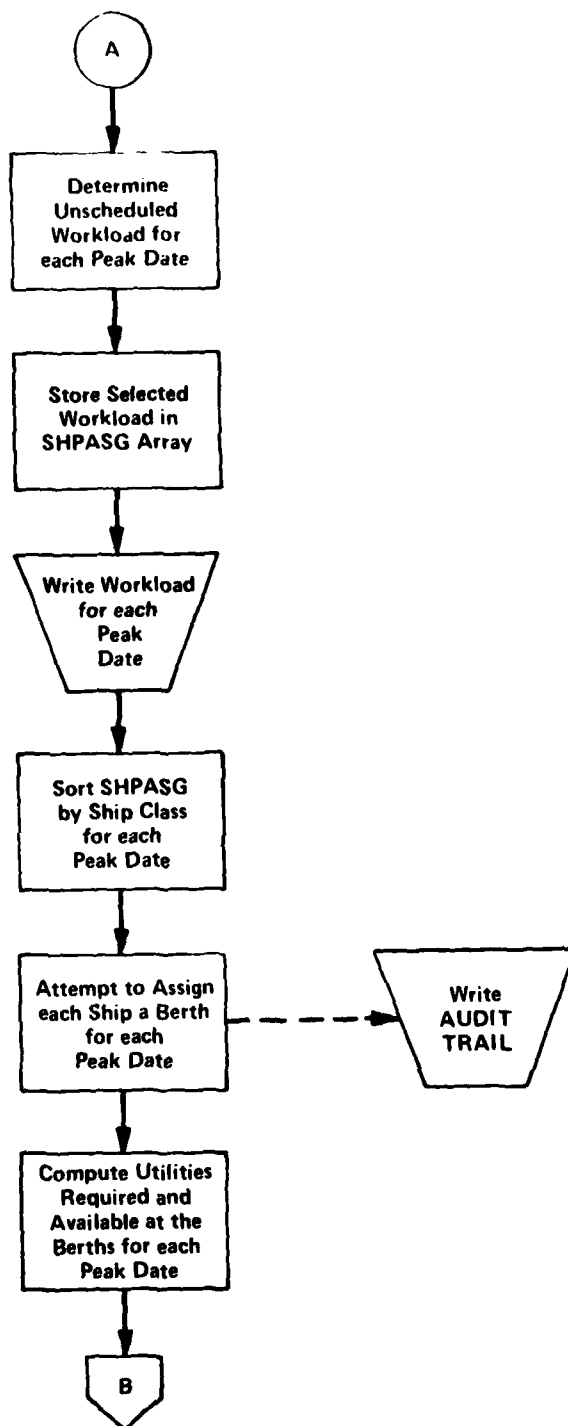


Figure 3 - BURFA Logic Flowchart (continued)

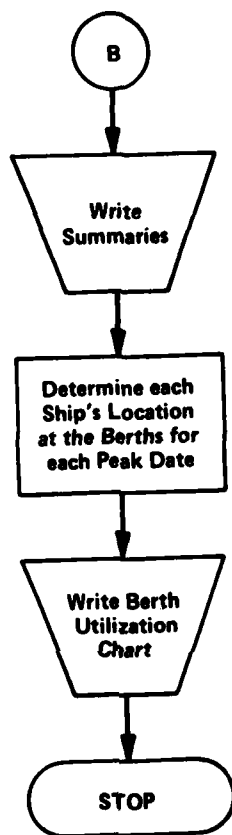


Figure 3 - BURFA Logic Flowchart (continued)

3. BURF SUBROUTINES DESCRIPTIONS

3.1 PROGRAM BIPPY ROUTINES

Flowcharts for Routine BIPPY and its major subroutines are given in Appendix D.

3.1.1 Routine BIPPY

The main routine, BIPPY, reads the berthing schedule one record (i.e., a history of a single berthing) at a time. If any ship on the schedule is to be berthed within the given time period, a data node is created containing the proper impact-point value. Each node is linked with the others by means of two chains, one based on the increasing start dates and the other on the increasing end dates.

Having constructed this data structure, BIPPY steps through the date chains, adding impact points to an accumulator (current sum) upon encountering a start and deleting them on an end. The "skyline" plot* is produced at this time. A series of accumulators is kept and used to determine the running average. Peaks are detected by a drop in the running average and are stored if they exceed the smallest previously stored peak. The smallest previous peak is then deleted. At the end of the period of interest the peaks remaining are summarized in the output, and the routine stops.

3.1.2 Subroutine DAZE

Subroutine DAZE converts the single integer date representation, used internally by BIPPY and BURFA, into the month/day/year notation of the user. The various lengths of the months are considered.

3.1.3 Subroutine IMPACT

Subroutine IMPACT does a table look-up on the ship-type to determine the impact point number. If the table contains no entry for the ship-type, a diagnostic message is printed.

*See Sample BIPPY output (page A-11, Appendix A).

3.1.4 Subroutine LINK

Subroutine LINK creates a data node containing information for a single berthing. This node is linked into two chains, one based on increasing start dates and the other on increasing end dates.

3.2 PROGRAM BURFA SUBROUTINES

Flowcharts for Routine BURFA and the major BURFA subroutines are given in Appendix D.

3.2.1 Routine BURFA

The main routine, BURFA, acts as a system-monitoring routine. It calls into execution each of the logical links of the program.

3.2.2 Subroutine RDPARM

The read-parameters subroutine, RDPARM, inputs all parameters necessary to perform the simulation. Simulation dates, i.e., peak dates, generated by BIPPY are read from tape 3. Options for the forms of input are also read.

All look-up tables with the exception of SHPASG are initialized in RDPARM.

3.2.3 Subroutine SHPMOD

The ship-module subroutine, SHPMOD, selects ship records from the ship/drydock schedule created by DDS. Only ships which are berthed (i.e., tied up to a pier) on any of the simulation dates are selected.

SHPMOD also estimates an unscheduled ship berthing incidence for each simulation date, using a random-number ship-maintenance probability check over a uniform distribution curve for the year of each simulation date.

The SHPASG (PDN, SN, I) table of BURFA is initialized in this subroutine, where PDN is a number from 1 to 10 which points to the simulation date, SN is a number from 1 to 40 which points to the ship being considered for the simulation date, and I is a pointer indicating storage of ship information.

Table SHPASG is the computer pointer look-up table which contains the ship information derived from the DDS schedule and table pointers necessary for the ship/berth assignment.

3.2.4 Subroutine ASSGN

The berthing-assignment subroutine, ASSGN, uses the tables determined in subroutines RDPARM and SHPMOD for the assignment of ships to berths by priority and by berth-facilities availability. This subroutine sorts those ships which must be berthed on any date of peak utilities usage by ship class and by pre-assignment criteria. This insures that the largest ships and those already pre-assigned a berth are processed first. The sorted ship table, SHPASG, is processed three times for each peak date in an attempt to assign each ship in the table to a berth. Each time the ship table SHPASG, is processed for a peak date, the processing is referred to as a pass through the ship file.

For each berth a ship-type preference is specified in the PIERCL and ICLASP tables, and for each ship-type a berth preference is specified in the SHPCLS table. On the first pass through the ship file, only ships of the type specified as first-choice preference for a particular berth are considered. If a berth has no ship-type preference, it is ignored. The ships that can be assigned to a berth are so marked and removed from the ship file. On the second pass through the file, all the remaining ships and all available berths are considered. The ships which can berth are marked as berthed and removed from the file. On the third pass, all remaining unberthed ships which can be nested are considered. Ship-type nesting specifications are given in the NEST table. All ships which can be nested with ships already berthed are marked and removed from the ship file. A maximum of two ships can be nested in a single berth.

The factors considered for berthing a ship are available berth space (ft) and electric current (ac at 450 volts). Berth space is considered as a restriction for the first two passes through the ship file. Only accessible space available at the berth or pier is considered. If a berth or pier entrance is blocked by the berthing of the ship, the berth or pier is not accessible, and its space cannot be utilized by the ship. Two aspects of electric power are considered in each of the three passes: the electric power available at the base is considered first, then the electric power electric current available at the pier.

All ships not berthed in the three passes are marked in such a way that the indicator specifies the reason for failure.

In summary, a ship can berth only if it meets the following utility requirements:

- a. Electric current needed by the ship is less than or equal to the electric current available at a berth or pier.
- b. The space needed by the ship is less than or equal to the space available at a berth or pier for a singly berthed ship.
- c. The ship does not block an adjacent berth or pier.

3.2.5 Subroutine SUMMY

The summary subroutine, SUMMY, produces two summary reports. The first report provides the forecasting of utilities required and those available at the berths. The utilities considered in this report are electric current (ac at 450 volts), fresh and salt water (gpm), steam power (lb/hr), and berthing space (ft) required.

The second report shows the available electric current generated by each power station and the electric current required by the berths that each station services.

3.2.6 Subroutine GRAPH

The pier-configuration subroutine, GRAPH, shows by graphic output the positioning of ships at the piers. Two symbols are used; "*" is used for ships berthed; "X" is used for unused pier space.

GRAPH also gives a listing of the ships berthed at the pier. Ships singly berthed are separated by commas. Those nested are separated by a plus sign.

3.2.7 Subroutine SORTS

The subroutine, SORTS, sorts the ship file (SHPASG) for a simulation date by ship class numbers. Ship records with low ship class numbers will appear first in the ship file.

3.2.8 System Editing Routine

Flowcharts for the system editing routines are given in Appendix D.

3.2.8.1 Function IBIP

Given the ship-type and hull number, this function determines the ship's berthing and dock classes.

3.2.8.2 Function ICLASS

Given the ship-type, ICLASS returns the berth preference number for the ship (see Appendix B).

3.2.8.3 Function INEST

Given the ship-type and hull number, INEST returns the ship-class nesting number. If this number is equal to zero, the ship cannot be nested with another ship.

3.2.8.4 Function MDATE

Given a calendar date specified in terms of month, day, and year, MDATE returns the date in days.

3.2.8.5 Subroutine SORT

The subroutine, SORT, sorts the ship file (SHPASG) for a given simulation date by berth pre-assignment. The ship records with pre-assigned berths will appear first in the ship file.

4. BURF INPUT DATA

4.1 BIPPY INPUT DESCRIPTION AND CARD FORMATS

Program BIPPY requires two main sets of data, the ship workload file generated by DDS and a BIPPY parameter deck. The first of these is a projected ship-availability file for a given shipyard. This file, provided by the LRPS, is referred to as Tape 1 within BIPPY and BURFA and is described in section 4.2.1. The remainder of the data, the BIPPY parameter deck, is supplied by the user on cards. These cards consist of the Berthing Impact Point cards, a header card, and a Date and Option card.

4.1.1 Berthing Impact Point Card Format

These cards constitute the Berthing Impact Point Table. There is one card for each ship class giving the ship-type, the lower and upper hull numbers for the particular class, and that class's berthing impact point. There may be up to 80 such cards, the last of which must begin with the word "END". Figure 4 shows the format for these cards; input variables and formats are described in Table 1.

4.1.2 BIPPY Date And Option Card Format

Following the "END" card is a card containing the alphanumerics used as a header or title on the printed output. The final card, the Date and Option card, contains the start date (month, day, year) of the period to be considered, the end date, the number of days over which the running average (for peak determination) is to be taken, the number of peak dates to be reported (up to 10), an indicator for printed output (1 if the skyline chart is desired, 0 otherwise), and the lower cutoff level below which no impact-point totals will be printed on the skyline chart.

An example of the skyline chart (a histogram of total impact points by dates) is presented in Appendix A. Figure 5 presents the format description for the Date and Option card: variables are described in Table 2.

4.2 BURFA INPUT DESCRIPTION AND CARD FORMATS

BURFA has three input sources:

- (1) A ship workload file generated by DDS for ships scheduled to be drydocked at a specified shipyard.

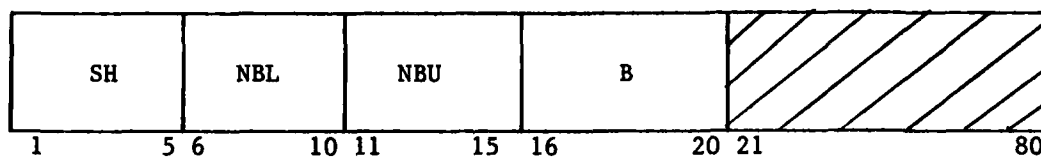


Figure 4 - Berthing Impact Point Card Format

TABLE 1 - BERTHING IMPACT POINT CARD FORMAT DESCRIPTION

VARIABLE	FORMAT	DESCRIPTION
SH	A5	Ship-type name
NBL	I5	Lower limit of ship hull number
NBU	I5	Upper limit of ship hull number
B	I5	Berthing impact point

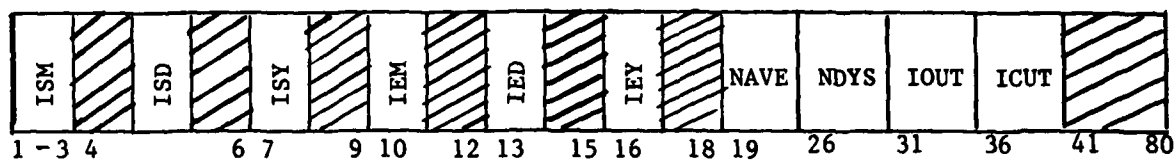


Figure 5 - Date and Option Card Format

TABLE 2 - DATE AND OPTION CARD FORMAT DESCRIPTION

VARIABLE	FORMAT	DESCRIPTION
ISM	I2	Start date, month
ISD	I2	Start date, day
ISY	I2	Start date, year
IEM	I2	End date, month
IED	I2	End date, day
IEY	I2	End date, year
NAVE	I7	Period of running average, in days
NDYS	I5	Number of peaks reported
IOUT	I5	Output indicator
ICUT	I5	Output lower cutoff

(2) Dates of maximum berthing utilization, generated by BIPPY for the ship workload file generated by DDS.

(3) BURFA parameter cards.

4.2.1 Input Data Generated by DDS

The list of ships scheduled to dock in a specific time period, the ship workload file, is read by shipyard. This list of ships consists of records which are 80-character card images. These records may be read in either card or tape form. Each ship list is preceded by an identification record and is terminated with an "END" record.

4.2.1.1 Ship Workload Identification Record Format

The ship workload identification record format is shown in Figure 6. Table 3 describes the variables and formats.

4.2.1.2 Ship Workload Records Format

The ship workload records generated by DDS have the format given in Figure 7. Variables formats are described in Table 4.

4.2.1.3 "END" Record Format

The END card has the word END in columns 1-3.

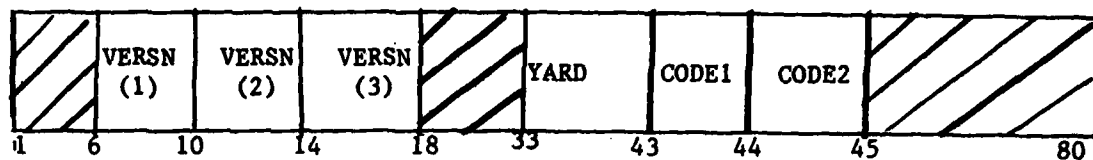


Figure 6 - Ship Workload Identification Record Format

TABLE 3 - SHIP WORKLOAD IDENTIFICATION RECORD FORMAT DESCRIPTION

VARIABLE	FORMAT	DESCRIPTION
VERSN (1)	A4	Identifying symbols for "ship workload" file of DDS used in BURFA
VERSN (2)	A4	
VERSN (3)	A4	
YARD	A5	Name of shipyard to be considered
CODE 1	I1	Code number given to shipyard by the SCHED program
CODE 2	I1	

Figure 7 - Ship Workload Record Format

TABLE 4 - SHIP WORKLOAD RECORD FORMAT DESCRIPTION

VARIABLE	FORMAT	DESCRIPTION
TYPE	A5	Ship-type specification
HULL	I4	Ship hull number
YARD	A5	Overhaul yard
DOCK	A3	Drydock identification
SMO, SDAY, SYR	3I2	Starting docking date
DMO, DDAY, DYR	3I2	Drydocking date
UMO, UDAY, UYR	3I2	Undocking date
EMO, EDAY, EYR	3I2	End docking date
BERTH	A2	If ship is pre-assigned a berth, insert program berth letter. Otherwise blank (See Table 10)
DKT	I4	Drydocking time
TYWK	A3	Type of work to be done at yard
DKCLS	I2	* Size of ship. The greater the ship class number, DKCLS, the smaller the ship size.
PRITY	I2	Priority of shipyard assignment, used by program SCHED

* For consistency in the LRPS Reports DKCLS is equivalent to Ship class.

4.2.2 BURFA Input Data

4.2.2.1 Simulation Dates Record Format 1

This record format, used when JOPT (see 4.2.3.1) is set equal to 2, is shown in Figure 8. The variables and formats used are described in Table 5.

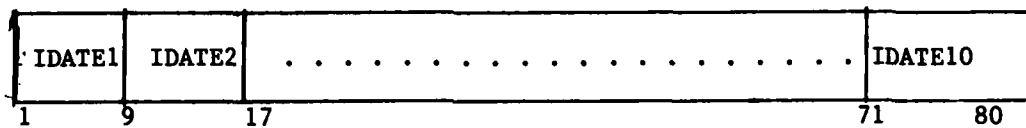


Figure 8 - Simulation Dates Record Format 1

TABLE 5 - SIMULATION DATES RECORD FORMAT 1 DESCRIPTION

VARIABLE	FORMAT	DESCRIPTION
IDATE1, IDATE2,...,IDATE10	10I8	Simulation dates, in days

4.2.2.2 Simulation Dates Record Format 2

This record format, used when JOPT (see 4.2.3.1) is set equal to 1, is shown in Figure 9; variables and formats are described in Table 6.

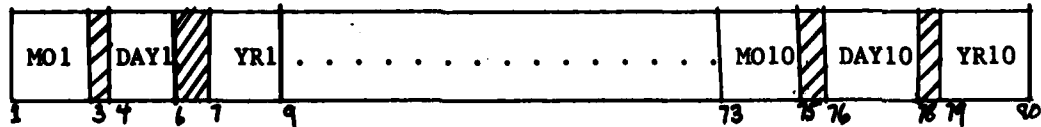


Figure 9 - Simulation Dates Record Format 2

TABLE 6 - SIMULATION DATES RECORD FORMAT 2 DESCRIPTION

VARIABLES	FORMAT	DESCRIPTION
MO1, DAY1, YR1,..., MO10, DAY10, YR10	10(I2,1X,I2,1X,I2)	Simulation dates, in months, days, years

4.2.3 BURFA Parameter Cards Formats

4.2.3.1 BURFA Option Card Format

The BURFA Option Card format is given in Figure 10; variables and formats are described in Table 7.

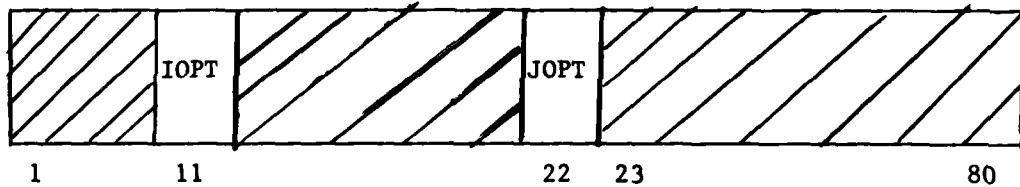


Figure 10 - BURFA Option Card Format

TABLE 7 - BURFA OPTION CARD FORMAT DESCRIPTION

VARIABLE	FORMAT	DESCRIPTION
IOPT	I1	Ship workload records input indicator IOPT = 1 indicates card input on standard tape 5 IOPT = 2 indicates tape input to be used with tape unit 1 as input device IOPT = 3 indicates both card and tape are to be used
JOPT	I1	Simulation dates indicator JOPT = 1, card input is to be used JOPT = 2, tape input is to be used with tape unit 3 as its input device

4.2.3.2 The Ship-Type Matrix Cards Format

A Ship-Type Matrix Card specifies the ship-types which take precedence in assignment of a berth. Each Ship-Type Matrix Card is immediately followed by a Berth-Program-Letter Sequence Card (see 4.2.3.3). The maximum number of Ship-Type Matrix Cards is ten. The termination of the ship-type card reading is accomplished by an "END" card. The Ship-Type Matrix Card format is given in Figure 11; the variables and formats are described in Table 8.

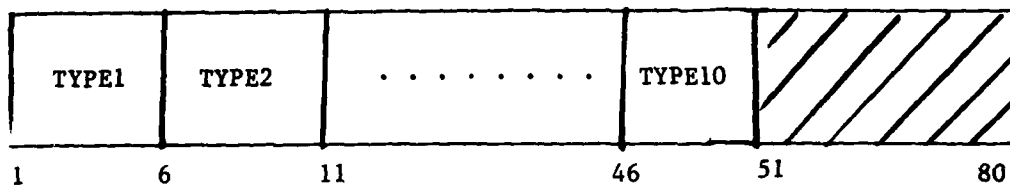


Figure 11 - Ship-Type Matrix Card Format

TABLE 8 - SHIP-TYPE MATRIX CARD FORMAT DESCRIPTION

VARIABLES	FORMAT	DESCRIPTION
TYPE1,TYPE2,...,TYPE10	10A5	Ship-types of ships to have precedence in berth assignment

4.2.3.3 Berth-Program-Letter Sequence Cards Format

A Berth-Program-Letter Sequence Card immediately follows a Ship-Type Matrix Card. It specifies the program letter, given to each berth (see 4.2.3.4), for the berths which have as their first-assignment choice the ship-types specified in the preceding Ship-Type Matrix Card. The maximum number of berths per card is 15 with one card for each Ship-Type Matrix Card. The Berth-Program-Letter Sequence Card format is given by Figure 12; Table 9 describes the variables and formats.

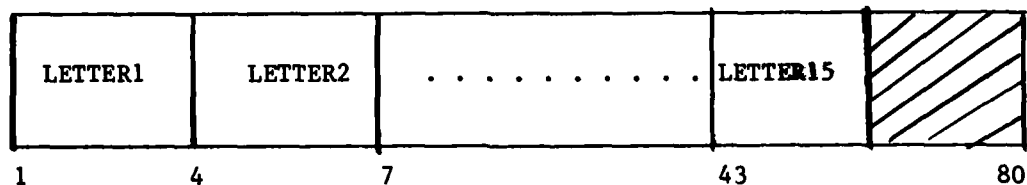


Figure 12 - Berth-Program-Letter Sequence Card Format

TABLE 9 - BERTH-PROGRAM-LETTER SEQUENCE CARD FORMAT DESCRIPTION

VARIABLES	FORMAT	DESCRIPTION
LETTER1, LETTER2,..., LETTER15	15A3	Program letters used for berth identification

4.2.3.2 Berth Identification Card Format

The Berth Identification Card contains a program identification letter and lists the utilities, electric current, water, steam, and linear space at a berth. Berths with the same berth identification letter are considered as one berth with lengths and utilities totaled. The maximum number of individual berths is 100.

Figure 13 provides the Berth Identification Card format; Table 10 describes the variables and formats.

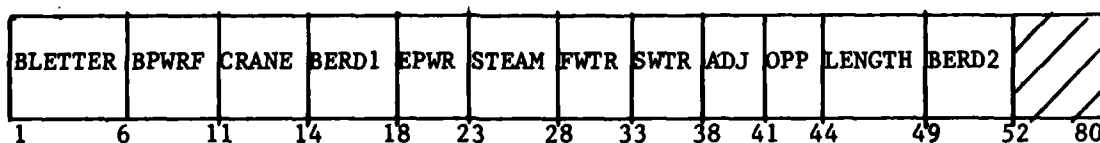


Figure 13 - Berth Identification Card Format

TABLE 10 - BERTH IDENTIFICATION CARD FORMAT DESCRIPTION

VARIABLE	FORMAT	DESCRIPTION
BLETTER	A5	Berth letter applies to to program treatment of berths as individual or combined berths
BPWRF	I5	Maximum electric current (ac at 450 volts) available for each linear foot of ship
CRANE	I3	Crane capacity*
BERD1	A3	Berth description
EPWR	I5	Electrical current (ac at 450 volts) available at the berth
STEAM	I5	Steam (lb/hr) available at the berth
FWTR	I5	Fresh water (gpm) available at the berth
SWTR	I5	Salt water (gpm) available at the berth
ADJ	A3	Berth letter of berth adjacent to berth (see Appendix A)
OPP	A3	Berth letter of berth opposite to berth
LENGTH	I5	Berth linear length (ft)
BERD2	A3	Berth description

* Not used in program at present

4.2.3.5 Ship-Type Nesting-Configuration Card Format

The Ship-Type Nesting-Configuration Cards specify the ship-types and hull-number ranges of ships that can be nested in the same berth. The maximum number of Ship-Type Nesting-Configuration Cards is 100. The nesting-card reading is terminated by an "END" card. Figure 14 provides the Ship-Type Nesting Configuration Card format; Table 11 describes the variables and formats.

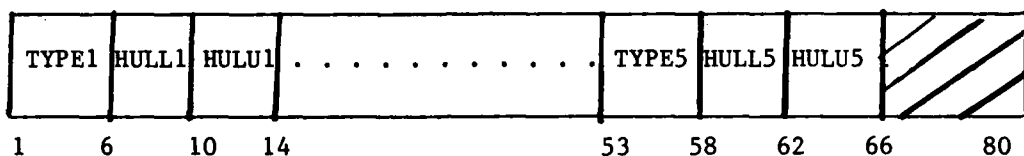


Figure 14 - Ship-Type Nesting-Configuration Card Format

TABLE 11 - SHIP-TYPE NESTING-CONFIGURATION CARD FORMAT DESCRIPTION

VARIABLE	FORMAT	DESCRIPTION
TYPE1 - TYPE5	A5	Ship-type
HULL1 - HULL5	I4	Hull-number, lower limit
HULU1 - HULU5	I4	Hull-number, upper limit

4.2.3.6 Ship-Type Card Format

The Ship-Type Cards specify all utilities needed by a particular ship-type while at the berth. The maximum number of Ship-Type Cards is 100. The Ship-Type Card reading is terminated by an "END" card. Figure 15 shows the Ship-Type Card format; Table 12 describes the variables and formats.

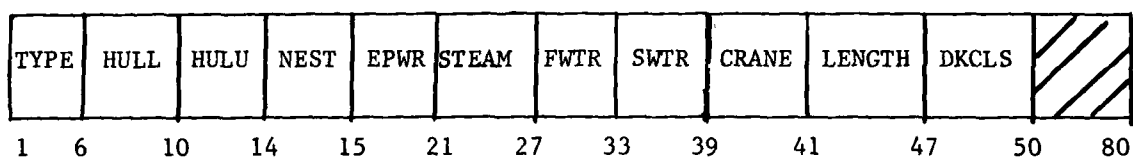


Figure 15 - Ship-Type Card Format

TABLE 12 - SHIP-TYPE CARD FORMAT DESCRIPTION

VARIABLE	FORMAT	DESCRIPTION
TYPE	A5	Ship-Type name
HULL	I4	Hull number, lower limit
HULU	I4	Hull number, upper limit
NEST	I1	Ship nesting indicator NEST = 0, ship cannot be nested NEST = 2, ship can be nested
EPWR	I6	Electric current (ac at 450 volts)
STEAM	I6	Steam power (lb/hr)
FWTR	I6	Fresh water (gpm)
SWTR	I6	Salt water (gpm)
CRANE	I2	Crane specifications*
LENGTH	I6	Linear length of ship (ft)
DKCLS	I3	Ship class

* Not used in program at present 34

4.2.3.7 Berth Electric Power-Station Card Format

A Berth Electric Power-Station Card specifies the program berth letter names of all those berths being supplied electric power by the same power station. This card also gives a total current (ac at 450 volts) produced by the power station. The maximum number of power-station cards is ten. The maximum number of berths which may be supplied electric power by a single station is nine. The berth power-station reading is terminated by an "END" card. Berth power-station card format is given by Figure 16; Table 13 describes the variables and formats.

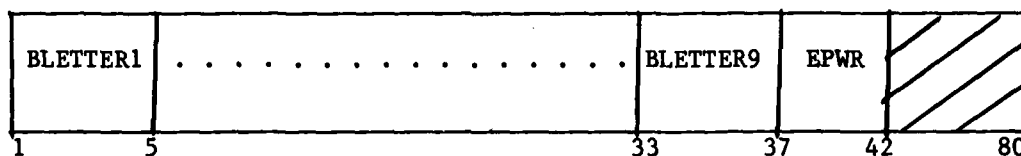


Figure 16 - Berth Electric Power-Station Card Format

TABLE 13 - BERTH ELECTRIC POWER-STATION CARD FORMAT DESCRIPTION

VARIABLE	FORMAT	DESCRIPTION
BLETTER1-BLETTER9	9A4	Program berth letters of all berths being supplied by same power station
EPWR	15	Total electric current produced by station (ac at 450 volts)

4.2.3.8 Unscheduled-Workyear Probability Card Format

The Unscheduled-Workyear Probability Card specifies the sequential years for which unscheduled work probabilities are given and the maximum number of unscheduled ships allowed for each year. The maximum number of years considered is ten. If no ship probabilities are to be read, a blank card is inserted. Figure 17 shows the format for the Unscheduled-Workyear Probability Cards; Table 14 describes the variables and formats.

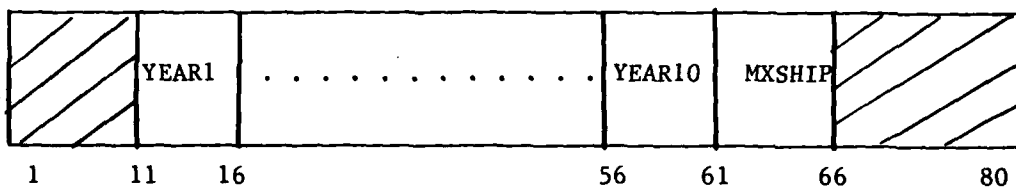


Figure 17 - Unscheduled-Workyear Probability Card Format

TABLE 14 - UNSCHEDULED-WORKYEAR PROBABILITY CARD FORMAT DESCRIPTION

VARIABLE	FORMAT	DESCRIPTION
YEAR1-YEAR10	10I5	Years for which unscheduled ship maintenance probabilities are given
MXSHIP	I5	Maximum number of unscheduled ships per given yard

4.2.3.9 Unscheduled-Work Probability Cards Format

The Unscheduled-Work Probability Cards specify the probabilities that given ship-types will be considered as unscheduled work for a given year. Each probability is given with respect to the corresponding year specified on the Unscheduled-Workyear Probability Card. The maximum number of Unscheduled Work Probability Cards is 40. This card reading is terminated by an "END" card. Figure 18 shows the format for the Unscheduled-Work Probability Cards; Table 15 describes the variables and formats.

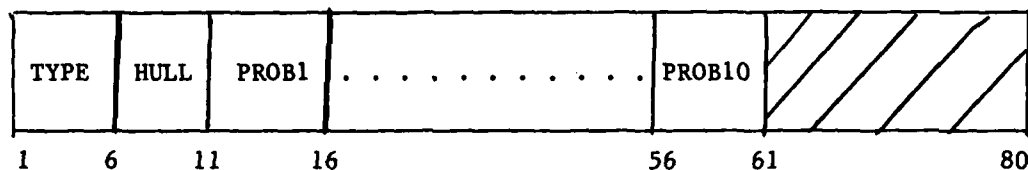


Figure 18 - Unscheduled-Work Probability Card Format

TABLE 15 - UNSCHEDULED-WORK PROBABILITY CARD FORMAT DESCRIPTION

VARIABLE	FORMAT	DESCRIPTION
TYPE	A5	Ship-type
HULL	I5	Ship class number
PROB1-PROB10	10F5.2	Probability of unscheduled work for each of the years specified (for specified ship-type)

5. BURF OUTPUT

5.1 BIPPY OUTPUT DESCRIPTION

Two forms of output are available from BIPPY. One of these is simply a list of peak dates, or more specifically the center dates of the peaked running averages. These dates are both printed and placed on tape 3 for use later by BURFA. It is a user option to request from one to ten of these dates. If the user asks for M dates, BIPPY will supply the dates of the M highest peaks within the considered interval. The other output, a "skyline plot" or histogram of actual impact-point totals (not averages) on a daily basis, is optional and may be suppressed. Only totals in excess of a user-defined lower cutoff level are presented in the "skyline plot." Any ships for which no berthing impact points have been defined will be noted on the first page of the printed output.

5.2 BURFA OUTPUT DESCRIPTION

BURFA produces a series of reports. Each report has a report reference number which is specified at the top of each output page. This number is of the format 50-XX-SS, where 50 indicates the LRPS report level which refers to the BURF system, XX indicates the level of printout within the BURF system, and SS indicates the shipyard sequence number.

The reports produced by BURFA are:

Report reference number	Description
50-20-SS	BURFA parameter deck listing
50-13-SS	Ship assignment listing
50-01-SS	Ship Utilities Requirements summary with deficiencies and excesses of utilities specified - listing of ship-berth assignments with diagnostics specifying cause for failure of ship to berth
50-02-SS	Electric power-station utilization listings
50-03-SS	Graphic display of ship berthing configuration
50-04-SS	Audit Trail*

* Computer listing of ship/berth assignment processing. The Audit Trail is printed on tape unit 2.

6. COMPUTER SYSTEM

The BURF Program was designed to run on the NSRDC CDC 6700 computer facility. BURF requires 60K actual words of core. An average computer run requires three minutes per shipyard.

Computer control cards for standard deck setups and ship and shipyard data are available at NSRDC, Code 1863. The computer program listings for the CDC 6700 are given in Appendix D.

BURF has been adapted to run on the IBM 360 computer. For these program listings and the program execution procedures contact NAVSHIPS, Code 70T.

APPENDIX A - BURF Sample Problem

Appendix A provides a sample problem. The problem case consists of a fictitious workload for the Charleston Naval shipyard from 1973 to 1981.

Appendix A also gives a listing of all input to BURF for the problem case.

C

C

SSBN	636CHASNG02	8 277	81877	51478101678	78	27CRO	72 4	280000	627	5149
SSN	660CHASNG02	7 378	7 978	4 479 92879	79	27ORF	7210	150000	637	5160
AE	33CHASNG05	81071	82071	9 371 92371	72	15FO	5551	5000	26	7 7
AS	18CHASNG0510	671	102471112771	1 872	72	35RC	5522	29056	11	15 30
AE	34CHASNG0511	971	112871121271122071		72	15FO	5551	5000	26	7 7
AE	35CHASNG05	21072	22172	3 672 32372	72	15FO	5551	5000	26	7 7
DE	1090CHASNG05	7 372	71572	8 172 81472	73	18FO	7140	4900	1078	7 7
AE	34CHASNG05	72172	8 472	81572 9 172	73	12PS	5554	6000	26	7 7
SSN	681CHASNG05	71073	72073	8 573 82473	74	17PS	7137	7900	637	7 7
SSN	683CHASNG05	72473	8 973	83073 9 973*	74	22FO	7225	20000	637	7 7
DD	938CHASNG0510	473	102373111773	1 474	74	26RO	7522	34351	931	15 45
DD	849CHASNG05	71574	8 474	82974101574	75	26RO	8522	19370	710	15 45
MSO	521CHASNG05102074		10287411	674112074	75	10FO	9852	500	519	7 7
DD	965CHASNG05103074		11 774112474121674		75	18FO	4540	5000	963	7 7
AD	19CHASNG0511	674	112774123174	2 675	75	35RO	5522	19970	14	15 15
DD	7203CHASNG05	82175	82975	9127510 275	76	15PS	4543	6000	963	7 7
ATS	7201CHASNG0510	475	101375101775111575		76	5PS	9454	500	0	7 7
AD	27CHASNG05	92076	10 776111076122076		77	35RO	7622	19970	26	15 15
ATS	7302CHASNG05	1 377	11577	11977 21877	77	5PS	9454	500	0	7 7
SSN	646CHASNG05	2 177	2 97711	577 42878	77	27ORF	7210	150000	637	5162
SSN	7204CHASNG05	11778	12578	21078 3 278	78	17PS	7237	12400	0	7 7
DD	7305CHASNG05	2 279	21979	31379 5 279	79	23RO	4522	20600	963	15 45
DD	7401CHASNG05	32079	33179	41479 5 279	79	15PS	4543	6000	963	7 7
AS	33CHASNG06	8 175	81975	9227512 175	76	35RO	3540	28840	33	15 15
DE	1091CHASNG06	92275	10 875111175122275		76	35RO	7122	16995	1078	15 15
CG	10CHASNG06	11576	13176	31276 51576	76	42RO	4022	38110	10	15 45
AS	18CHASNG06	7 976	72976	9 176101176	77	35RO	5522	18940	11	15 30
DE	1068CHASNG06	91776	10 776111076121776		77	35RO	7122	16995	1052	15 15
DE	1072CHASNG06111276		12 176	1 477 21177	77	35RO	7122	16995	1052	15 15
DD	7307CHASNG06121576		1 577	11977 2 277	77	15PS	4543	6000	963	7 7
DLG	13CHASNG06123076		12077	22877 42977	77	40RO	6022	43569	9	20 45
DD	938CHASNG06	2 477	3 177	32377 5 977*	77	23RO	7522	19370	931	15 45
DD	7203CHASNG06	1 478	12078	21178 4 378	78	23RO	4522	20600	963	15 45
SSN	676CHASNG06	2 279	2 97911	579 43080	79	27ORF	7110	150000	637	5163
MSO	422CHASNF12	81771	82571	9 371 91771	72	10FO	9852	500	422	7 7
MSO	509CHASNF12	81771	9 471	91371 93071	72	10FO	9852	500	508	7 7
MSO	424CHASNF12	91771	9297110	871101771	72	10FO	9852	500	422	7 7
MSO	468CHASNF12	1 472	11272	11672 21572	72	5PS	9855	300	422	7 7
MSO	519CHASNF12	1 472	11772	12172 21572	72	5PS	9855	300	519	7 7
SS	416CHASNF12	1 372	12272	4 572 6 272	72	75RO	9816	39052	416	15 15
MSO	422CHASNF12	5 572	51672	52072 61672	72	5PS	9855	300	422	7 7
MSO	509CHASNF12	5 572	52172	52572 61672	72	5PS	9855	300	508	7 7
SS	424CHASNF12	6 972	62572	9 772112472	72	75RO	9816	25472	420	15 42
MSO	459CHASNF12	91872	9287210	772101872	73	10FO	9852	500	422	7 7
DD	861CHASNF12101272		101372111272	11273	73	31NRT	9567	9000	764	0 0
MSO	459CHASNF12	6 173	61073	61473 71673	73	5PS	9855	300	422	7 7
MSO	462CHASNF12	7 273	71073	71473 81673	74	5PS	9855	300	422	7 7
MSO	469CHASNF12	7 273	71573	71973 81673	74	5PS	9855	300	422	7 7
MSO	471CHASNF12	7 273	72073	72473 81673	74	5PS	9855	300	422	7 7
MSO	494CHASNF12	7 273	72573	72973 81573	74	5PS	9855	300	422	7 7
MSO	511CHASNF12	7 273	73073	8 373 81573	74	5PS	9855	300	508	7 7
MSO	440CHASNF12	91873	9287310	773101873	74	10FO	9852	500	422	7 7
MSO	494CHASNF12101873		10237311	673111973	74	10FO	9852	500	422	7 7
SS	487CHASNF12102673		111273	12574 32674	74	75RO	9816	25235	343	15 15
MSO	440CHASNF12	6 374	61574	61974 71774	74	5PS	9855	300	422	7 7
SS	523CHASNF12	6 374	62074	9 27411 474	74	75RO	9816	25235	484	15 15
SS	484CHASNF12	81274	9 374111674	11075	75	75RO	9816	25235	484	15 15
SS	524CHASNF1212	274	122274	3 675 5 275	75	75RO	9816	25235	343	15 15
SS	478CHASNF12	42875	51675	72975 92975	75	75RO	9816	25235	484	15 15
MSO	520CHASNF12	71775	73075	8 375 81775	76	5PS	9855	300	519	7 7

MSO	521CHASNFI2	71775	8 475 8 875 81775	76	5PS 9855	300	422	7	7
MSO	461CHASNFI2	91775	9287510 275111775	76	5PS 9855	300	422	7	7
DD	861CHASNFI2	101275	101375111275 11276	76	31NRT9567	9000	764	0	0
SS	420CHASNFI2	21376	3 176 32876 51476	76	28RO 9816	25235	420	15	42
SS	425CHASNFI2	52776	61476 82776102776	76	75RO 9816	25235	425	15	15
SS	487CHASNFI2	92776	101776123076 22577	77	75RO 9816	25235	343	15	15
SS	523CHASNFI2	5 477	52077 8 27710 477	77	75RO 9816	25235	484	15	15
SS	490CHASNFI2	72177	8 877102177122177	78	75RO 9816	25235	343	15	15
SS	524CHASNFI2	10 377	102277 1 478 3 278	78	75RO 9816	25235	343	15	15
MSO	425CHASNFI5	92071	9297110 871102071	72	10FO 9852	500	422	7	7
MSO	472CHASNFI5	2 172	21172 21572 31472	72	5PS 9855	300	422	7	7
MSO	470CHASNFI5	2 772	21672 22072 31572	72	5PS 9855	300	422	7	7
MSO	460CHASNFI5	21072	22172 22572 31672	72	5PS 9855	300	422	7	7
MSO	424CHASNFI5	61572	62572 62972 71572	72	5PS 9855	300	422	7	7
MSO	425CHASNFI5	61572	63072 7 472 71572	72	5PS 9855	300	422	7	7
MSO	495CHASNFI5	61572	7 572 7 972 71572	72	5PS 9855	300	422	7	7
DD	758CHASNFI5	7 372	71672 8 97210 372	73	31NRT9567	9000	692	0	0
SSN	660CHASNG01	3 174	3 77412 174 22875F	74	270RO 7210	120000	637	5	72
MSO	462CHASNFI5	101772	10287211 672111772	73	10FO 9852	500	422	7	7
MSO	461CHASNFI5	91873	9287310 773101873	74	10FO 9852	500	422	7	7
MSO	511CHASNFI5	101873	10287311 673111973	74	10FO 9852	500	508	7	7
MSO	496CHASNFI5	71774	72574 72974 81774	75	5PS 9855	3380	422	7	7
SS	490CHASNFI5	82174	9 874112174 12175	75	75RO 9816	25235	343	15	15
MSO	473CHASNFI5	61775	62575 62975 71775	75	5PS 9855	300	422	7	7
MSO	7303CHASNFI5	61775	63075 7 475 71775	75	5PS 9855	300	0	7	7
SS	522CHASNFI5	72677	81377102677122777	78	75RO 9816	25235	484	15	15
DD	844CHASNFI8	7 171	7 671 71671 9 171	72	11RO 8522	19570	710	0	45
DDG	10CHASNFI8	7 171	72171 82971 1 372	72	40RO 8022	26771	2	15	40
DD	841CHASNFI8	81371	83071 92671111571	72	28RO 8522	17792	710	15	45
DD	878CHASNFI8	91371	92971102071121071	72	22RO 8522	23785	710	15	45
DD	940CHASNFI8	102971	11 8711112271 11772	72	15PS 8043	6000	931	7	7
DE	1080CHASNFI8	111571	11237112 271122771	72	10PS 7143	5500	1078	7	7
DE	1086CHASNFI8	122071	122871 11472 13072	72	18FO 7140	4500	1078	7	7
DE	1081CHASNFI8	1 572	11772 12672 21672	72	10PS 7143	5500	1078	7	7
SSN	603CHASNFI8	11072	12772102272 41373	72	270RF 7110	150000	593	5168	
MSO	469CHASNFI8	101772	10287211 672111772	73	10FO 9852	500	422	7	7
DD	865CHASNFI8	102072	11 772121172 21673	73	35RO 8522	25750	710	15	45
DE	1094CHASNFI8	121172	122272 1 873 12273	73	18FO 7140	4500	1078	7	7
DD	839CHASNFI8	2 573	22573 31873 5 473	73	22RO 8522	19570	710	15	45
SSBN	610CHASNFI8	4 973	41673 11074 51074	73	270RF 72 4	260000	608	5106	
DD	881CHASNFI8	121773	11174 21474 41574	74	35RO 8522	19570	710	15	45
DD	872CHASNFI8	21474	3 274 32674 51674	74	25RO 8522	19570	710	15	45
DDG	2CHASNFI8	22574	32774 5 574 62474	74	40RO 7522	43569	2	15	40
DDG	18CHASNFI8	32674	5 674 61474 72374	74	40RQ 7522	36050	2	15	40
DD	841CHASNFI8	7 174	72074 8147410 174	75	26RO 8522	19570	710	15	45
DD	942CHASNFI8	8 174	81974 92274112974	75	35RO 7522	25750	931	15	45
MSO	473CHASNFI8	92074	9287410 774102074	75	10FO 9852	500	422	7	7
DD	867CHASNFI8	10 174	101874111474 1 375	75	28RO 8522	19570	710	15	45
DDG	10CHASNFI8	101574	111774122674 21175	75	40RO 7522	43569	2	15	40
DD	878CHASNFI8	11075	12675 3 175 5 975	75	35RO 8522	19570	710	15	45
DD	890CHASNFI8	3 375	32275 41875 6 575	75	28RO 8522	19570	710	15	45
SSN	676CHASNFI8	4 175	42175 11576 33076	75	270RO 7210	120000	637	5	74
DE	1044CHASNFI8	1 276	12176 22476 4 276	76	35RO 7122	16995	1040	15	15
DD	865CHASNFI8	2 276	22576 32076 5 376	76	25RO 8522	19570	710	15	45
ATS	7302CHASNFI8	41676	42576 5 176 52876	76	7FO 9451	300	0	7	7
DE	1059CHASNFI8	5 376	52076 62376 8 376	76	35RO 7122	16995	1052	15	15
SSN	638CHASNFI8	6 176	62476 32077 83077	76	270RF 7210	150000	637	5164	
SSN	669CHASNFI8	6 177	6 977 3 578 83078	77	270RF 7210	150000	637	5164	
DD	763CHASNFI8	4 378	4 578 42578 6 378	78	21NRT8567	9000	710	0	C
DD	878CHASNFI8	6 978	62978 72478 9 978	78	26RO 8522	19570	710	15	45

DE 1091CHASNFI8 12279 2 979 31579 42779 79 35RO 7122 16995 1078 15 15
DE 1044CHASNFI8 5 379 52079 62379 8 379 79 35RO 7122 16995 1040 15 15
END

183

C SAMPLE DIPPY PARAMETER DECK

AD	1	36	14
AD	37	9999	18
AE	1	25	13
AE	26	9999	16
AF	1	9999	13
AFS	1	9999	15
AG	1	9999	6
AGDF	1	9999	14
AGEH	1	9999	0
AGS	1	9999	
AGSS	1	9999	6
AO	1	97	14
AO	98	9999	18
AOE	1	9999	24
AOG	1	9999	8
AOR	1	9999	19
AR	1	21	13
AR	22	9999	18
ARC	1	9999	13
ARS	1	9999	6
AS	1	30	16
AS	31	9999	18
ASR	1	9999	8
ATF	1	9999	6
ATS	1	9999	8
ATSS	1	9999	6
CA	1	9999	21
CC	1	9999	17
CG	1	9999	22
CGN	1	9999	25
CLG	1	9999	19
CVA	1	40	26
CVA	41	58	29
CVA	59	62	33
CVA	63	9999	32
CVAN	1	67	35
CVAN	68	9999	38
CVS	1	40	26
CVS	41	9999	29
CVT	1	9999	26
DD	1	930	12
DD	931	962	14
DD	963	9999	16
DDG	1	36	14
DDG	37	9999	18
DE	1	1051	11
DE	1052	9999	13
DEG	1	9999	14
DER	1	9999	11
DLG	1	9999	16
DLGN	1	35	18
DLGN	36	9999	20
LCC	1	18	12
LCC	19	9999	17
LHA	1	9999	28
LKA	1	9999	15
LPH	1	13	15
LPH	14	9999	16
LPH	1	9999	16

LSD	1	35	14
LSD	36	9999	16
LST	1	1178	13
LST	1179	9999	15
LPSS	1	9999	8
MSC	1	9999	0
MSH	1	9999	0
MSO	1	9999	0
PG	1	9999	0
PGH	1	9999	0
SS	1	9999	6
SSN	1	636	12
SSN	637	670	13
SSN	671	687	14
SSN	688	9999	18
SSRN	1	659	18
SSRN	660	9999	20
TAK	1	9999	0

END

CHARLESTON
07/01/72 06/30/81

FY 73 - 81
1 1

BERTHING IMPACT POINTS
1 85

21

[illegible]

CVS	419999	4950		300		968	10
CV	59 62	7200 39500		300	3500	1080	5
CVA	59 62	7200 39500		300	3500	1080	5
CV	639999	10000 50000		300	3500	1046	5
CVA	639999	10000 50000		300	3500	1046	5
CVAN	1 67	10550 50000		300	3500	1100	5
CVN	1 67	10550 50000		300	3500	1100	5
CVAN	689999	10850 50000		300	3500	1100	5
CVN	689999	10850 50000		300	3500	1100	5
CC	19999	3150 13000		200	3000	634	40
CG	19999	3530 13300		200	2500	674	40
CGN	19999	3580 17600		200	3000	721	30
CLG	19999	2730 13000		200	2500	610	45
DD	1 9302	1110 5000		50	1250	390	95
DD	1 930	1350 5000		25	1250	418	75
DD	931 9622	1350 5000		50	1250	418	75
DDG	1 362	1840 7000		50	1250	493	75
DDG	379999	2680 7000		50	1250	493	45
DE	110512	900 3700		50	1250	415	71
DE	105299992	1400 3700		50	1250	438	72
DEG	199992	1300 3700		50	1250	432	71
DER	199992	900 3700		50	1250	306	98
DLG	199992	2680 7000		65	2000	547	50
DLGN	1 35	3500 10000		65	3000	565	50
DLGN	369999	4300 12000		100	3000	596	45
LCC	1 18	2650 9300		100	2500	499	75
LCC	199999	3450 9800		150	2500	620	75
LMA	19999	6000 31700		300	3500	820	20
LKA	19999	1780 8000		100	2500	576	55
LPA	19999	1800 12600		100	2500	490	80
LPO	1 13	1850 5600		100	2000	569	35
LPO	149999	1850 5600		100	2000	570	35
LPH	19999	2680 24000		180	2500	592	35
LPSS	199992	300		25	1000	322	98
LSD	1 35	1100 6900		100	2000	510	76
LSD	369999	1500 7000		100	2000	555	55
LST	11178	950 4000		50	1250	445	80
LST	11799999	1850 4000		50	1250	523	60
SS	199992	300		25	1000	350	98
SSAN	1 659	1700		25	1200	425	72
SSBN	6609999			25	1200	425	72
SSN	1 636	1750		25	1000	320	71
SSN	637 670	1700		25	1000	320	72
SSN	671 687	1700		25	1000	320	72
SSN	6889999	3700		25	2000	400	72
TAK	19999	200 4100		95	2000	520	55
AGEH	19999			3	500	220	99
MSC	199992	400		3	500	144	99
MSO	199992	1400		3	1100	190	99
PG	19999	1200		3	500	165	99
PGH	19999			3	500	75	99

END		7650										
J	I	15600										
A	B	C	D	E	F							
END												
CHASN			72	73	74	75	76	77	78	79	80	81
AD	40	3	3	3	3	3	3	3	3	3	3	3
AE	29	3	3	3	3	3	3	3	3	3	3	3
AOR	17	5	3	3	3	3	3	3	3	3	3	3
ARS	67	2	2	2	2	2	2	2	2	2	2	2

CHASN
CHASN
CHASN
CHASN
CHASN

AS	22	4	4	4	4	4	4	4	4	4	4	CHASN
ASR	69	2	2	2	2	2	2	2	2	2	2	CHASN
ATF	68	3	3	3	3	3	3	3	3	3	3	CHASN
ATS	70				10	4	4	4	4	9	6	CHASN
AOG	60	2	2	2	2	2	2	2	2	2	2	CHASN
DD	1	17	12	12	11	10	4	4	4	4	4	CHASN
DD	931				5	7	14	21	21	21	21	CHASN
DDG	44	10	10	10	10	10	10	10	10	10	10	CHASN
DE	1052	6	16	15	12	12	12	12	12	12	12	CHASN
DLG	32	10	10	10	12	12	12	12	12	12	12	CHASN
SS	64	20	15	14	14	13	11	11	11	8	8	CHASN
SSN	653	10	12	14	14	14	14	14	14	14	14	CHASN
END												CHASN
SS	1111	CHASN	F121	U2673	111273	12574	32674	74	75RO	9816	25235	343 15 15
SS	2222	CHASN	F121	U2673	111273	12574	32674	74	75RO	9816	25235	343 15 15
SS	6333	CHASN	F121	U2673	111273	12574	32674	74	75RO	9816	25235	343 15 15
SS	4444	CHASN	F121	U2673	111273	12574	32674	74	75RO	9816	25235	343 15 15
SS	5555	CHASN	F121	U2673	111273	12574	32674	74	75RO	9816	25235	343 15 15
SS	6666	CHASN	F121	U2673	111273	12574	32674	74	75RO	9816	25235	343 15 15
SS	7777	CHASN	F121	U2673	111273	12574	32674	74	75RO	9816	25235	343 15 15
CVA	39	CHASN	F121	U2673	111273	12574	32674	74	75RO	9816	25235	343 15 15
SSN	7777	CHASN	F121	U2673	111273	12574	32674	74	75RO	9816	25235	343 15 15
AD	111	CHASN	F121	U2673	111273	12574	32674	74	75RO	9816	25235	343 15 15
AD	222	CHASN	F121	U2673	111273	12574	32674	74	75RO	9816	25235	343 15 15
AD	332	CHASN	F121	U2673	111273	12574	32674	74	75RO	9816	25235	343 15 15
END												

CHARLESTON		FY 73 - 81										BERTHING IMPACT POINTS										
DATE	POINTS	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185
2/18/74	86	XX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2/19/74	86	XX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2/20/74	86	XX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2/21/74	86	XX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2/22/74	86	XX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2/23/74	86	XX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2/24/74	86	XX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2/25/74	100	XXXXXXXXXXXXXXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2/26/74	88	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2/27/74	88	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2/28/74	102	XXXXXXXXXXXXXXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3/ 1/74	115	XXXXXXXXXXXXXXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3/ 2/74	89	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3/ 3/74	89	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3/ 4/74	89	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3/ 5/74	89	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3/ 6/74	89	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3/23/74	90	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3/24/74	90	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3/25/74	90	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3/26/74	110	XXXXXXXXXXXXXXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5/ 5/74	130	XXXXXXXXXXXXXXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9/22/75	105	XXXXXXXXXXXXXXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9/23/75	89	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9/24/75	89	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9/25/75	89	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9/26/75	89	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9/27/75	89	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9/28/75	89	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11/11/75	97	XXXXXXXXXXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11/12/75	109	XXXXXXXXXXXXXXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11/13/75	109	XXXXXXXXXXXXXXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11/14/75	109	XXXXXXXXXXXXXXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11/15/75	101	XXXXXXXXXXXXXXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11/16/75	101	XXXXXXXXXXXXXXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11/17/75	89	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11/18/75	89	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11/19/75	89	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11/20/75	89	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11/21/75	89	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11/26/75	99	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11/27/75	89	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11/28/75	89	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
8/17/77	80	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
6/24/79	90	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
6/25/79	90	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
6/26/79	90	XXXX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

THE PEAK DAYS BASED ON RUNNING AVERAGES OVER 1 DAYS.

DATE	POINTS
3/ 1/74	115

CHASN

BERTHING AND UTILITIES
REQUIREMENTS FORECAST
PROGRAM

50-00-03 TEST 641172

58-10-03 TEST 041172

CHASN

NO.OF SHIP BERTHING CLASSES= 04,NO.OF BERTH PREFERENCE CLASSES= 4,NO.OF SINGLE BERTHS= 10,NO.OF COMBINED ACTIVE BERTHS= 0

SIMULATION DATES

3/ 1/74 0/ 0/ 0 0/ 0/ 0 0/ 0/ 0 0/ 0/ 0 0/ 0/ 0 0/ 0/ 0 0/ 0/ 0 0/ 0/ 0

BERTH PREFERENCE (1ST CHOICE) MATRIX

PREFERENCE GROUP	PREFERENCE TABLE									
	BERTHS					FIRST PASS				
1										
2	I	M	G							
3	F	E								
4	J									

SHIP TYPES

GROUP	CVA	CVN	CVT	CV	CVN	CLG	DD	DDG	DE	DEG	DLG
1											
2	AOE	CA	CG								
3	SSN	SSBN									
4	SS										

NESTING COMBINATION GROUPS

GROUP	TYPE	RANGE		TYPE	RANGE		TYPE	RANGE	
1	00		1 962	DDG		1 9999	DE		1 9999
2	00		962 999	DLG		1 9999	SS		1 9999
3	AGSS		1 9999	LPSS		1 9999	ATS		1 9999
4	A0G		1 9999	ATF		1 9999	ARS		1 9999
							ASR		1 9999

** EACH SHIP IN EACH GROUP CAN BE DOUBLE BERTHED WITH ANY OTHER SHIP IN THE SAME GROUP

CHASN

58-11-03 TEST 041172

BERTH IDENTIFICATION			CAPABILITY TABLE							
SEQ NO	PROGRAM	SHIPYARD	CRANE	EPWR	STMP	FWTR	SWTR	LENGTH	ADJ	OPP
1	J	C/S 352	-0	1400	4000	200	1000	1045	I	M
2	I	D/N 314	-0	4400	6000	400	2800	1060	J	I
3	H	O/S 314	-0	4400	-0	30	400	1111	G	
4	G	F/N 317B	-0	6400	7000	200	2000	1200	H	
5	F	G/S 317D	-0	2800	2000	130	3200	450		E
6	E	G/M 317D	-0	4000	2000	130	3200	745	D	F
7	D	H/N 317E	-0	4200	8000	65	250	650	E	C
8	C	H/S 317E	-0	4800	2000	130	1300	650	B	D
9	B	J/N 317F	-0	2400	7000	130	1500	650	C	A
10	A	J/S 317F	-0	2600	7000	130	1500	650		B

CHASN

50-11-03 TEST 641172

POWER STATION IDENTIFICATION

POWER STATION		BERTHS				AMPS
1	J	I	H			7650
2	A	B	C	D	E F	15600

CHASN

58-12-03 TEST 041172

UNASSIGNED WORK PROBABILITIES

SHIP	HULL	72	73	74	75	76	77	78	79	80	81
AD	40	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03
AE	29	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03
AOR	17	.05	.03	.03	.03	.03	.03	.03	.03	.03	.03
ARS	67	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
AS	22	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04
ASR	69	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
ATF	68	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03
ATS	70	-0.00	-0.00	-0.00	.10	.04	.04	.04	.04	.09	.06
AOG	60	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
DD	1	.17	.12	.12	.11	.10	.04	.04	.04	.04	.04
DD	931	-0.00	-0.00	-0.00	.05	.07	.14	.21	.21	.21	.21
DDG	44	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10
DE	1052	.06	.16	.15	.12	.12	.12	.12	.12	.12	.12
DLG	32	.10	.10	.10	.12	.12	.12	.12	.12	.12	.12
SS	64	.20	.15	.14	.14	.13	.11	.11	.11	.08	.08
SSN	653	.10	.12	.14	.14	.14	.14	.14	.14	.14	.14
END	-0	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00

SHIP IDENTIFICATION

SHIP BERTHING CLASS		BERTHING PREF		SHIP REQUIREMENTS TABLE									
----		----		MULL	NEST	EPNR	SYMP	PWTR	SWTR	CRANE	LTSHIP	DKCLS	
----		----		----	----	----	----	----	----	----	----	----	
1	5	AD	1	36	2	920	19200	100	2500	-0	531	76	
2	5	AD	37	9999	-0	2600	20200	100	2500	-0	645	35	
3	5	AE	1	25	-0	3700	10300	100	2000	-0	512	00	
4	5	AE	20	9999	-0	1700	10300	100	2000	-0	564	55	
5	5	AF	1	9999	-0	1030	4100	100	2000	-0	502	00	
6	5	AFS	1	9999	-0	1450	0000	200	2500	-0	501	50	
7	5	AG	1	9999	-0	1000	9300	100	2000	-0	564	94	
8	5	AGOE	1	9999	-0	1325	3700	50	1250	-0	615	71	
9	5	AGS	1	9999	2	300	-0	25	1000	-0	342	90	
10	5	AGSS	1	9999	2	300	-0	25	1000	-0	342	90	
11	5	AD	1	97	-0	1000	4400	50	2000	-0	644	76	
12	5	AD	90	9999	-0	1040	9300	50	2000	-0	695	55	
13	5	ADG	1	9999	2	130	4400	50	2000	-0	325	94	
14	2	ADG	1	9999	-0	1000	9300	200	3000	-0	793	30	
15	5	ADR	1	9999	-0	1000	9300	100	3000	-0	659	30	
16	5	AR	1	21	-0	1400	13700	100	2500	-0	530	76	
17	5	AR	22	9999	-0	1050	13700	100	2500	-0	530	35	
18	5	ARC	1	9999	2	976	4400	50	2000	-0	626	90	
19	5	ARS	1	9999	2	100	1900	25	500	-0	214	99	
20	5	AS	1	26	-0	2320	20200	100	2500	-0	644	35	
21	5	AS	31	9999	-0	2320	20200	100	2500	-0	644	35	
22	5	ASR	1	9999	2	510	2900	50	1250	-0	251	00	
23	5	ATP	1	9999	2	00	2100	25	500	-0	235	99	
24	5	ATSS	1	9999	2	460	1500	25	500	-0	203	90	
25	5	ATSS	2	9999	2	300	-0	25	1000	-0	342	90	
26	5	AVH	2	9999	-0	1000	4000	100	2500	-0	551	55	
27	2	CA	1	9999	-0	3530	14300	200	2500	-0	717	40	
28	2	CA	1	40	-0	3600	13700	300	3500	-0	699	20	
29	1	CVA	1	40	-0	3600	13700	300	3500	-0	699	20	
30	1	CVS	1	40	-0	3600	13700	300	3500	-0	699	20	
31	1	CVT	1	9999	-0	3600	13700	300	3500	-0	699	20	
32	1	CV	41	50	-0	6350	36500	300	3500	-0	960	10	
33	1	CVA	41	50	-0	6350	36500	300	3500	-0	960	10	
34	1	CVS	41	9999	-0	4350	-0	300	-0	-0	900	10	
35	1	CV	59	62	-0	7200	39500	300	3500	-0	1000	5	
36	1	CV	59	62	-0	7200	39500	300	3500	-0	1000	5	
37	1	CV	63	9999	-0	10000	50000	300	3500	-0	1046	5	
38	1	CV	63	9999	-0	10000	50000	300	3500	-0	1046	5	
39	1	CVAH	1	67	-0	14500	50000	300	3500	-0	1100	5	
40	1	CVAH	1	67	-0	10550	50000	300	3500	-0	1100	5	
41	1	CVAH	60	9999	-0	10050	50000	300	3500	-0	1100	5	
42	1	CVAH	60	9999	-0	10050	50000	300	3500	-0	1100	5	
43	2	CC	1	9999	-0	3150	15000	200	2900	-0	634	40	
44	2	CG	1	9999	-0	3530	13300	200	2900	-0	674	40	
45	5	CGH	1	9999	-0	3500	17000	200	3000	-0	721	30	
46	2	CLG	1	9999	-0	2730	13000	200	2900	-0	610	45	
47	2	DD	1	930	2	1110	5000	50	1250	-0	340	95	
48	2	DD	1	93	0	1350	5000	50	1250	-0	410	75	
49	2	DD	931	962	2	1350	5000	50	1250	-0	410	75	

CHASN

50-13-03 TEST 041172

SHIP ASSIGNMENT				SHMCLS	OKCLS	PRITY	TYWK
DATE	SHIP	TYPE	MULL				
3/ 1/74	1	CVA	39	29	20	16	RO
3/ 1/74	2	AD	111	2	35	16	RO
3/ 1/74	3	AD	222	2	35	16	RO
3/ 1/74	4	AD	332	2	35	16	RO
3/ 1/74	5	SSN	604	75	71	10	RF
3/ 1/74	6	SSN	7777	78	72	16	RO
3/ 1/74	7	SSN	660	76	72	10	RO
3/ 1/74	8	SSBN	610	73	72	4	RF
3/ 1/74	9	SSN	687	77	72	25	F0
3/ 1/74	10	DDG	2	50	75	22	RO
3/ 1/74	11	DDG	19	50	75	22	RO
3/ 1/74	12	DD	881	47	95	22	RO
3/ 1/74	13	DD	872	47	95	22	RO
3/ 1/74	14	SS	5555	72	98	16	RO
3/ 1/74	15	SS	6666	72	98	16	RO
3/ 1/74	16	SS	7777	72	98	16	RO
3/ 1/74	17	SS	487	72	98	16	RO
3/ 1/74	18	SS	1111	72	98	16	RO
3/ 1/74	19	SS	2222	72	98	16	RO
3/ 1/74	20	SS	333	72	98	16	RO
3/ 1/74	21	SS	4444	72	98	16	RO
3/ 1/74	22	SS	64	72	98	0	RU

CHASH

50-J1-J3 TEST 041172

SIMULATION DATE 3/ 1/74									
PORTM LATITUDE	SHIPYARD IDENTITY	EPONER AMP/450V	FWATER GPM	SWATER GPM	STEAM LBS/MR	LENGTH FT	NESTED FT		
J	C/S	AVAIL REQD DIFF	208 75 133	1000 3000 -2000	4000 0 4000	1045 700 345	350		
I	O/M	AVAIL REQD DIFF	400 150 300	2800 2500 300	6000 14000 -8000	1068 906 74	0		
H	O/S	AVAIL REQD DIFF	400 300 -270	400 3500 -3100	-0 31700 -31700	1111 899 212	0		
G	F/N	AVAIL REQD DIFF	200 125 75	2000 4500 -2500	7000 13000 -3000	1200 1100 20	0		
F	G/S	AVAIL REQD DIFF	130 25 105	3200 1000 2200	2000 0 2000	450 320 130	0		
E	G/N	AVAIL REQD DIFF	130 50 80	3200 2200 1000	2000 0 2000	745 745 0	0		
D	M/N	AVAIL REQD DIFF	65 100 -35	250 2500 -2250	8000 20200 -12200	650 645 5	0		
C	M/S	AVAIL REQD DIFF	130 130 30	1300 2500 -1200	2000 20200 -18200	650 645 5	0		
B	J/N	AVAIL REQD DIFF	130 100 30	1500 2500 -1000	7000 20200 -13200	650 645 5	0		
A	J/S	AVAIL REQD DIFF	130 50 80	1500 2000 -500	7000 0 7000	650 350 300	350		
U		REQD	125	3	0	1720	0		
TOTAL		AVAIL REQD DIFF	1553 1825 928	17150 28200 -9050	45000 116300 -71300	8211 7115 1896	700		

BERTHING SUMMARY II.

SHIPS BERTH			TYNK	BERTH
TYPE	HULL			
SSN	668		RO	F
CVA	39		RO	M
AO	222		RO	D
AO	332		RO	C
SSN	684		RF	E
SSN	7777		RO	G
AO	111		RO	B
SSN	618		RF	E
BOG	2		RO	I
BOG	19		RO	
BO	881		RO	G
BO	872		RO	
SS	5595		RO	J
SS	6666		RO	
SS	7777		RO	A
SS	487		RO	J
SS	1111		RO	A

(* SHIP NESTED)

REQUIREMENTS FOR SHIPS NOT BERTHED			REASON FOR FAILURE
TYPE	HULL	TYNK	
SSN	687	FO	INSUFFICIENT POWER
SS	2222	RO	INSUFFICIENT SPACE
SS	333	RO	INSUFFICIENT SPACE
SS	444	RO	INSUFFICIENT SPACE
SS	64	RU	INSUFFICIENT SPACE

CHASN

50-02-03	TEST	041172	
POWER STATION	REQD	AVAIL	
1	8100	7650	
2	13550	15600	

58-03-03 TEST 041172

CHASN

BERTHING ASSIGNMENT SIMULATION

BERTH SHIPYARD
LETTER IDENTITY

SHIP UTILIZATION CHART SIMULATION DATE 3/ 1/74

J C/S

	200	400	600	800	1000	1200	1400	1600	1800	2000	2200
I D/W											
M D/S											
S F/W											
F C/S											
E C/W											
O H/W											

(X=OPEN, O=1 SHIP, =NESTED SHIPS)

BERTH ASSIGNMENT LISTING

J	SS	5555+SS	407,SS	6466
I	DDG	2,00G	19	
M	CVA	39		
S	SSM	7777,00	001,00	072
F	SSM	648		
E	SSM	604,SSON	610	
O	AD	222		

CHASM

50-06-03 TEST 041177

DATE	TYPE	MULL	PASS	BERTH	ACTION TAKEN
3/ 1/74	SSN	660	0	F	SHIP CAN BERTH, REMAINING SPACE= 130 POWER= 5100 NO.OF SHIPS IN BERTH= 1
3/ 1/74	CUB	39	0	M	SHIP CAN BERTH, REMAINING SPACE= 212 POWER= 5200 NO.OF SHIPS IN BERTH= 1
3/ 1/74	AD	222			
3/ 1/74	AD	332			
3/ 1/74	SSN	606			
3/ 1/74	SSN	7777	1	F	SHIP CANNOT BERTH, INSUFFICIENT SPACE AVAIL= 130 REQ= 320
			1	E	SHIP CAN BERTH, REMAINING SPACE= 425 POWER= 3350 NO.OF SHIPS IN BERTH= 1
3/ 1/74	SSN	611	1	F	SHIP CANNOT BERTH, INSUFFICIENT SPACE AVAIL= 130 REQ= 400
3/ 1/74	SSN	610	1	E	SHIP CANNOT BERTH, INSUFFICIENT POWER, AVAIL= 3350 REQ= 3700
			1	F	SHIP CANNOT BERTH, INSUFFICIENT SPACE AVAIL= 130 REQ= 425
			1	E	SHIP CAN BERTH, REMAINING SPACE= 0 POWER= 1650 NO.OF SHIPS IN BERTH= 2
3/ 1/74	SSN	607	1	F	SHIP CANNOT BERTH, INSUFFICIENT SPACE AVAIL= 130 REQ= 320
			1	E	SHIP CANNOT BERTH, INSUFFICIENT SPACE AVAIL= 0 REQ= 320
3/ 1/74	DOC	2	1	I	SHIP CAN BERTH, REMAINING SPACE= 567 POWER= 3360 NO.OF SHIPS IN BERTH= 1
3/ 1/74	DOC	19	1	I	SHIP CAN BERTH, REMAINING SPACE= 74 POWER= 1520 NO.OF SHIPS IN BERTH= 2
3/ 1/74	DD	801	1	I	SHIP CANNOT BERTH, INSUFFICIENT SPACE AVAIL= 74 REQ= 390
			1	M	SHIP CANNOT BERTH, INSUFFICIENT SPACE AVAIL= 212 REQ= 390
			1	C	SHIP CAN BERTH, REMAINING SPACE= 810 POWER= 5290 NO.OF SHIPS IN BERTH= 1
3/ 1/74	DD	872	1	I	SHIP CANNOT BERTH, INSUFFICIENT SPACE AVAIL= 74 REQ= 390
			1	M	

1	G				SHIP CAN BERTH, REMAINING SPACE= 420 POWER= 4100 NO. OF SHIPS IN BERTH= 2
1	J	5555	3/ 1/74 SS		SHIP CAN BERTH, REMAINING SPACE= 695 POWER= 1100 NO. OF SHIPS IN BERTH= 1
1	J	6666	3/ 1/74 SS		SHIP CAN BERTH, REMAINING SPACE= 345 POWER= 800 NO. OF SHIPS IN BERTH= 2
1	J	7777	3/ 1/74 SS		SHIP CANNOT BERTH, INSUFFICIENT SPACE AVAILABLE= 345 REQ= 350
1	J	407	3/ 1/74 SS		SHIP CANNOT BERTH, INSUFFICIENT SPACE AVAILABLE= 345 REQ= 350
1	J	1111	3/ 1/74 SS		SHIP CANNOT BERTH, INSUFFICIENT SPACE AVAILABLE= 345 REQ= 350
1	J	2222	3/ 1/74 SS		SHIP CANNOT BERTH, INSUFFICIENT SPACE AVAILABLE= 345 REQ= 350
1	J	333	3/ 1/74 SS		SHIP CANNOT BERTH, INSUFFICIENT SPACE AVAILABLE= 345 REQ= 350
1	J	4444	3/ 1/74 SS		SHIP CANNOT BERTH, INSUFFICIENT SPACE AVAILABLE= 345 REQ= 350
1	J	64	3/ 1/74 SS		SHIP CANNOT BERTH, INSUFFICIENT SPACE AVAILABLE= 345 REQ= 350
1	J	222	3/ 1/74 AD		SHIP CANNOT BERTH, INSUFFICIENT SPACE AVAILABLE= 345 REQ= 350
2	J				SHIP CANNOT BERTH, INSUFFICIENT SPACE AVAILABLE= 345 REQ= 645
2	I				SHIP CANNOT BERTH, INSUFFICIENT SPACE AVAILABLE= 74 REQ= 645
2	M				SHIP CANNOT BERTH, INSUFFICIENT SPACE AVAILABLE= 212 REQ= 645
2	G				SHIP CANNOT BERTH, INSUFFICIENT SPACE AVAILABLE= 420 REQ= 645 BERTH NOT ACCESSIBLE
2	F				SHIP CANNOT BERTH, INSUFFICIENT SPACE AVAILABLE= 130 REQ= 645
2	E				SHIP CANNOT BERTH, INSUFFICIENT SPACE AVAILABLE= 8 REQ= 645
2	D				SHIP CAN BERTH, REMAINING SPACE= 5 POWER= 6400 NO. OF SHIPS IN BERTH= 1
2	J	332	3/ 1/74 AD		SHIP CANNOT BERTH, INSUFFICIENT SPACE AVAILABLE= 345 REQ= 645
2	I				SHIP CANNOT BERTH, INSUFFICIENT SPACE AVAILABLE= 74 REQ= 645
2	M				SHIP CANNOT BERTH, INSUFFICIENT SPACE AVAILABLE= 212 REQ= 645
2	G				SHIP CANNOT BERTH, INSUFFICIENT SPACE AVAILABLE= 420 REQ= 645 BERTH NOT ACCESSIBLE
2	F				SHIP CANNOT BERTH, INSUFFICIENT SPACE AVAILABLE= 130 REQ= 645
2	E				SHIP CANNOT BERTH, INSUFFICIENT SPACE AVAILABLE= 8 REQ= 645
2	D				SHIP CANNOT BERTH, INSUFFICIENT SPACE AVAILABLE= 5 REQ= 645

3/ 1/76	SSM	7777	2 J	SHIP CAN BERTH, REMAINING SPACE = NO. OF SHIPS IN BERTH = 1	5 POWER = 3000	
			2 J	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL = 345 REQ = 400	
			2 I	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL = 74 REQ = 400	
			2 M	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL = 212 REQ = 400	
			2 G	SHIP CAN BERTH, REMAINING SPACE = NO. OF SHIPS IN BERTH = 3	20 POWER = 400	
3/ 1/76	AD	111	2 J	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL = 345 REQ = 645	
			2 I	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL = 74 REQ = 645	
			2 M	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL = 212 REQ = 645	
			2 G	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL = 20 REQ = 645	
			2 F	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL = 130 REQ = 645	
			2 E	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL = 0 REQ = 645	
			2 D	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL = 5 REQ = 645	
			2 C	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL = 5 REQ = 645	
			2 B	SHIP CAN BERTH, REMAINING SPACE = NO. OF SHIPS IN BERTH = 1	5 POWER = 2400	
3/ 1/76	SSM	607	2 J	SHIP CANNOT BERTH, INSUFFICIENT POWER.	AVAIL = 000 REQ = 1700	
			2 I	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL = 74 REQ = 320	
			2 M	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL = 212 REQ = 320	
			2 G	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL = 20 REQ = 320	
			2 F	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL = 130 REQ = 320	
			2 E	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL = 9 REQ = 320	
			2 D	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL = 5 REQ = 320	
			2 C	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL = 5 REQ = 320	
			2 B	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL = 5 REQ = 320	
			2 A	SHIP CANNOT BERTH, INSUFFICIENT POWER.	AVAIL = 2400 REQ = 1700	
3/ 1/76	SS	7777	2 J	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL = 345 REQ = 390	
			2 I	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL = 74 REQ = 390	
			2 M	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL = 212 REQ = 390	
			2 G	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL = 20 REQ = 390	

A-29

2 F	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	133 REQ=	350
2 E	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	0 REQ=	350
2 D	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	5 REQ=	350
2 C	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	5 REQ=	350
2 B	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	5 REQ=	350
2 A	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	300 REQ=	350
3/ 1/76 SS 333				
2 J	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	345 REQ=	350
2 I	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	74 REQ=	350
2 H	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	212 REQ=	350
2 G	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	20 REQ=	350
2 F	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	130 REQ=	350
2 E	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	0 REQ=	350
2 D	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	5 REQ=	350
2 C	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	5 REQ=	350
2 B	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	5 REQ=	350
2 A	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	300 REQ=	350
3/ 1/76 SS 4444				
2 J	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	345 REQ=	350
2 I	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	74 REQ=	350
2 H	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	212 REQ=	350
2 G	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	20 REQ=	350
2 F	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	130 REQ=	350
2 E	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	0 REQ=	350
2 D	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	5 REQ=	350
2 C	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	5 REQ=	350
2 B	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	5 REQ=	350
2 A	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	300 REQ=	350
3/ 1/76 SS 64				
2 J	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	345 REQ=	350
2 I	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	74 REQ=	350
2 H	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	212 REQ=	350
2 G	SHIP CANNOT BERTH, INSUFFICIENT SPACE	AVAIL=	20 REQ=	350

2	F				SHIP CANNOT BE NESTED	SPACE AVAILABLE	130 REQ	300
2	E				SHIP CANNOT BE NESTED, INSUFFICIENT SPACE	AVAILABLE	0 REQ	300
2	D				SHIP CANNOT BE NESTED, INSUFFICIENT SPACE	AVAILABLE	5 REQ	300
2	C				SHIP CANNOT BE NESTED, INSUFFICIENT SPACE	AVAILABLE	5 REQ	300
2	B				SHIP CANNOT BE NESTED, INSUFFICIENT SPACE	AVAILABLE	5 REQ	300
2	A				SHIP CANNOT BE NESTED, INSUFFICIENT SPACE	AVAILABLE	300 REQ	300
3/ 1/74	SS	607						
3/ 1/74	SS	607						
3/ 1/74	SS	1111						
3	J				NEST SHIP WITH SS 9999			
					SHIP CAN BE NESTED, REMAINING SPACE	369 POWER	500	
					NO. OF SHIPS IN BERTH	3		
3	J				SHIP CANNOT BE NESTED			
3	I				SHIP CANNOT BE NESTED			
3	H				SHIP CANNOT BE NESTED			
3	G				SHIP CANNOT BE NESTED			
3	F				SHIP CANNOT BE NESTED			
3	E				SHIP CANNOT BE NESTED			
3	D				SHIP CANNOT BE NESTED			
3	C				SHIP CANNOT BE NESTED			
3	B				SHIP CANNOT BE NESTED			
3	A				SHIP CANNOT BE NESTED			
3/ 1/74	SS	2222						
					NEST SHIP WITH SS 7777			
					SHIP CAN BE NESTED, REMAINING SPACE	300 POWER	1000	
					NO. OF SHIPS IN BERTH	2		
3	J				SHIP CANNOT BE NESTED			
3	I				SHIP CANNOT BE NESTED			
3	H				SHIP CANNOT BE NESTED			
3	G				SHIP CANNOT BE NESTED			
3	F				SHIP CANNOT BE NESTED			
3	E				SHIP CANNOT BE NESTED			
3	D				SHIP CANNOT BE NESTED			
3	C				SHIP CANNOT BE NESTED			
3	B				SHIP CANNOT BE NESTED			
3	A				SHIP CANNOT BE NESTED			
3/ 1/74	SS	333						

3	I	SHIP CANNOT BE NESTED
3	H	SHIP CANNOT BE NESTED
3	G	SHIP CANNOT BE NESTED
3	F	SHIP CANNOT BE NESTED
3	E	SHIP CANNOT BE NESTED
3	D	SHIP CANNOT BE NESTED
3	C	SHIP CANNOT BE NESTED
3	B	SHIP CANNOT BE NESTED
3	A	SHIP CANNOT BE NESTED
3/ 1/76	SS	4404
3	J	SHIP CANNOT BE NESTED
3	I	SHIP CANNOT BE NESTED
3	H	SHIP CANNOT BE NESTED
3	G	SHIP CANNOT BE NESTED
3	F	SHIP CANNOT BE NESTED
3	E	SHIP CANNOT BE NESTED
3	D	SHIP CANNOT BE NESTED
3	C	SHIP CANNOT BE NESTED
3	B	SHIP CANNOT BE NESTED
3	A	SHIP CANNOT BE NESTED
3/ 1/76	SS	64
3	J	SHIP CANNOT BE NESTED
3	I	SHIP CANNOT BE NESTED
3	H	SHIP CANNOT BE NESTED
3	G	SHIP CANNOT BE NESTED
3	F	SHIP CANNOT BE NESTED
3	E	SHIP CANNOT BE NESTED
3	D	SHIP CANNOT BE NESTED
3	C	SHIP CANNOT BE NESTED
3	B	SHIP CANNOT BE NESTED
3	A	SHIP CANNOT BE NESTED

APPENDIX B - Glossary of Important Variables in BURF

FOR ICLASP (CLN,I)

Variable

CLN

Position (I)

1-15

Description

Berth precedence
number.

ICLASP (CLN,I)

Ship-type of ship
to be considered
as first-choice
ship-type for the
berthing precedence
class number

FOR BERTH (BN,I)

Variable	Position (I)	Description
BN		Berth number
BLETTER	1	Program letter for berth
EPWR	2	Amount of electric current (ac at 450 volts) still available for use by other ships
STEAM	3	Steam (lb/hr)
FWTR	4	Fresh water (gpm)
SWTR	5	Salt water (gpm)
ADJ	6	Berth letter of adjacent berth
OPP	7	Berth letter of berth on opposite side of pier
BLT	8	Space remaining (ft)
CRANE	9	Not used (future use)
NSHIPS	10	Number of ships in berth

FOR NEST (NT,I)

Variable	Position (I)	Description
NT		Nesting type
TYPE1	1	Ship-type of nested ship
HULL1	2	Hull number, lower limit
HULU1	3	Hull number, upper limit
.	.	Information
.	.	repeated for
.	.	each ship-type
.	.	that can be
.	.	nested
TYPE5	13	
HULL5	14	
HULU5	15	

FOR PIER (BN,I)

Variable	Position	Description
BN		Berth Number
BLETTER	1	Berth Letter
REPWR	2	Electric current requirement (ac at 450 volts) per foot of ship
CRANE	3	Not used
PIERD	4	Pier description
EPWR	5	Electric current (ac at 450 volts)
STEAM	6	Steam (lb/hr)
FWTR	7	Fresh water (gpm)
SWTR	8	Salt water (gpm)
ADJ	9	Berth letter of adjacent berth
OPP	10	Berth letter of on opposite side of pier
BLT	11	Length of berth (ft)
YDN	12	Shipyard name of berth

FOR PROB (SN,I)

Variable

Position

Description

*
SN

Number corresponding to ship-type and hull number of ship for which maintenance probabilities are given for the ten-year interval considered.

PROB (SN,I)

1-10

Probability given between 0 and 1 for the ship SN requiring unscheduled maintenance during I year of the interval

* SN refers to the order in which the ship-type and class number of ship are input. See Unscheduled-work Probability Card, Section 4.2.3.9.

FOR PIERCL (CLN,I)

Variable

Position (I)

Description

CLN

Berthing precedence

PIERCL (CLN, I)

1-15

Program letter
representation
for berth identity.

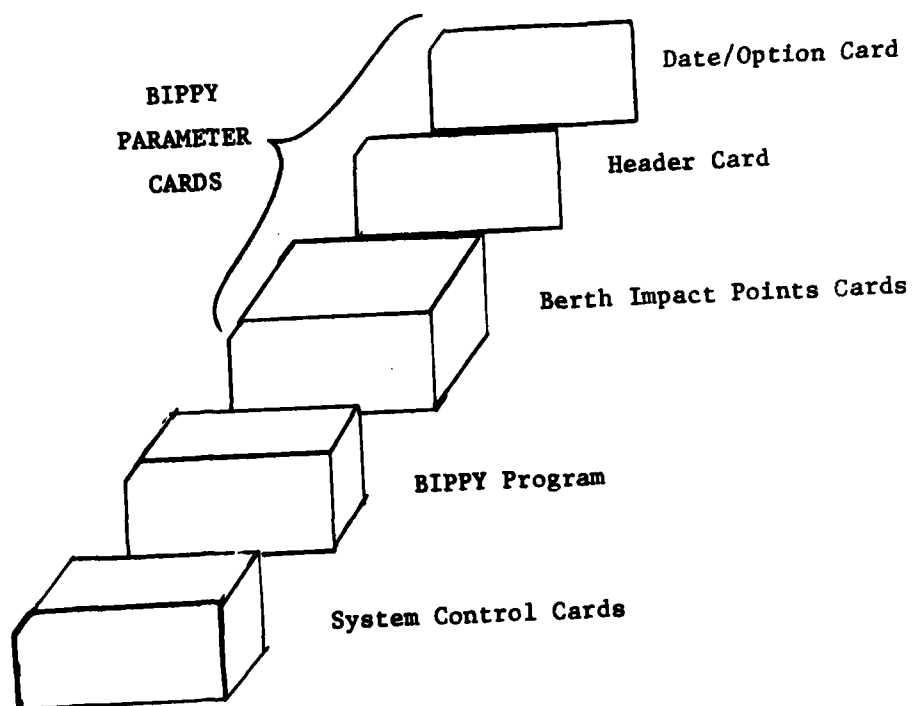
FOR SHPASG (PDN, SN, I)

Variable	Position (I)	Description
PDN		Period number, corresponds to berthing simulation date number
SN		Ship number of ship to be considered
TYPE	1	Ship-type name
HULL	2	Hull number
IMARK	3	System variable used for processing = 0, when not assigned to berth; indicates lack of space to berth ship = 1, indicates lack of electric current to berth = 2, if assigned berth, indicates skipping of steps in processing
BERTH	4	Berth letter of berth assigned to ship
SHPCLS	5	Ship berth preference class number
DKCLS	6	Ship class number
PRTY	7	Docking priority
TPWR	8	Type of work scheduled
NESTSH	9	Ship number of ship nested with this ship
NNEST	10	Total number of ships nested with this ship

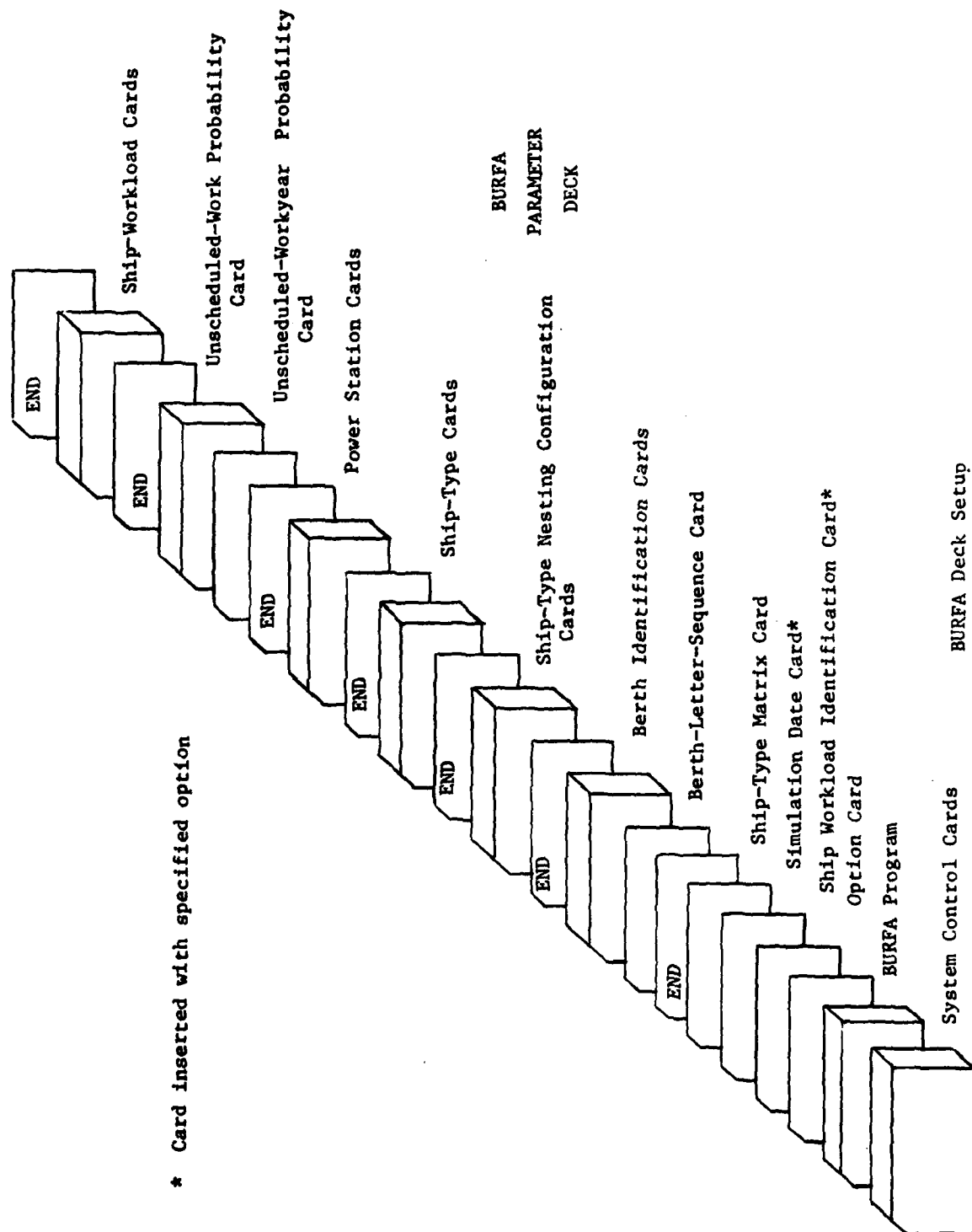
FOR SHPCLS (CLN,I)

Variable	Position (I)	Description
CLN		Ship class number
TYPE	1	Ship-type
HULU	2	Lower and upper
HULL	3	limit of hull number, range
NEST	4	Nesting indicator
EPWR	5	Electric current (ac at 450 volts)
STEAM	6	Steam (lb/hr)
FWTR	7	Fresh water (gpm)
SWTR	8	Salt water (gpm)
CRANE	9	Not used
LTSHIP	10	Length of ship (ft)
DKCLS	11	Ship class number
SHPCLS	12	Ship berthing preference class number

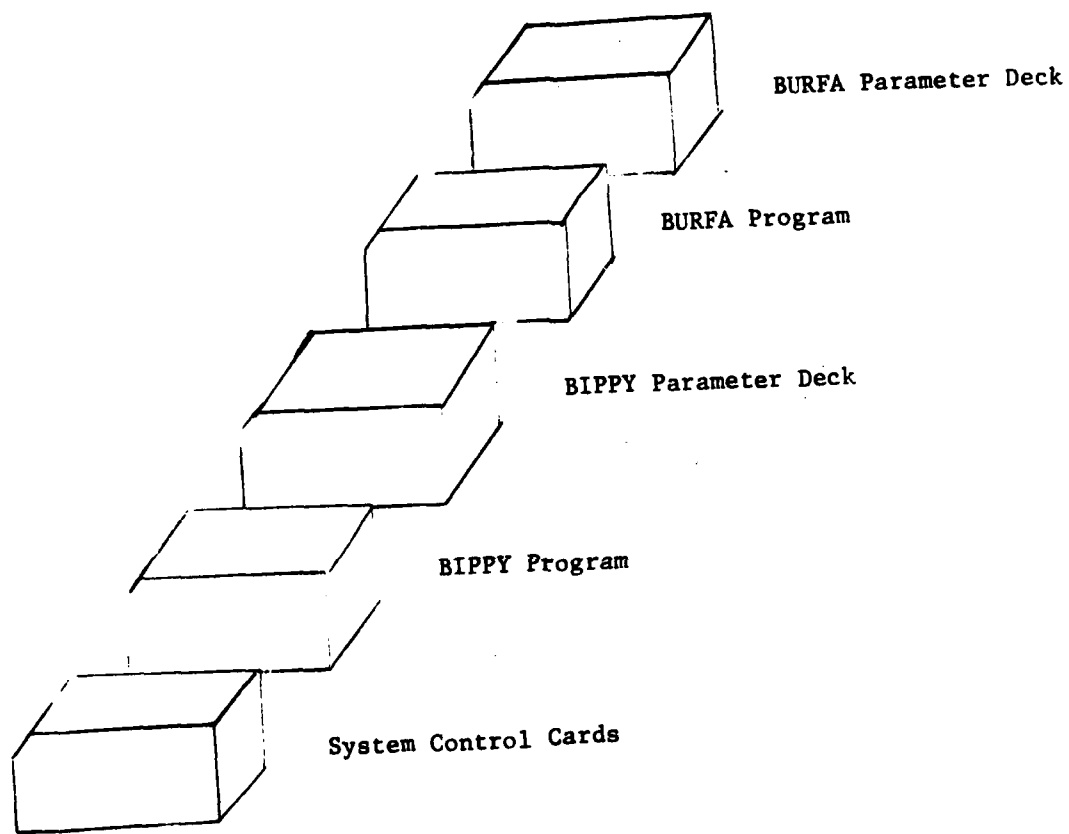
APPENDIX C - BURF Sample Deck Setup Diagrams



BIPPY Deck Setup

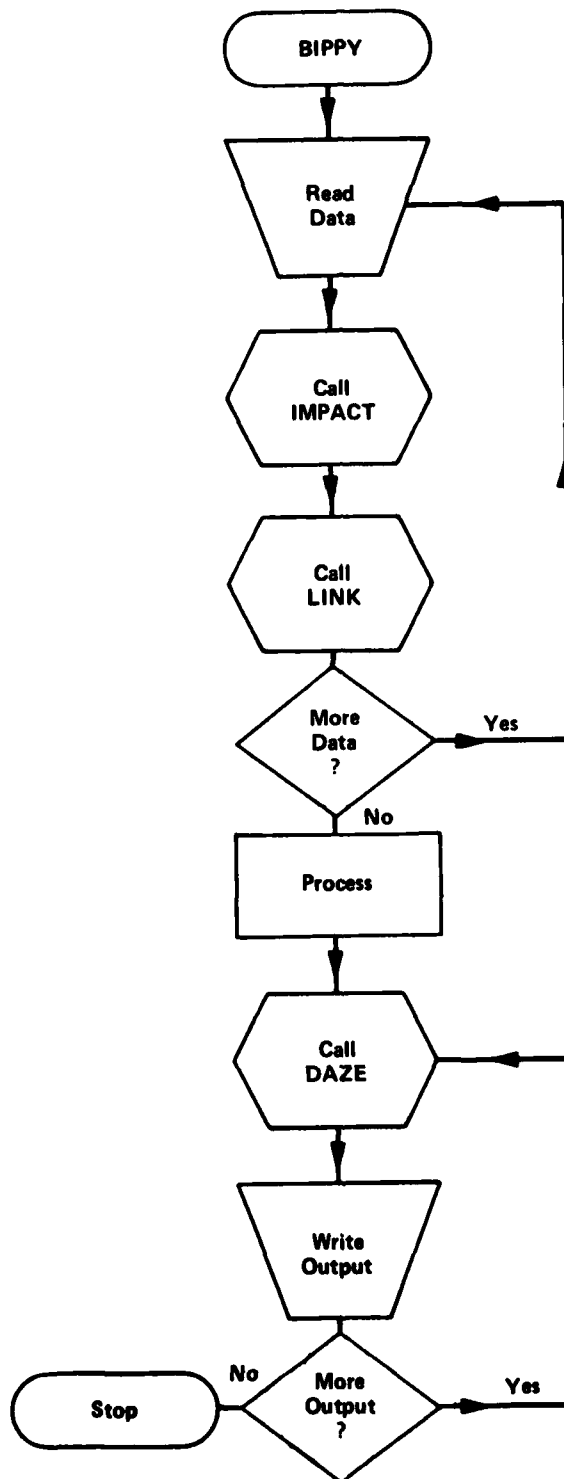


* Card inserted with specified option

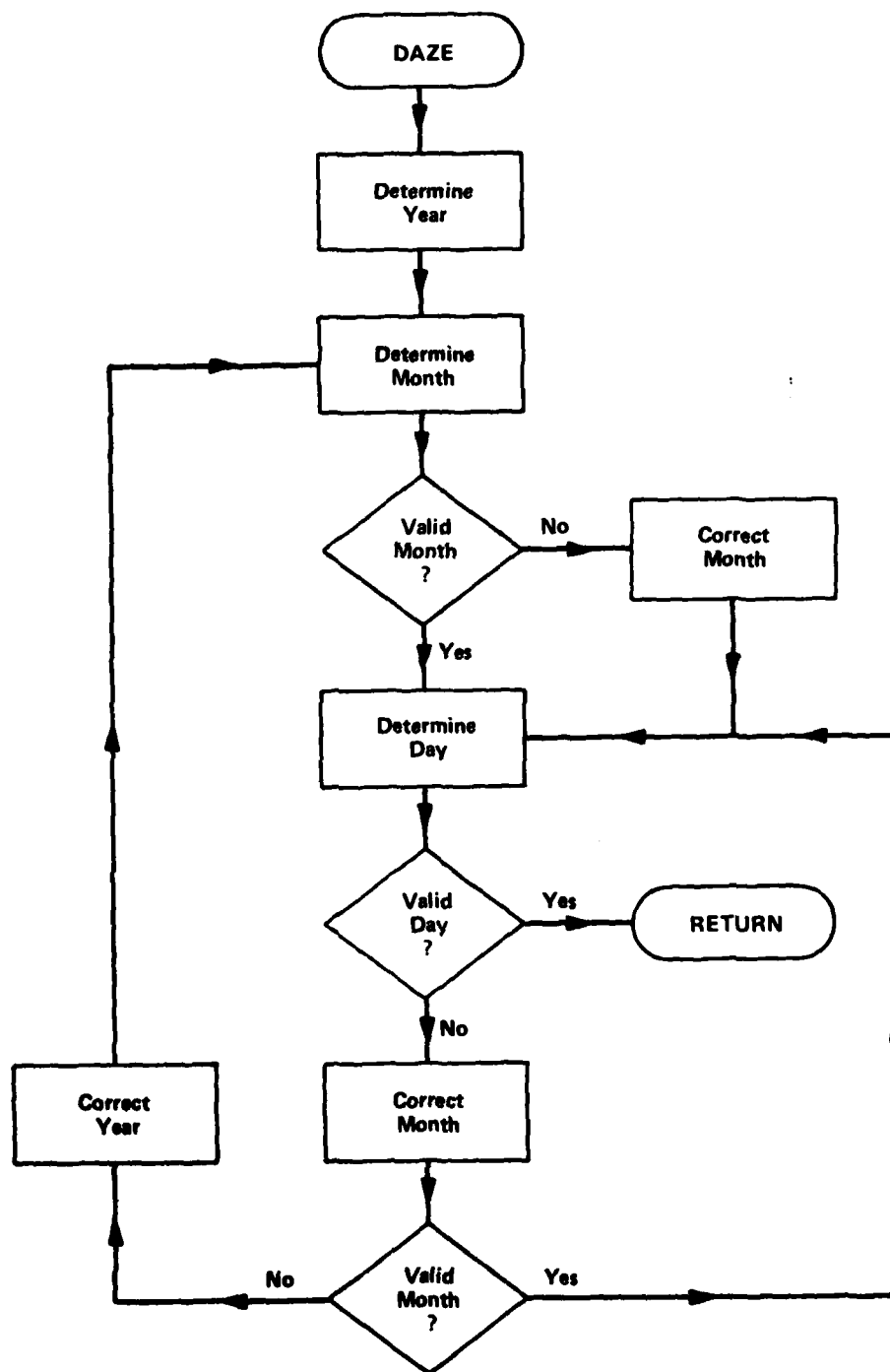


BIPPY/BURFA Deck Setup

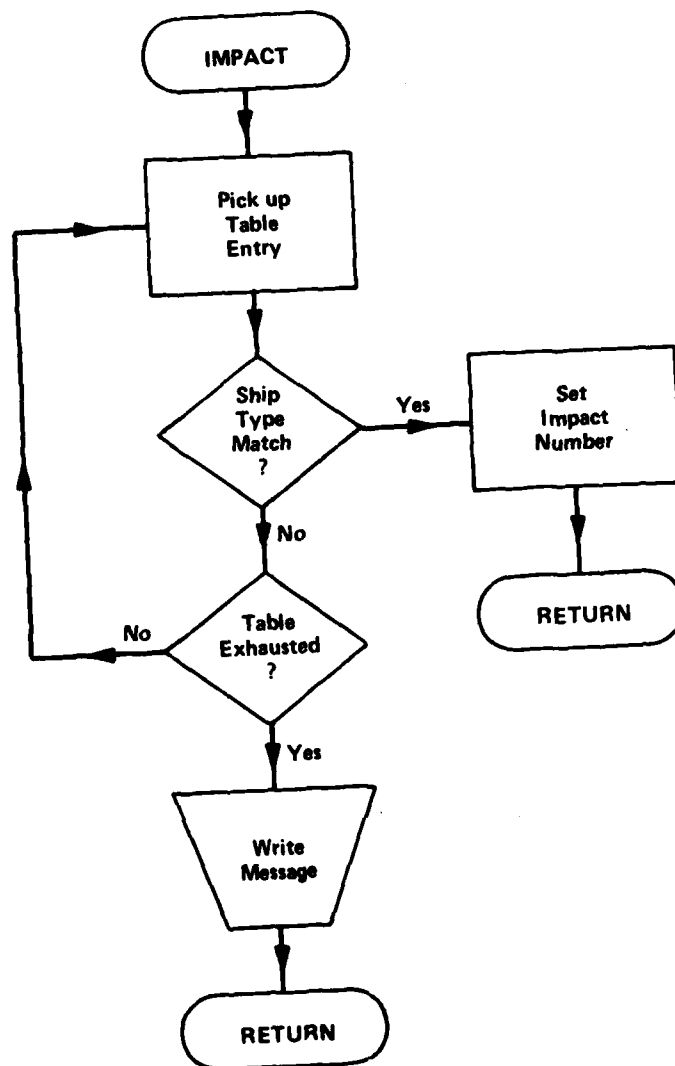
APPENDIX D - BURF Program Flow Charts



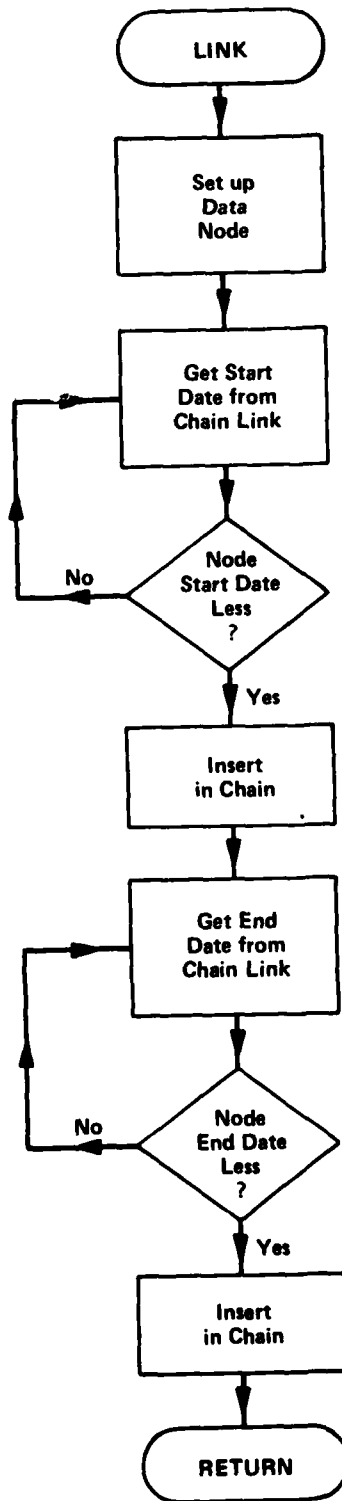
Flowchart for BIPPY



Flowchart for Subroutine DAZE



Flowchart for Subroutine IMPACT



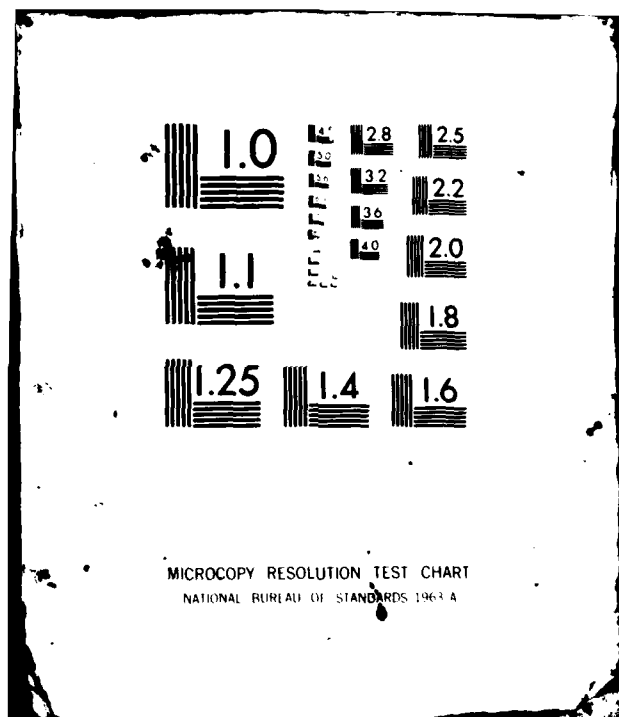
Flowchart for Subroutine LINK

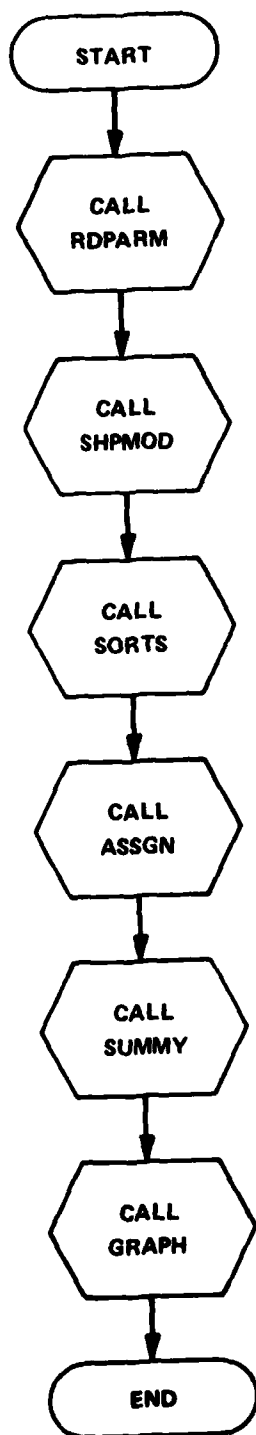
DAVID W TAYLOR NAVAL SHIP RESEARCH AND DEVELOPMENT CE--ETC F/6 15/5
BERTHING AND UTILITIES REQUIREMENTS FORECASTING (BURF) PROGRAM --ETC(U)
FEB 73 R E MELTON, D R HOEKZEMA
DINSRDC-3999

Ni

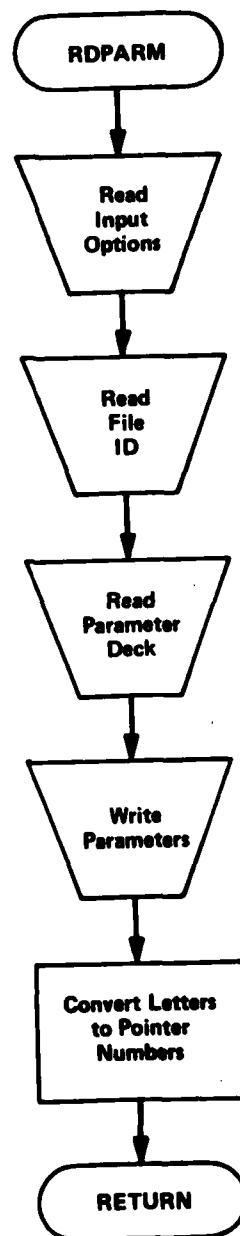
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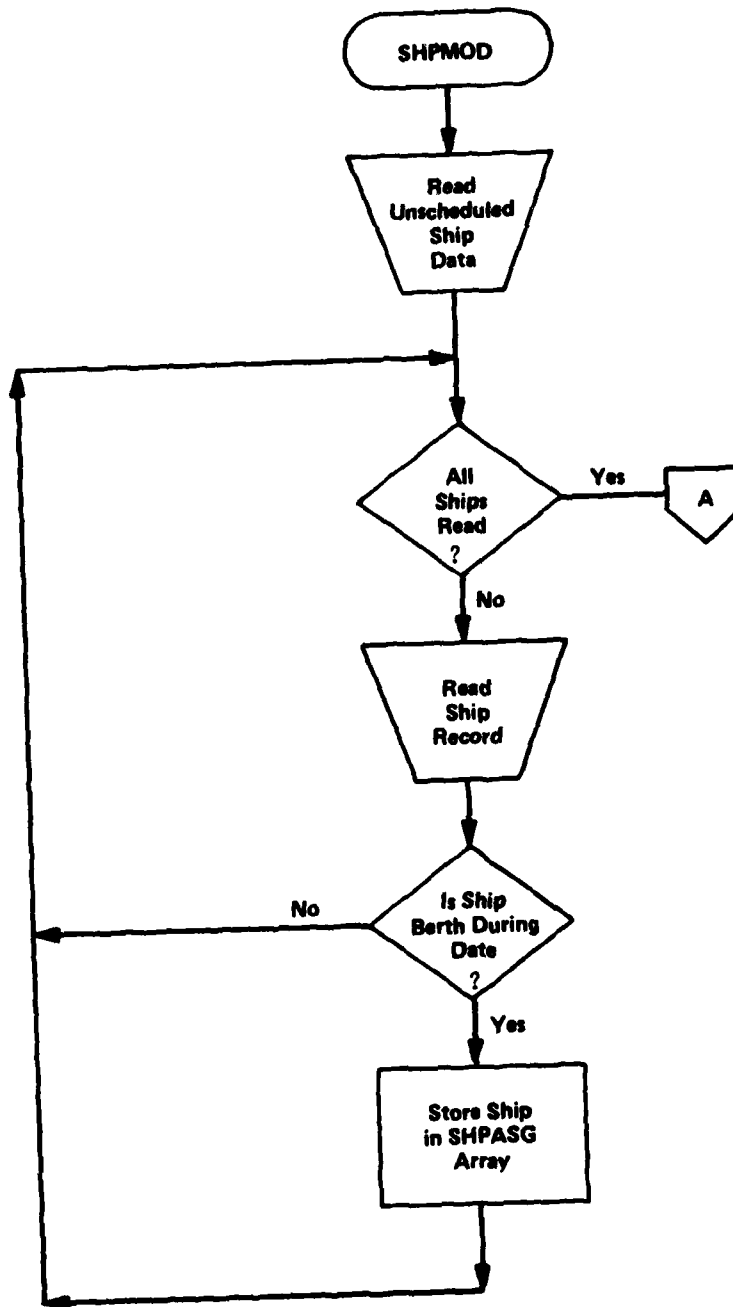




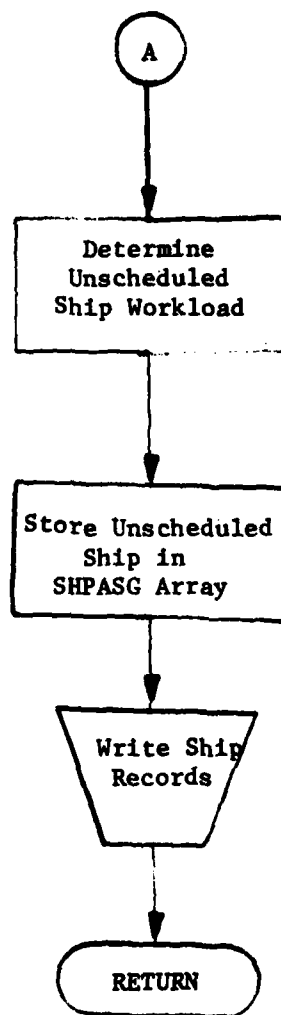
**Flowchart for BURFA, Indicating Order of Calling
Subroutines RDPARM, SHPMOD, SORTS,
ASSGN, SUMMY and GRAPH**



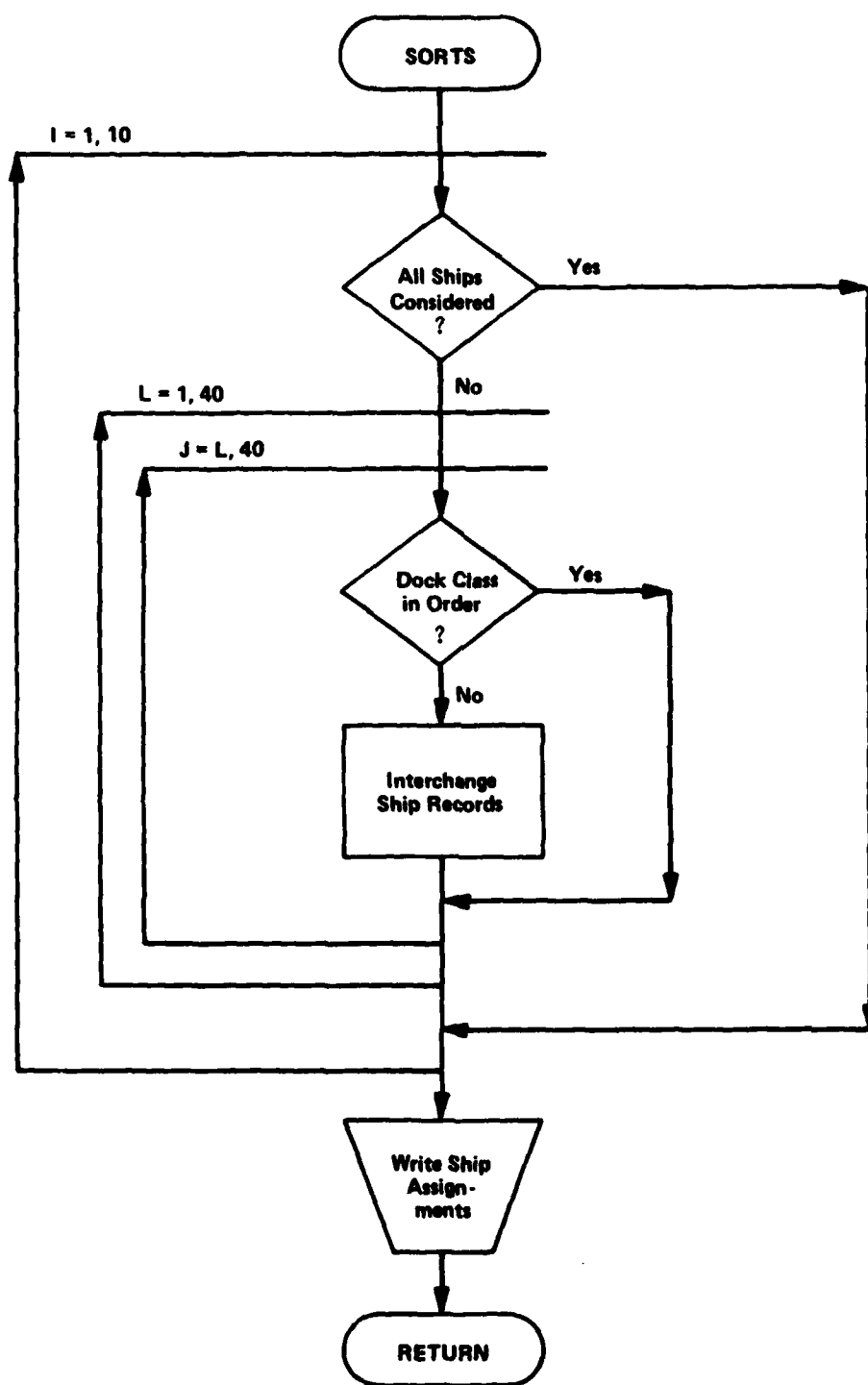
Flowchart for Subroutine RDPARM



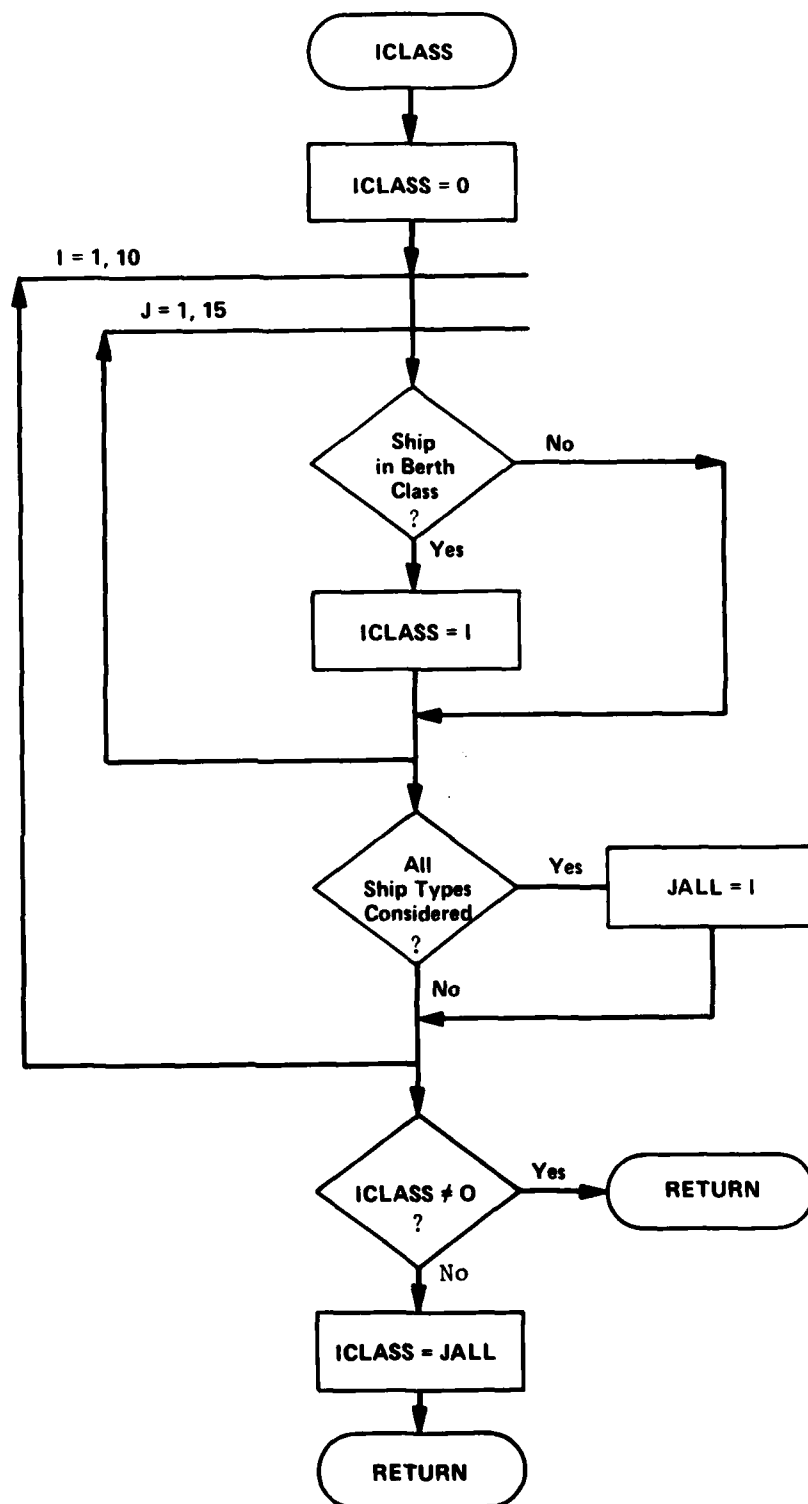
Flowchart for Subroutine SHPMOD



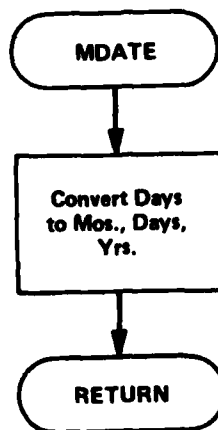
Flowchart for Subroutine SHPMOD (continued)



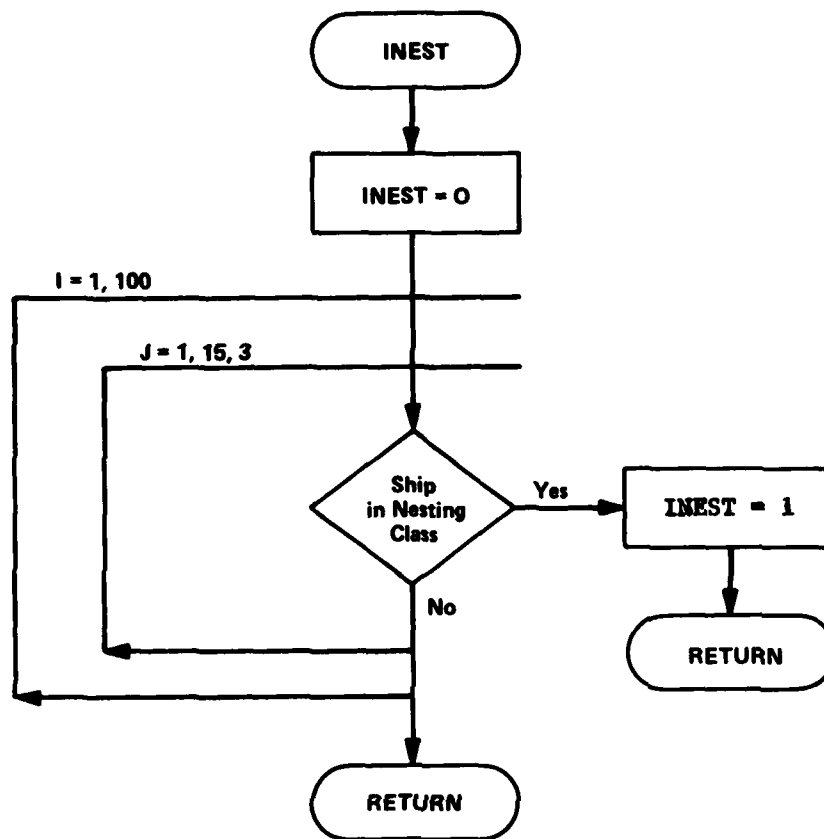
Flowchart for Subroutine SORTS



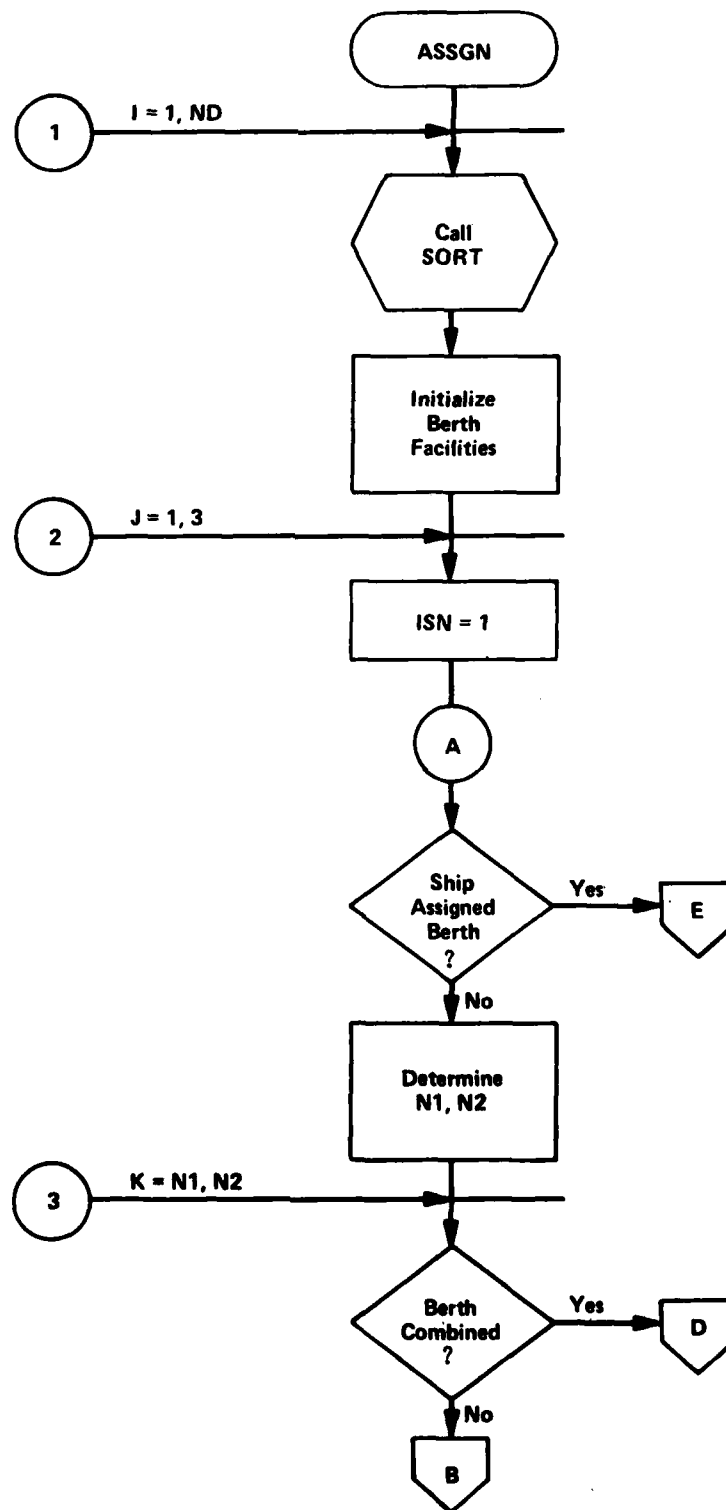
Flowchart for Function ICLASS



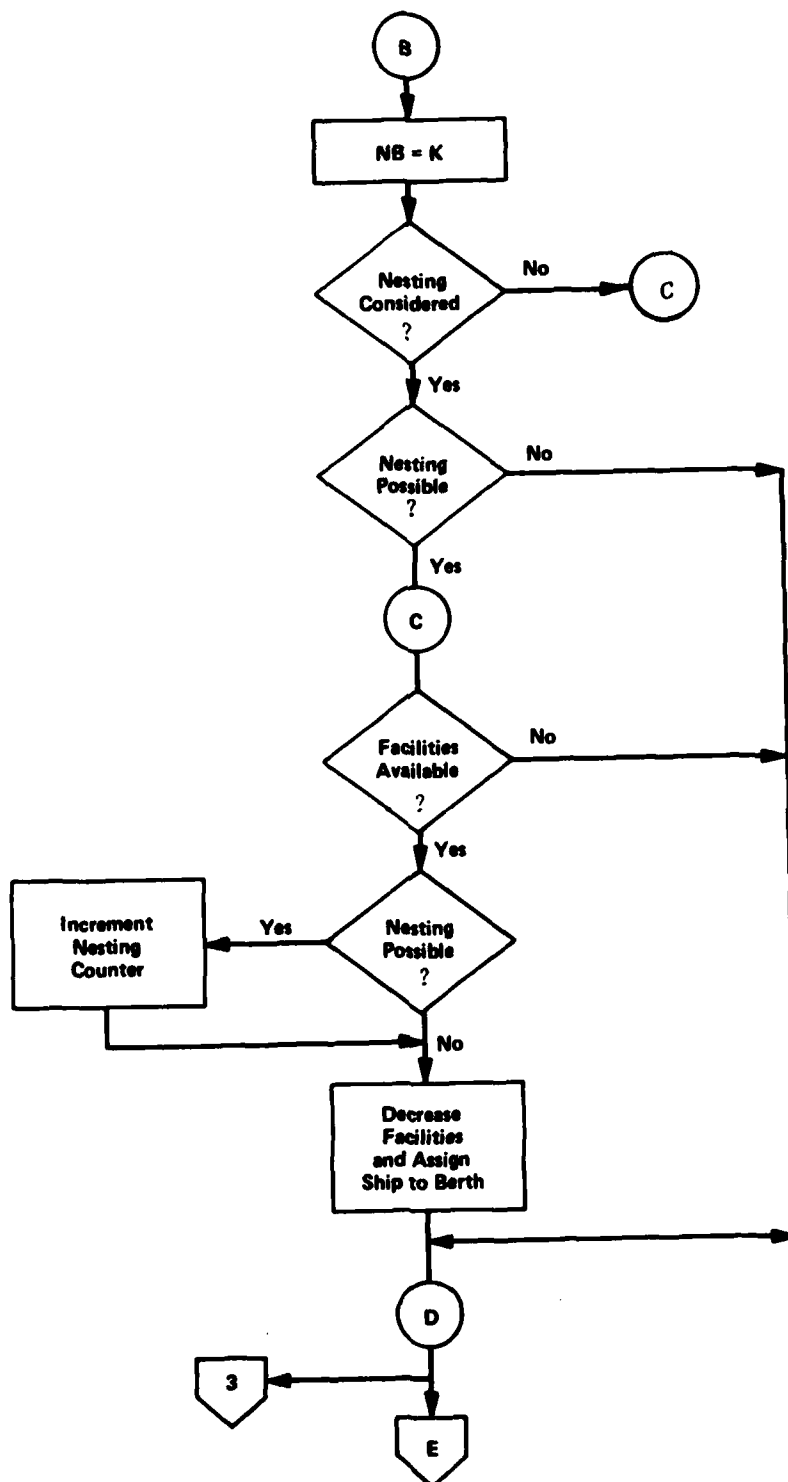
Flowchart for Function MDATE



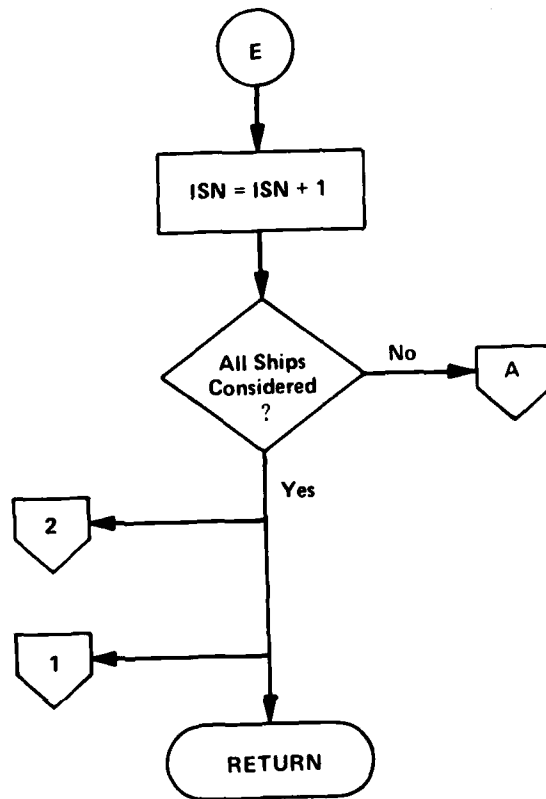
Flowchart for Function INEST



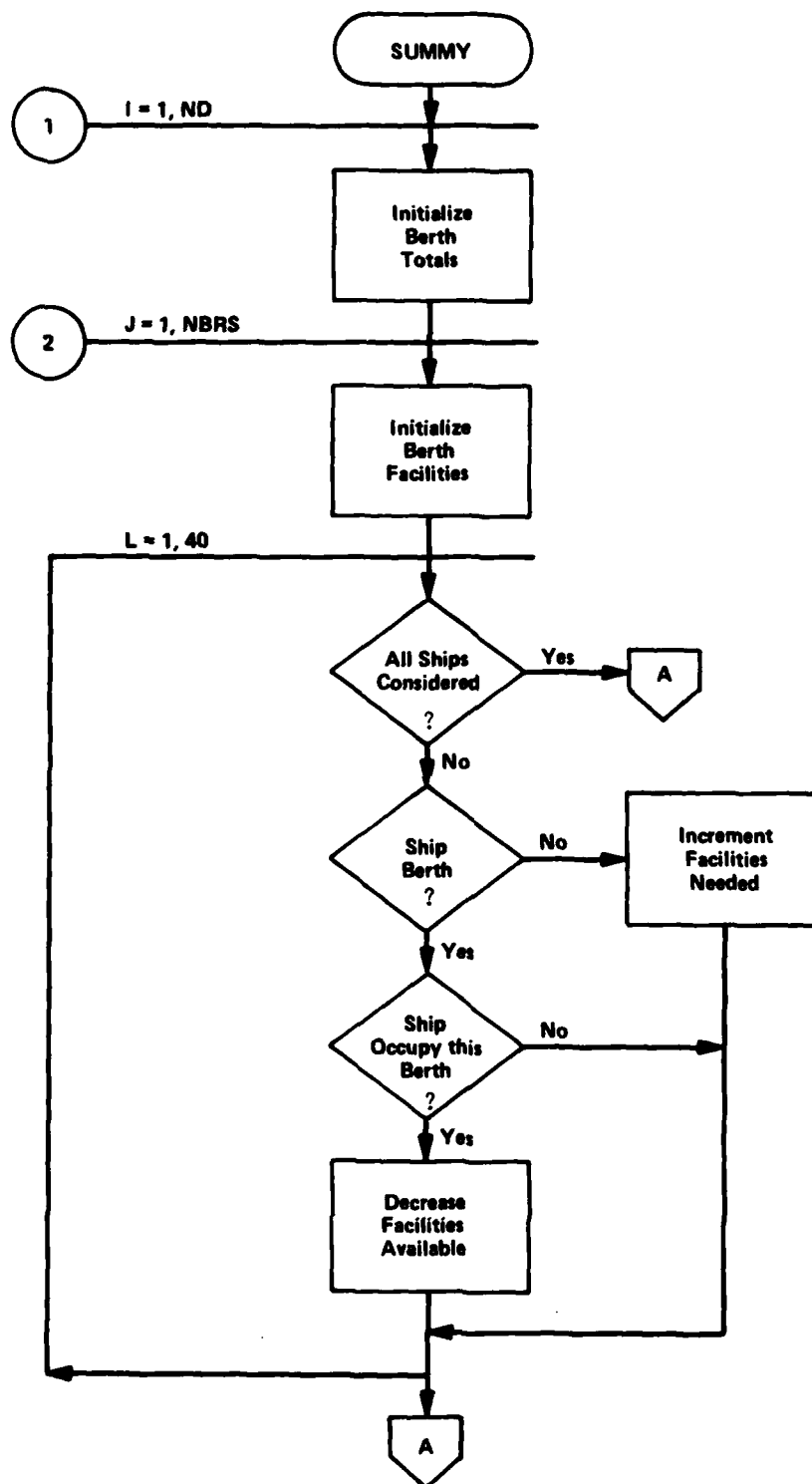
Flowchart for Subroutine ASSGN



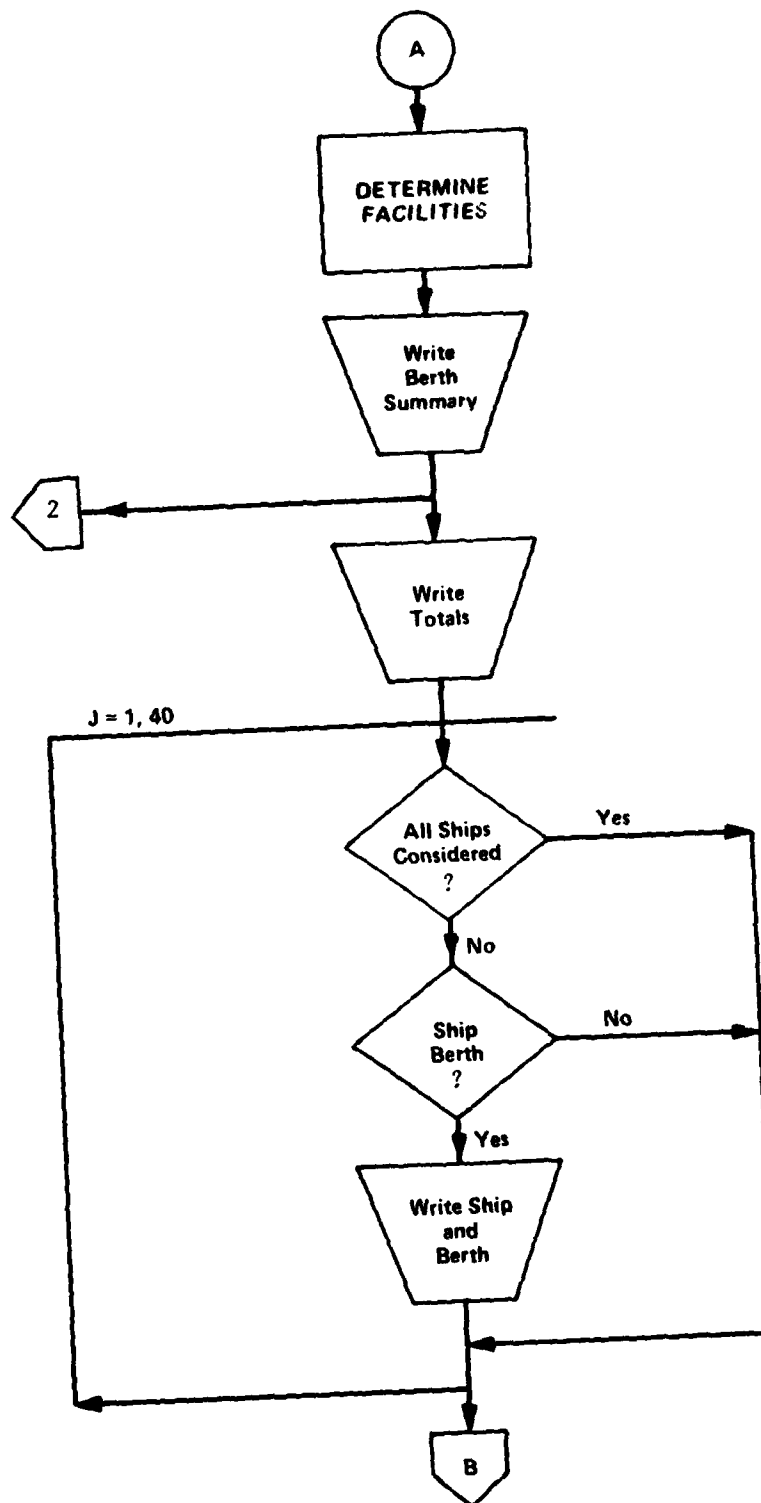
Flowchart for Subroutine ASSGN (continued)



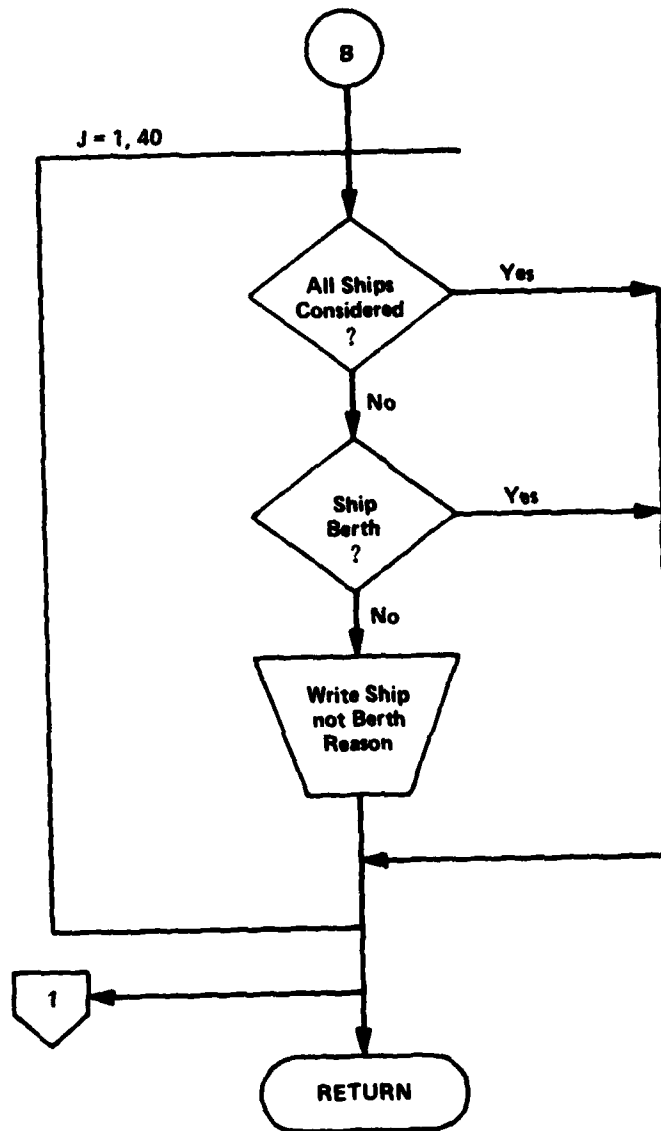
Flowchart for Subroutine ASSGN (continued)



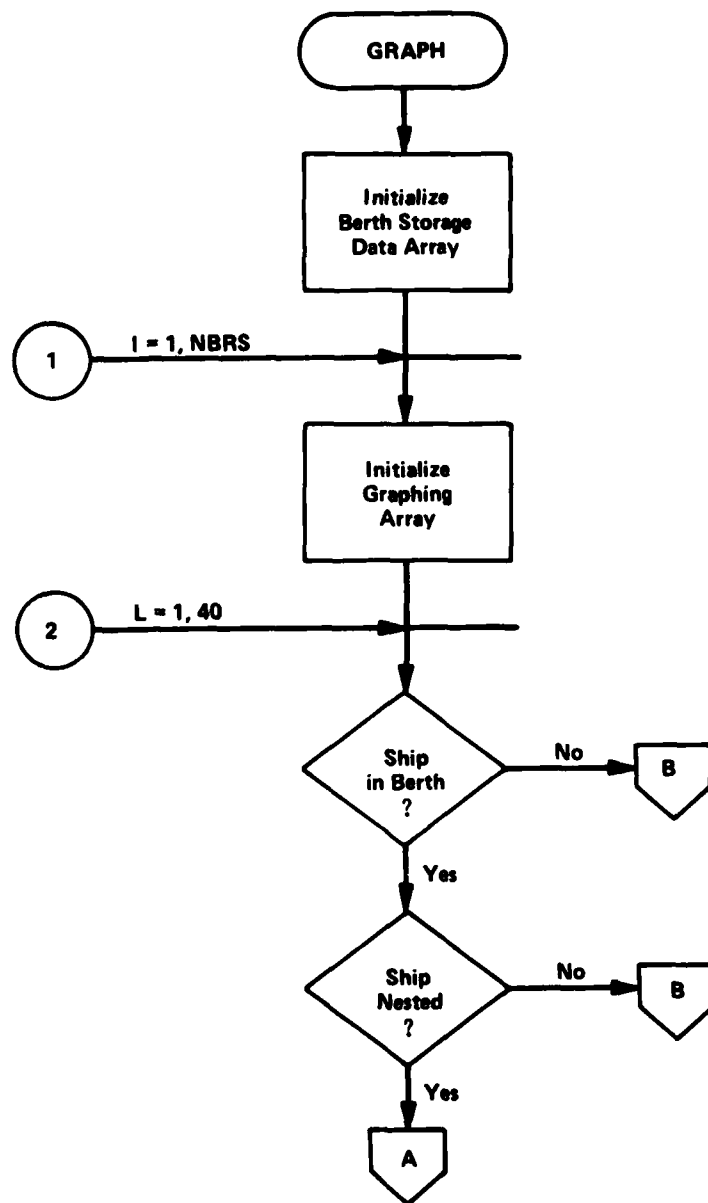
Flowchart for Subroutine SUMMY



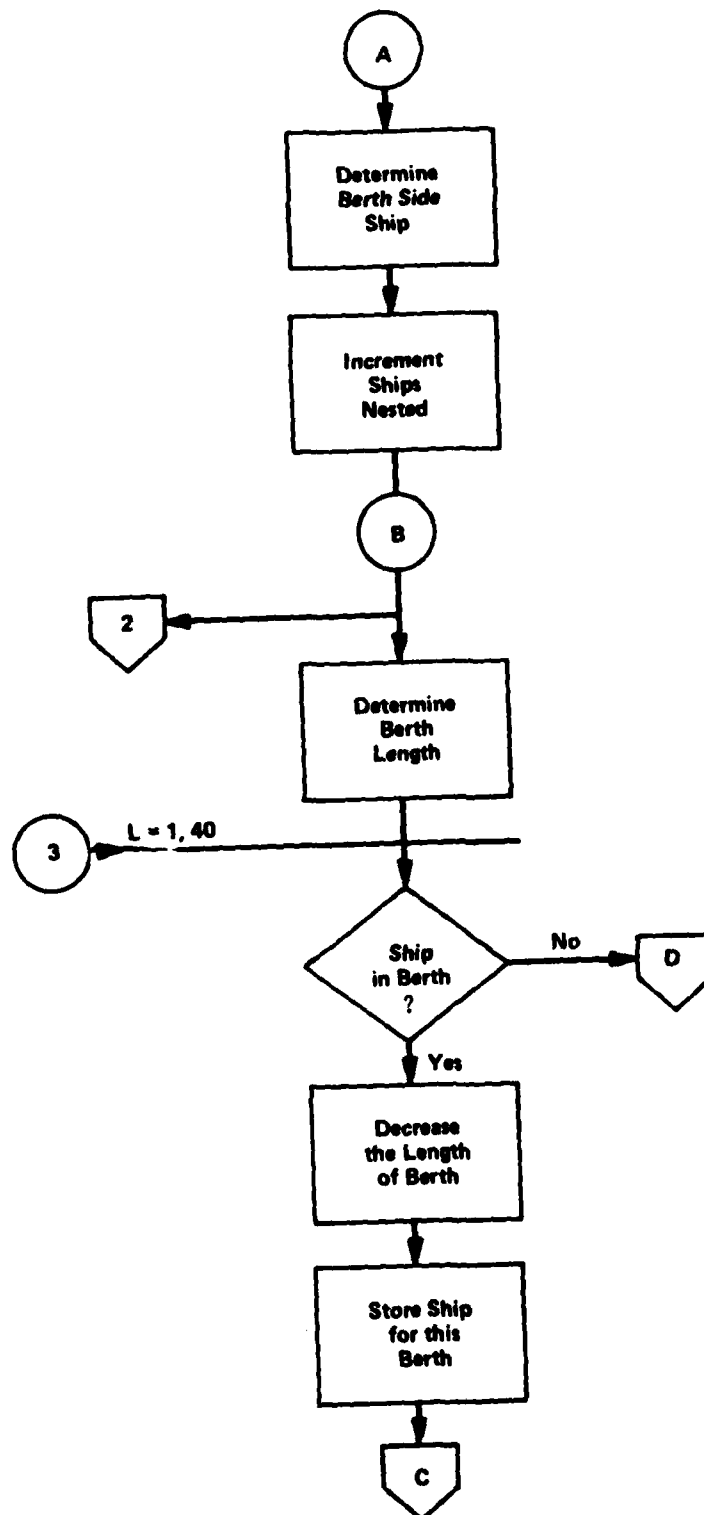
Flowchart for Subroutine SUMMY (continued)



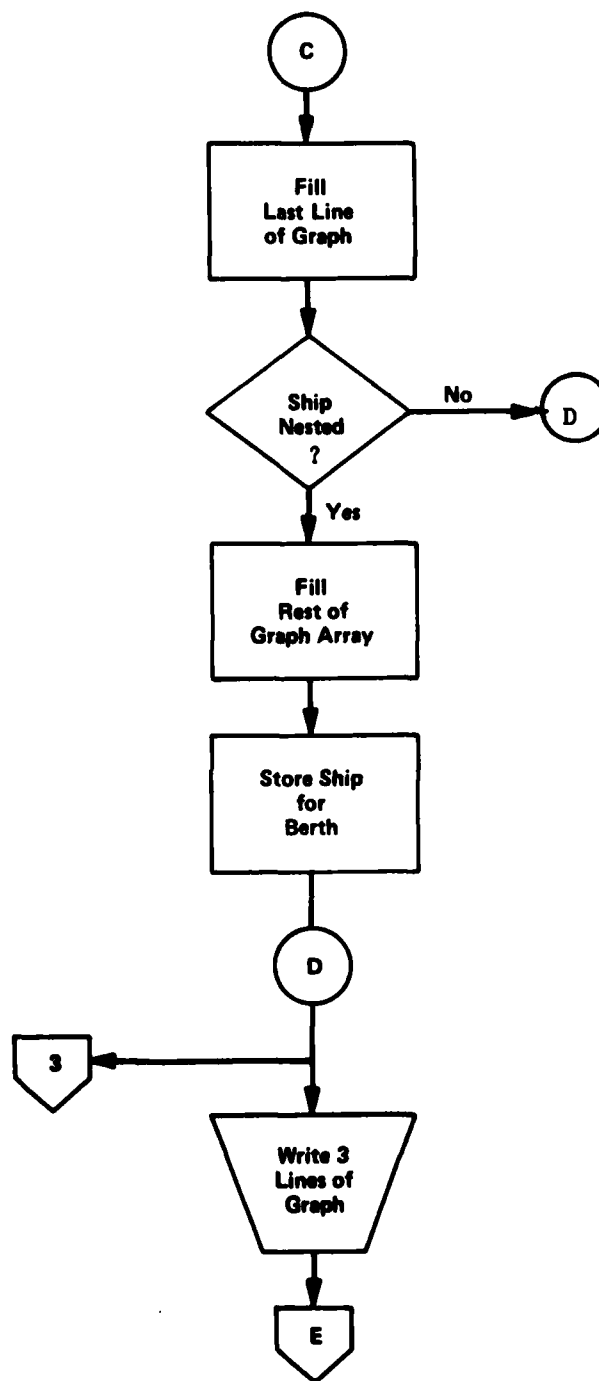
Flowchart for Subroutine SUMMY (continued)



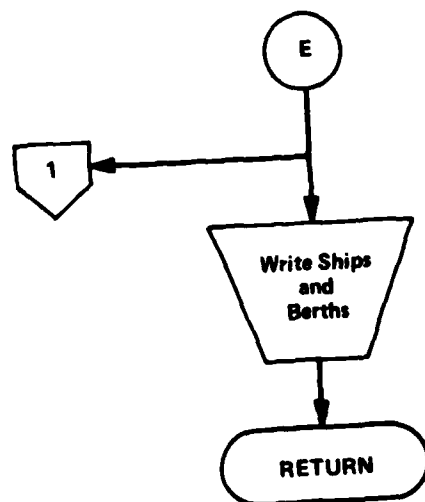
Flowchart for Subroutine GRAPH



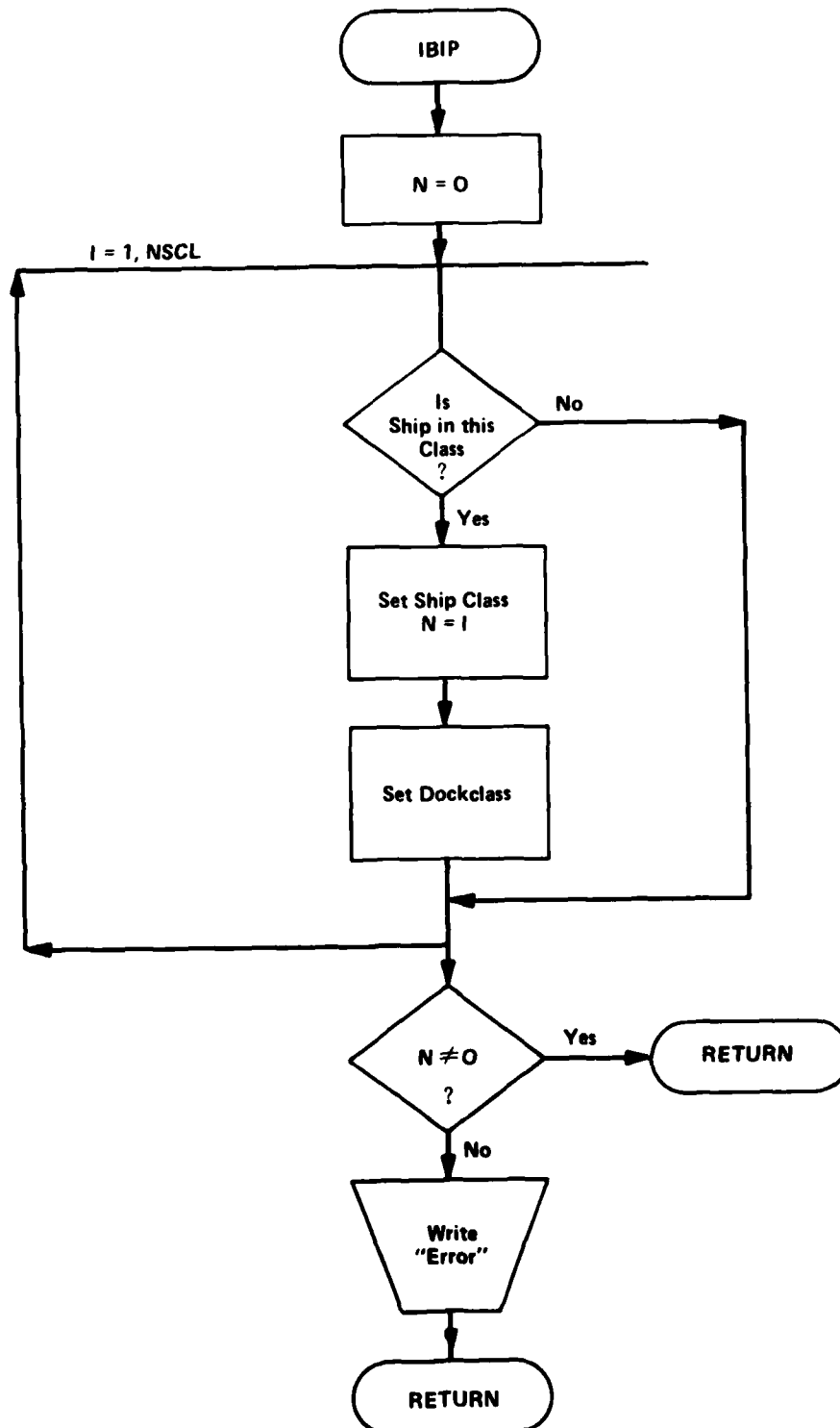
Flowchart for Subroutine GRAPH (continued)



Flowchart for Subroutine GRAPH (continued)



Flowchart for Subroutine GRAPH (continued)



Flowchart for Function IBIP

APPENDIX E - BURF Program Listings

PROGRAM BIPV TRACE

```

64      J01 = 30*(IM1-1) + ICF(IM1) + I01 + 365*Y1
        J04 = 30*(IM4-1) + ICF(IM4) + I04 + 365*Y4
        IF (J01.GT.J04.OR.J04.LT.J01) GO TO 288
        DETERMINE THE BERTHING IMPACT POINTS.
        CALL IMPACT (SHIP,MO,BIP)
        IF (BIP.LE.0) GO TO 288
        IF (IM2-NE.0) GO TO 290
        IF (DOCK.EQ.AST) GO TO 240
        J01 = MAX8(J01,J03)
        J04 = MAX8(J04,J05)
        CALL LINK(J01,J04,BIP)
        GO TO 288
65      C
        FUDGE IN BATES FOR SHIPS THAT COULD NOT BE DOCKED.
        Z40  KT = (J04 - J01 - IOT)/2
        J02 = J01 + KT
        J03 = J04 - KT
        GO TO 291
        Z90  J02 = 30*(IM2-1) + ICF(IM2) + I02 + 365*Y2
        J03 = 30*(IM3-1) + ICF(IM3) + I03 + 365*Y3
        IF (J02.LT.J03) GO TO 288
        Z91  J01 = MAX8(J01,J03)
        J02 = MIN8(J02,J05)
        CALL LINK(J01,J02,BIP)
        IF (J03.GT.J05) GO TO 288
        Z60  J03 = MAX8(J03,J05)
        J04 = MIN8(J04,J05)
        CALL LINK(J03,J04,BIP)
        GO TO 288
66      C
        THE 300 CODING PASSES THROUGH THE LINKED BERTH DATES KEEPING A
        C    A RUNNING TOTAL OF IMPACT POINTS AT ANY TIME. THIS TOTAL IS
        C    AVERAGED OVER NAVE DAYS. A BERTHING PERIOD IS A SERIES OF ONE
        C    OR MORE DAYS DURING WHICH NO SHIP IS BERTHING OR UNBERTHING.
        C    ONLY ONE PEAK DAY IS REPORTED FOR ANY BERTHING PERIOD.
        Z00  IF (IOUT-NE.1) GO TO 310
        IOT(1) = IOUT
        DO 305 N = 2,21
        Z05  IOT(N) = IOT(N-1) + 5
        WRITE (6,5) (IM(N),N=1,0), (IOT(N),N=1,21)
        Z10  LOAD = 0
        ITOT = 0
        KTOT = 0
        DO 315 N = 1,10
        Z15  RAN(N) = 0
        MIDAT(N) = 0
        MIPT(N) = 0
        SP = 511
        EP = E11
        DATE = J05 - 1
        LDY = DATE
        STEP TO NEXT DAY
        Z20  DATE = DATE + 1
        IF (DATE.GT.J05) GO TO 319
        C    ADD IN ADDITIONAL IMPACT POINTS TO TOTAL LOAD.
        Z25  IF (SP.EQ.0) GO TO 330
        IF (SDT(1SP).GT.DATE) GO TO 330

```

```

PROGRAM      BIPPY      TRACE
115          LOAD = LOAD + SP(EP)
              SP = 5(1SP)
              GO TO 325
              SUBTRACT DELETED IMPACT POINTS FROM TOTAL LOAD.
              IF (EP.EQ.0) GO TO 350
              IF (EDT(EP).GT.DATE) GO TO 350
              LOAD = LOAD - SP(EP)
              EP = E(EP)
              GO TO 330
120          IF (IOUT.NE.1) GO TO 370
              IF (ILOAD.LY.IGUT) GO TO 370
              CREATE AND WRITE OUTPUT LINE.
              IF (ILOT.LY.NE.DATE) WRITE (6,0)
              LDT = DATE
              CALL DAZE (DATE,LH,LD,LV)
              NH = 0
              DO 355 N = 1,101
              OUT(N) = BL
              NH = NH + 1
              IF (NH.NE.5) GO TO 354
              OUT(N) = 0
              NH = 0
              IF (H.LE.(LOAD-IGUT*1)) OUT(N) = A
              CONTINUE
              OUT(102) = BL
              IF (ILOAD-IGUT).GT.100) OUT(102) = P
              WRITE (6,0) LH,LD,LV,LOAD,OUT(N),NH,1,102)
              FIND THE RUNNING AVERAGE OVER NAVE DAYS.
              LTOT = KTOT
              KTOT = ITOT
              ITOT = 0
              IF (NAVE.LE.0) GO TO 382
              DO 351 N = 1,NAVE
              RAV(N) = RAV(N+1)
              ITOT = ITOT + RAV(N)
              RAV(NAVE) = LOAD
              ITOT = (ITOT + LOAD)/NAVE
              DETECT A PEAK BY A DROP IN THE TOTAL.
              IF (ITOT.GE.KTOT.OR.KTOT.LY.LTOT) GO TO 320
              FIND LEAST STORED PEAK
              K = 1
              DO 361 N = 1,NOTS
              IF (IPIPT(N).LT.IPIPT(K)) K = N
              CONTINUE
              IF THE NEW MODE IS IN THE TOP MOYS, INSERT IT.
              IF (KTOT.LE.IPIPT(K)) GO TO 320
              MIDAT(K) = DATE - NAVE/2 - 1
              IPIPT(K) = KTOT
              GO TO 320
              WRITE THE RESULTS
              WRITE (6,10) NAVE
              DO 361 N = 1,NOTS
              CALL DAZE(MIDAT(N),LH,LD,LV)
              WRITE (6,9) LH,LD,LV,IPIPT(N)
              WRITE (3,11) (MIDAT(N),N=1,10)
125          354
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130          356
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135          358
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140          360
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145          362
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150          364
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155          366
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```

PAGE

CDC 6688 FTM V3.0-P291 OPT-1 86/28/72 12.57.23.

TRACE

BIMBY

PROGRAM

STOP
END

SUBROUTINE	DAZE	TRACE
		SUBROUTINE DAZE(DATE,LM,D,LY)
C		SUBROUTINE DAZE CONVERTS THE INTERNAL DATE REPRESENTATION TO
C		MONTHS, DAYS, AND YEARS.
		COMMON /DAZ/ ICF(12)
5		INTEGER DATE
		LY = DATE/365
2		LM = (DATE-365*LY)/30 + 1
		IF (LM.GE.13) LM = LM-1
5		LD = DATE - 365*LY - 30*(LM-1) - ICF(LM)
		IF (LD.GT.0) RETURN
10		LM = LM - 1
		IF (LM.GT.0) GO TO 5
		LY = LY - 1
		GO TO 2
15		END

COC 6600 FTH V3.0-P291 OPT=1 06/20/72 12.57.23.

SUBROUTINE IMPACT TRACE

```

C      SUBROUTINE IMPACT (SHIP,NO,DIP)
C      SUBROUTINE IMPACT DOES A TABLE LOOKUP TO DETERMINE A SHIPS
C      BERTHING IMPACT POINTS.
C      COMMON /IMP/ SH(100),NBL(100),NBU(100),B(100)
C      INTEGER DIP,B
C      DO 100 I = 1,100
C      IF (SHIP.NE.SH(I)) GO TO 100
C      IF (NBL(I).NBL(1),OR.NO.ST.NBU(I)) GO TO 100
C      DIP = B(I)
C      RETURN
C      100 CONTINUE
C      DIP = 0
C      WRITE (6,1) SHIP,NO
C      FORMAT (SHIP,NO,16.25H WAS NO LISTED IMPACT POINTS.)
C      RETURN
C      END

```

```

SUBROUTINE LINK
TRACE
SUBROUTINE LINK(SOATE,EDATE,BIP)
SUBROUTINE LINK TAKES A SINGLE BERTHING AND ADDS IT TO THE DATA
STRUCTURE. START AND END DATES ARE EACH INDEPENDENTLY LIMITED
IN ASCENDING CHAINS.
COMMON /LINK/ I,SOT(1000),S(1000),EDT(1000),E(1000),BP(1000)
INTEGER BIP,BP,SOATE,EDATE,SOT,S,EDT,E,SP,SPLE,EP,EPL
I = I + 1
IF (I.LE.1000) GO TO 10
WRITE (6,1)
FORMAT (15H)
10. STOP
STORE KNOWN DATA IN THE NEW MODE.
10. BPI() = BIP
SOT(I) = SOATE
EDT(I) = EDATE
SPLE = 1
EPL = 1
SP = S(1)
EP = E(1)
LINK THE START DATE.
20. IF (SP.EQ.0) GO TO 100
IF (SOATE.LE.SOT(SP)) GO TO 100
SPLE = SP
SP = S(ESP)
GO TO 30
30. S(ESP) = 1
S(1) = SP
LINK THE END DATE.
100. IF (EP.EQ.0) GO TO 200
IF (EDATE.LE.EDT(EP)) GO TO 200
EPL = EP
EP = E(EP)
GO TO 100
200. E(EP) = 1
E(1) = EP
RETURN
END

```

CDC 6400 FTM V3.0-P291 OPT=1 06/28/72 13.11.29.

TRACE

OVERLAY(SURFA,0,0)
PROGRAM SURFALINPUT,OUTPUT,TAPL1,TAPE2,TAPE3,
C TAPES=INPUT,TAPES=OUTPUT,
CALL OVERLAY(SURFA,1,0)
CALL OVERLAY(SURFA,2,0)
CALL OVERLAY(SURFA,3,0)
END

5

```

      BLOCK DATA                                C/CDC 6600 FTM V3.0-F291 OPT=1 JG
      TRACE                                     -----
      BLOCK DATA                               C-----
      C                                         C
      C                                         C
      C INITIALIZE COMMON VARIABLES             C-----
      C                                         C
      C-----
      COMMON                                    C
      C /TIME/ VERSN(3),YARD,IDATE(10),NO,IOPT,NY1,NY2
      C /POMEK/ IPWR(10,10),MPS
      C /SHIP/ SMPASC(10,40,10),JALL
      C /SHIPC/ SMPCLS(100,12),MSCL
      C /PIERS/ PIER(100,12),MBRS
      C /BERTMS/ BERTH(100,10)
      C /PIEAC/ PIEACL(10,15) ,MPCL
      C /FLASP/ ICLASP(10,15)
      C /NESTS/ NEST(100,15) ,NESTC(100,5)
      C /NESTS/ SMPASC,PIER,BERTH,PIERCL,CIP
      C /NESTS/ IDATE,NO,SMPASC,SMPCLS,PIER,PIERCL, ICLASP,NEST/8211*0/
      END

```

CDC 6680 FTM V3.8-P291 OPT-1 86/28/72 13.11.29.

TRACE

SUBROUTINE DATE

SUBROUTINE DATE(I DATE, LM, LO, LY)

THIS ROUTINE CONVERTS DAYS TO MONTH, DAYS AND YEAR

```

      DIMENSION ICF(12)
      DATA ICF/ 0,1,-1,0,0,1,1,2,3,4,4,4/
      LY=IDATE/365
      2 LM=(IDATE-365*LY)/30+1
      IF (LM-66.12) LM=LM-1
      5 LO=IDATE-365*LY-30*(LM-1)-ICF(LM)
      IF (LO-67.8) RETURN
      LM=LM-1
      IF (LM-67.8) GO TO 5
      LY=LY+1
      GO TO 2
      END
  
```

PAGE 1

CDC 6600 FTN V3.0-E291 OPT=1 06/28/72 13.11.23.

TRACE
OVERLAY(BURFA,1,0)
PROGRAM BAS1
CALL RDPARM
CALL SMPHOD
CALL SORTS
END


```

11 CONTINUE
   ND=1
   DO 10 I=1,10
     IF (DATE(I).LE.0) GO TO 20
     ND=ND+1
     CALL DATE (DATE(I),JDATE(ND),JDATE(ND+1),JDATE(ND+2))
   10 ND=ND+3
C
C   HEAD NO. OF SHIPS (PIER CLASSES AND NO. OF BERTHS IN YARD)
C
1002 FORMAT(10X,I1,10X,I1)
C
C   READ BERTH FACILITIES DATA
C
20   DO 35 I=1,10
     READ(5,1007) (ICLASSP(I,J),J=1,15)
1007 FORMAT(15A5)
     IF (ICLASSP(I,1).EQ.IEND) GO TO 45
     READ(5,1009) (PIERCL(I,J),J=1,15)
1009 FORMAT(15A3)
     35 MPCL=I
     45 MPCL=I
     ICLASSP(MPCL+1,1)=IALL
     DO 55 I=1,100
       READ(5,1006) (PIER(I,J),J=1,12)
       IF (I.EQ.1) GO TO 54
       IF (PIER(I,1).EQ.INULL) GO TO 54
       IF (PIER(I,1).EQ.PIERS(I,1)) MMB=MMB+1
1006 FORMAT(15F5.2,13A5,15A3,15A3)
     54 IF (PIER(I,1).EQ.IEND) GO TO 65
     55 MURS=I
     65 MURS=I
     DO 150 I=1,100
       READ(5,1010) (MEST(I,J),J=1,15)
       IF (MEST(I,1).EQ.IEND) GO TO 155
     150 MMS=I
     1610 FORMAT(15F5.2,13A5)
C
C   READ SHIP CLASSES - FACILITIES USAGE DATA
C
155   DO 15 I=1,100
     READ(5,1004) (SMPLS(I,J),J=1,11)
1004 FORMAT(15A5,21A11,10A12,10A12)
     IF (SMPLS(I,1).EQ.IEND) GO TO 25
     15 MSCL=I
     25 MFS=0
     26 MFS=MFS+1
     READ(5,1026) (IPWR(MFS,I),I=1,10)
1026 FORMAT(10A5,19)
     IF (IPWR(MFS,1).NE.IEND) GO TO 26
     MFS=MFS+1
C
C   PRINT PARAMETER SUMMARY
C
110 WRITE(6,2000) MVS1,MVS2, (VERSH(I),I=1,3),YARD

```



```

C-----
C
C THIS ROUTINE MODIFIES SHIPS RECORDS FOR THE SYSTEMS USE.
C NECESSARY SHIP PARAMETERS ARE ADDED TO THE SHIP RECORD.
C THE ROUTINE ALSO SIMULATES UNASSIGNED SHIP WORK BY THE USE
C OF RANDOM SELECTION BASED ON SHIP MAINTENANCE PROBABILITIES.
C-----
C
10 COMMON
C /TIME/ VERSN(3),YARD,IOATE(10),NU,IOPY,NY1,NY2
C /SHIP/ SHPASG(10,40,10),JALL
C /SHIP/ SHPCLS(100,12),MSCL
C /DIERS/ PIER(100,12),NORS
C /DIMENSION PROB(40,10),SMUF(40),ISMUF(40)
C /INTEGER SHPASG,CLIP,SHPCLS,SHPCL(10),SOATE,EDATE,UDATE,DOATE,
C /I SHP(25),SNO(40),SHIP(40),RA,TEAR(10),PIER
C /DATA IEND,MTAPE1,SHPC/SHEND,11*0/
C /DATA RA /JMRU /,IUCK,IUM/SHUDOK,SHUNOS /,IELWK/ 4M /
C /IOPY=1, CARD INPUT ONLY
C /-2 TAPE1 INPUT ONLY
C /-3 TAPE1 AND CARD INPUT
C /JP = 0
C /DUN = 1.
C /IOCL = 1
C THE FOLLOWING REACS UNSCHEDULED SHIP PROBABILITIES.
C READ (5,2005) (YEAR(I),I=1,10),MXSH
C /FORMAT (10X,115)
C /WRITE(6,2006) NY1,NY2,(VERSN(I),I=1,3),YARD
C /WRITE (6,3000) (YEAR(I),I=1,10)
C /FORMAT(//5X,29)UNASSIGNED WORK PROBABILITIES /5X,29(1M-1//5X,
C /14)SHIP,4X,4HNULL,10(5X,12) /5X,4H----,4X,4H----,10(2X,5M-----)
C /JP = JP + 1
C /READ (5,2001) SHIP(JP),SNO(JP),(PROB(JP,I),I=1,10)
C /FORMAT (45,15,10F5.2)
C /WRITE (6,3001) SHIP(JP),SNO(JP),(PROB(JP,I),I=1,10)
C /FORMAT (5X,4X,4X,14,10(2X,F5.2))
C /IF (SHIP(JP).NE.IEND) GO TO 110
C /WRITE(6,9999)
C /FORMAT(1M1)
C /JP = JP - 1
C /GO TO (20,30,40),IOPY
C /20 READ(5,1000) (SHP(I),I=1,22)
C /FORMAT(15,14,A5,A3,3I2,A2,9I2,A2,2X,I4,A3,2I2)
C /IF (SHP(11).EQ.IUCK.OR.SHP(11).EQ.IUM) GO TO 20
C /IF (SHP(11).EQ.IEND) GO TO 100
C /GO TO 60
C /30 READ(5,1000) (SHP(I),I=1,22)
C /IF (SHP(11).EQ.IUCK.OR.SHP(11).EQ.IUM) GO TO 30
C /IF (SHP(11).EQ.IEND) GO TO 100
C /GO TO 60
C /40 IF (MTAPE1.NE.0) GO TO 50
C /READ(1,1000) (SHP(I),I=1,22)
C /IF (SHP(11).EQ.IUCK.OR.SHP(11).EQ.IUM) GO TO 40
C /IF (SHP(11).NE.IEND) GO TO 60

```

```

      NTAPE1 = 1
      50 READ(5,106J) (SMP(I),I=1,22)
      IF(SMP(1).EQ.1UCH.OR.SMP(1).EQ.1UM) GO TO 50
      IF(SMP(1).EQ.1END) GO TO 100
      60 CONVERT BERTHING AVAIL. DATES TO DAYS
      SOATE=MOATE(SMP(1),SMP(6),SMP(7))
      UDATE= MOATE(SMP(1),SMP(10),SMP(11))
      EDATE= MOATE(SMP(12),SMP(12),SMP(13))
      EDATE= MOATE(SMP(15),SMP(16),SMP(17))
      CHECK IF SHIP IS BERTH DURING ANY OF THE SIMULATION LATES
      DO 80 I=1,NO
      IOATEC=0
      IF(10ATE(I).LT.SOATE) GO TO 80
      IF(10ATE(I).GT.EDATE) GO TO 80
      IF(10ATE(I).GT.EDATE) GO TO 80
      65 IF(10ATE(I).LT.UDATE) IOATEC=1
      IF(10ATEC.EQ.0) GO TO 10
      SMP(I)=SMP(I)+1
      M=SMP(I)
      IF(SMP(I).EQ.1BLNK) GO TO 91
      DO 92 I=1,NMMS
      IF(SMP(I).NE.0) GO TO 92
      SMP(I)=1
      GO TO 91
      92 CONTINUE
      91 SMPASC(I,M)=10IP(SMP(1),SMP(2),IOCL)
      IF(SMPASC(I,M).NE.0) GO TO 90
      SMP(I)=SMP(I)-1
      GO TO 10
      90 SMPASC(I,M)=SMP(I)
      SMPASC(I,M)=SMP(I)
      ITEMP= 10IP(SMP(1),SMP(2),IOCL)
      SMPASC(I,M)= IOCL
      SMPASC(I,M)=SMP(I)
      SMPASC(I,M)=SMP(I)
      NCL=SMPASC(I,M)
      80 CONTINUE
      GO TO 10
      C THE FOLLOWING DETERMINES WHICH UNSCHEDULED SHIPS ARE PRESENT.
      100 DO 200 I=1,NO
      IVR= IOATE(I)/365
      DO 210 K=1,10
      IF (IVR.EQ.YEAR(K)) GO TO 220
      210 CONTINUE
      WRITE (6,211) IVR
      211 FORMAT (17H THERE ARE NO PROBABILITY DATA FOR 19,12)
      GO TO 200
      C SHUFFLE THE ORDER OF THE PROBABILITY CARDS.
      220 DO 221 N=1,JP
      221 SHUF(N)= RANF(10H)
      PHIN= 0.
      DO 223 N=1,JP
      L= 40
  
```

SUBROUTINE SMPHOO TRACE

```

DO 222 M = 1,JF
222 IF (SHUF(M).LT.SHUF(L).AND.SHUF(M).GT.FMIN) L = M
223 FMIN = SHUF(L)
C
115 SELECT UP TO NESHIP UNSCHEDULED SHIPS.
IJP = 0
DO 230 N = 1,JP
230 N = 1,JP
L = ISHUF(N)
IF (IPROB(L).LT.RANF(DUM)) GO TO 230
SMPCL(I) = SMPCL(I) + 1
M = SMPCL(I)
SMPASG(I,M,2) = SMP(I)
SMPASG(I,M,3) = SHO(I)
SMPASG(I,M,4) = ISIP(SHIP(L),SMO(L),IOCL)
SMPASG(I,M,5) = ICCL
SMPASG(I,M,6) = RP
IJP = IJP + 1
IF (IJP.GE.NRSHIP) GO TO 200
230 CONTINUE
200 CONTINUE
C
C WRITE MODIFIED SHIP RECORDS
WRITE(6,2000) NY1,NY2,(VERSNIKL),KL=1,3),YARD
2000 FORMAT(1X,10H8-12-211,5X,3A4,60X,25)
WRITE(6,2002)
DO 126 I=1,NSCL
SMPCL(I,12)=ICLASS(SMPCL(I,1),JALL)
IF (MOD(I,5).NE.4) GO TO 120
WRITE(6,2004) NY1,NY2,(VERSNIKL),=1,3),YARD
2004 FORMAT(1X,10H8-12-211,5X,3A4,60X,25)
WRITE(6,2002)
2002 FORMAT(1X,10H8-12-211,5X,3A4,60X,25)
F 10HSHIP IDENTIFICATION / 5X,19(11M-1) / 7X,
F 10HSHIP ,25X,2HSHIP REQUIREMENTS TABLE /
F 7X,5MCLASS,5X,6MPCF,3X,4MTYPE,5X,6MNULL,4X,4MNEST,2X,
F 4MHPM,2X,4MSTMP,2X,4MSTR,2X,4MSMTR,2X,5MCRANE,2X,5MLTSM
F 2X,5MUKLS /
F 7X,5M-----5X,4M-----,3X,4M-----,2X,9M-----,15(2X,
F 6M-----),1(2X,5M-----))
120 WRITE(6,2003) SMPCL(I,12),SMPCL(I,1),JALL,11)
2003 FORMAT(1X,15,5X,14,3X,45,1X,14,1X,14,1X,15(15,1X),1X,15,2X,15
F 2X,15)
F 2X,15)
RETURN
END

```

FUNCTION	ISIP	TRACE
		FUNCTION 10IP (ISHP, ITYPE, IOKCLS)
5		THIS FUNCTION DETERMINES THE SHIP BERTHING CLASS, AND ITS DOCK CLASS GIVEN THE SHIP'S TYPE AND HULL NO.
10		COMMON C /SHIPC/ SMPCLS(100,12),MSCL INTEGER SMPCLS N=0 IOKCLS=98 DO 10 I=1,MSCL IF (SMPCLS(I,1).NE.ISHP) GO TO 10 IF (ITYPE.LT.SMPCLS(I,2)) GO TO 10 IF (ITYPE.GT.SMPCLS(I,3)) GO TO 10 N=N+1 IF (SMPCLS(I,1).LE.0) SMPCLS(I,1)=98 IOKCLS=SMPCLS(I,1) GO TO 20 10 CONTINUE 20 IOIP=N IF (N.LQ.0) WRITE(6,100) ISHP, ITYPE 1000 FORMAT(14,2H*,10H, F A5,2H,16,32H IS AN UNDEFINED SHIP CLASS/TYPE F RETURN END
15		
20		
25		

02 CONTINUE
01 CONTINUE
RETURN
END

CDC 6603 FTM V3.0-0291 OPT:1 05/26/72 13.11.23.

```

FUNCTION ICLASS TRACE
-----
FUNCTION ICLASS(NAME,JALL)
C
C THIS FUNCTION DETERMINES THE BERTHING PREFERENCE GROUP NO.
C AND THE BERTHING PREFERENCE GROUP NO. WHICH APPLIES TO ALL
C SHIP TYPES
C
C-----
COMMON /CLASP/ ICLASP(10,15)
DATA IALL/SMALL /
ICLASS=1
DO 10 I=1,10
DO 20 J=1,15
IF(NAME.NE.ICLASP(I,J)) GO TO 20
ICLASS=I
20 CONTINUE
IF(ICLASP(I,1).EQ.IALL) JALL=I
10 CONTINUE
IF(IALL.EQ.0) ICLASS=JALL
RETURN
END

```

CDC 6600 FTM V3.3-P291 OPT=1 06/28/72 13.11.29.

FUNCTION MOATE TRACE

```

C-----
C FUNCTION MOATE(M,I,J)
C-----
C THIS FUNCTION CONVERTS MONTH ,DAYS AND YEAR TO DAYS.
C-----
C
C DIMENSION ICF(12)
C DATA ICF/0,1,1,0,0,1,1,2,3,3,4,4/
C MOATE=30*(M-1)+ICF(M)+365-J
C RETURN
C END

```

5

10

PAGE 1

CDC 6600 FTM V3.0-P291 OPT=1 06/20/72 13.11.29.

TRACE

OVERLAY(MURFA,2,0)
PROGRAM BASZ
CALL ASSCH
CALL SURRY
END

5

CDC 6600 FTM V3.0-P291 OPT=1 06/28/72 13.11.29.

```

SUBROUTINE SORT      TRACE
-----
SUBROUTINE SORT(I)
C-----
C THIS ROUTINE SORTS THE SHIP RECORDS ACCORDING TO BIRTH
C PRE-ASSIGNMENT .
C SHIPS BIRTH ARE PLACED AT THE BEGINNING OF SHIP RECORDS.
C-----
C
COMMON
C /SHIP/ SMPASC(10,40,10) ,JALL
C INTEGER SMPASC,TEPPI(10)
DO 40 L=1,40
DO 20 J=1,40
IF(SMPASC(I,J,1).EQ.0) GO TO 40
IF(ING(SMPASC(I,L,4)).NE.IABS(SMPASC(I,J,4))) GO TO 20
DO 30 K=1,10
TEMP(K)=SMPASC(I,L,K)
SMPASC(I,L,K)=SMPASC(I,J,K)
SMPASC(I,J,K)=TEMP(K)
30 SMPASC(I,J,4)=TEMP(4)
20 CONTINUE
40 CONTINUE
RETURN
END

```

COC 6000 FTM V3.0-P291 OPT=1 06/20/72 13.11.29.

```

FUNCTION  INEST  TRACE
-----
C      FUNCTION INEST(TYPE,INULL)
C
C      THIS FUNCTION DETERMINES THE NESTING INDEX NO. FOR A
C      GIVEN SHIP.
C
C-----
C      COMMON /NESTS/ NEST(100,15) ,NESTC(100,5)
C      INEST=0
C      DO 10 I=1,100
C      IF(NEST(I,1).LE.0) RETURN
C      DO 20 J=1,15,3
C      IF(TYPE.NE.NEST(I,J)) GO TO 20
C      IF(INULL.LT.NEST(I,J+1)) GO TO 20
C      IF(INULL.GT.NEST(I,J+2)) GO TO 20
C      INEST=I
C      RETURN
C      20 CONTINUE
C      10 CONTINUE
C      RETURN
C      END

```

E-27

SUBROUTINE ASSEM TRACE

```

      IF(IK-LY,K) PIERSV(K)=PIERSV(IK)
      IF(IK-LY,K) GO TO 24
      PIERSV(K)=PIERSV(IK)+PIERSV(IK)
24  CONTINUE
      DO 29 J=1,NMBS
29  PIER(K,2)=FLOAT(BERTH(K,2))/FLOAT(WERTH(K,0))+.5
      CONSIDER THE NO. OF PASSES TO BE MADE
      DO 30 J=1,3
      ISM=1
      CONSIDER A SHIP TO BE BERTH
100 IF(SMPASG(I,ISM,3).GT.0) GO TO 35
      IF(IURT.GT.0) GO TO 81
      IURT=1
      WRITE(2,2001) I,I0,IY,SMPASG(I,ISM,1),SMPASG(I,ISM,2)
      HAS SHIP BEEN ASSIGNED A BERTH
      NM= SMPASG(I,ISM,4)
      ISCL = SMPASG(I,ISM,5)
      IF(NM.NE.0) GO TO 5001
      IF(SMPLSISCL,12).EQ.JALL.AND.J.EQ.1) GO TO 35
5001 IFCL= SMPLSISCL,12)
      IF(INB.EQ.0) GO TO 71
      CONSIDER IF THE SHIP CAN BE NESTED
      C
      C
      N=8
      IF(INB.GT.0) GO TO 83
      ISM=SMPASG(I,ISM,9)
      ITYPE=SMPASG(I-1,ISM,1)
      INALL=SMPASG(I-1,ISM,2)
      DO 76 II=1,48
      IF(SMPASG(I,II,1).NE.ITYPE) GO TO 76
      IF(SMPASG(I,II,2).NE.INALL) GO TO 76
      NM=IABS(NM)
      NESTC(INB,II)=NESTC(NB,II)+1
      WRITE(2,2002) N,PIER(NB,1)
      WRITE(2,2006) ITYPE,INALL
      GO TO 73
76  CONTINUE
      NB=IABS(NB)
      SMPASG(I,ISM,4)=N8
      SMPASG(I,ISM,9)=8
      DO 77 JJ=1,48
77  IF(SMPASG(I,JJ,9).NE.ISSN) GO TO 78
      SMPASG(I,JJ,9)=NP
      DO 78 JJ=1,48
      IF(SMPASG(I,ISM,1).NE.SMPASG(I-1,JJ,1)) GO TO 77
      IF(SMPASG(I,ISM,2).NE.SMPASG(I-1,JJ,2)) GO TO 77
      NP=JJ
78  CONTINUE
      DO 78 JJ=1,48
      IF(SMPASG(I,JJ,9).NE.ISSN) GO TO 78
      SMPASG(I,JJ,9)=NP
79  CONTINUE
      WRITE(2,2002) N,PIER(NB,1)
      GO TO 76
83  WRITE(2,2002) P,PIER(NB,1)
      GO TO 76

```

```

C
C      DETERMINE SHIP CLASS AND PIER CLASS
C      BERTHS AVAIL. IN PIER CLASS
C
115 71 IF (J.EQ.3.AND.SMPCLS(IISCL,N) .LT.2) GO TO 35
      N1=1
      N2=15
      IF (J.GT.1) N2=NERS
      DO 40 K=M1,M2
      IF (J.LT.2) GO TO 20
      IF (K.LQ.1) GO TO 27
      IF (PIER(K,1).EQ.0) GO TO 40
      N3=K
      27 IF (J.EQ.1) N3=PIERCL(IISCL,K)
      28 IF (N3.LQ.0) GO TO 40
      IF (PIER(N3,1).EQ.1) GO TO 40
      WRITE(2,2002) J,PIER(N3,1)
      2002 FORMAT(27X,I4,2X,A5)
C
C      DETERMINE BESTING ABILITY OF THE SHIP AND BERTH
C
120 82 IF (J.NE.3) GO TO 500
      IF (SMPCLS(IISCL,N).LT.2) GO TO 35
      IF (BERTH(NB,10).EQ.0) GO TO 500
      JSN=ISN-1
      KSN=8
      DO 500 I=1,JSN
      IF (SMPASC(I,11,4).NE.NB) GO TO 500
      IF (SMPASC(I,11,4).GT.0) KSN=KSN+1
      N3=I1
      500 IF (INEST(SMPASC(I,NP,1),SMPASC(I,NP,2),EQ.INEST(SMPASC(I,ISM,1),
C      SMPASC(I,ISM,2)),AND.INEST(SMPASC(I,NP,1),SMPASC(I,NP,2),NE.
C      0) GO TO 72
      IF (SMPASC(I,ISM,1).NE.SMPASC(I,NP,1)) GO TO 510
      IF (SMPASC(I,ISM,5).NE.SMPASC(I,NP,5)) GO TO 500
      72 ISCL=SMPASC(I,NP,5)
      IF (SMPCLS(IISCL,N).EQ.0) GO TO 500
      IPON = PIER(NB,2)*SMPCLS(IISCL,10)
      IF (IPON.LT.SMPCLS(IISCL,5)) GO TO 555
      150 IF (BERTH(NB,2).GE.SMPCLS(IISCL,5)) GO TO 502
      555 IPON=(FLOAT(PIER(NB,2))/FLOAT(BERTH(NB,6)))*FLOAT(SMPCLS(
C      ISCL,10))*.5
      ZPON=ZABS(IPON)
      IF (IPON.LT.SMPCLS(IISCL,5)) GO TO 500
      IF (PIERSV(NB).LT.SMPCLS(IISCL,5)) GO TO 500
      502 JPOW=ZPON*(NB,2)-SMPCLS(IISCL,5)
      BERTH(NB,2)=BERTH(NB,2)-SMPCLS(IISCL,5)
      IN=PIER(NB,10)
      IF (K.LQ.0) GO TO 501
      PIERSV(IK)=PIERSV(IK)-SMPCLS(IISCL,5)
      160 IF (BERTH(NB,2).GE.0) GO TO 501
      BERTH(NB,2)=0
      BERTH(IK,2)=BERTH(IK,2)+JPOW
      501 PIERSV(NB)=PIERSV(NB)-SMPCLS(IISCL,5)
      KSN=SMPCLS(IISCL,N)-1
165

```

SUBROUTINE	ASSIGN	TRACE	COC 6600 PTM V3.0-0201
170			IF(NESTING, KSN) .GE. NSH) GO TO 500 HESTC(NB, KSN) = HESTC(NB, KSN) + 1 SMPASC(1, ISM, 4) = -NB SMPASC(1, ISM, 9) = NP WRITE(12, 2004) SMPASC(1, NP, 2) 2006 FORMAT(10X, 15MESH SHIP WITH , A5, 1X, I4) GO TO 72
175			500 CONTINUE IF(SMPASC(1, ISM, 4) .EQ. 0) GO TO 3005 600 CONTINUE
180			C DETERMINE IF BERTH WAS SUFFICIENT FACILITIES C IF(SMPLCS(1, ISM, 1) .GT. 0) GO TO 5040 IF(BERTH(NB, 0) .EQ. 1000) BERTH(NB, 0) = 1100 5000 IF(BERTH(NB, 0) .GT. 0) GO TO 5002 IF(BERTH(NB, 0) .LT. 0 .AND. SMPASC(1, ISM, 6) .GE. 45) GO TO 5002 GO TO 5002
185			5002 IF(1ABS(BERTH(NB, 0)) .LT. SMPLCS(1, ISM, 1)) GO TO 5002 IPON = PIR(NB, 2) * SMPLCS(1, ISM, 10) IF(IPON .LT. SMPLCS(1, ISM, 9)) GO TO 6066 IF(BERTH(NB, 2) .GE. SMPLCS(1, ISM, 9)) GO TO 4005 6066 IPON = (PIER(NB) / (PIER(NB) / FLOAT(BERTH(NB, 0)) * FLOAT(SMPLCS(1, ISM, 10))) ** .5 C ISCL(1, 12)) ** .5 IPON = 1ABS(IPON) IF(IPON .LT. SMPLCS(1, ISM, 9)) GO TO 5003 IF(PIER(NB) .LT. SMPLCS(1, ISM, 9)) GO TO 5003 50 TO 6005
190			C BERTH WAS FACILITIES TO HANDLE SHIP C 6005 SMPASC(1, ISM, 4) = NB
195			C DECREASE BERTH FACILITIES AVAIL. C C WRITE ACTION TAKEN IN PROCESSING SHIP C GO TO 70
200			2000 WRITE(12, 2004) 2004 FORMAT(10X, 15MESH IS FULL) GO TO 40
205			3001 WRITE(12, 2005) 2005 FORMAT(10X, 15MESH SHIP CANNOT BE NESTED, IMPROPER SHIP TYPE GO TO 40
210			3002 IF(PIER(NB, 1) .EQ. 1) GO TO 40 IPON = 1ABS(BERTH(NB, 0)) WRITE(12, 2007) 10, SMPLCS(1, ISM, 10) IF(BERTH(NB, 0) .LT. 0) WRITE(12, 2014) 2014 FORMAT(10X, 15MESH NOT ACCESSIBLE) 2007 FORMAT(10X, 15MESH SHIP CANNOT BERTH, INSUFFICIENT SPACE F 0HAYALL , 10, 5M RES , 10) GO TO 40
215			3003 WRITE(12, 2008) PIER(NB), SMPLCS(1, ISM, 9) 2008 FORMAT(10X, 15MESH SHIP CANNOT BERTH, INSUFFICIENT POWER. F 0HAYALL , 10, 5M RES , 10) SMPASC(1, ISM, 3) = SMPASC(1, ISM, 3) - 1
220			

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CDC 6600 PFM V3.0-9291 OPT-1 06/28/72 13.11.23.

SUBROUTINE ASSEN TRACE

END

SUBROUTINE SUMRY TRACE

SUBROUTINE SUPRY

C
C THIS ROUTINE PRINTS TWO SUMMARIES OF SIMULATION RESULTS.
C 1. FACILITIES AVAILABLE, REQUIRED AND THEIR DIFFERENCES
C 2. DETAILED SHIP ASSIGNMENT.
C

10 COMMON
C /TIME/ VERSN(3),YARD,IOATE(10),NO,IOPT,NY1,NY2
C /POWER/ IPWR(10,10),MPS
C /SHIP/ SHPASC(10,40,10),JALL
C /PIERS/ PIER(100,12),NBRS
C /SHIPC/ SHPCLS(100,12),NSCL
C /PIERCL/ SHPCLS,PIER,AVAIL(5),REQ(6),DIFF(5),TOTAL(3,6)
15 I,UREG(6)
C DATA INULL,IASST,IBLK/ 5HNULL,1M*,1M / ,IRO/3HRO /
DO 10 I=1,NO
LINE=9

20 CALL DAZE(IOATE(1),IM,IO,IV)
WRITE(6,6000) NY1,NY2,(VERSN(L),L=1,3),YARD
4000 FORMAT(1N1,6H50-01-7211,5X,1A4,60X,A5)
WRITE(6,2000) IM,IO,IV

25 C INITIALIZE TOTALS AND REQ. ARRAYS.
C

DO 16 J=1,10
16 SP(J)=0
DO 15 K=1,3
DO 15 J=1,6
UREG(J)=0
15 TOTAL(K,J)=0
DO 20 J=1,NBRS
IF(PIER(J,1).EQ.INULL) GO TO 20
IF(J.GT.1.AND.PIER(J,1).EQ.PIER(J-1,1)) GO TO 20

35 C INITIALIZE AVAIL. FACILITIES.
C

36 DO 35 L=1,6
35 REGIL=0
DO 36 L=1,5
36 DIFF(L)=0
AVAIL(1)=PIER(J,5)
AVAIL(2)=PIER(J,7)
AVAIL(3)=PIER(J,8)
AVAIL(4)=PIER(J,6)
AVAIL(5)=PIER(J,11)
KK=J+1
JSAVE=0

50 DO 40 JJ=KK,NBRS
IF(PIER(J,1).NE.PIER(JJ,1)) GO TO 45
AVAIL(1)=AVAIL(1)+PIER(JJ,5)
AVAIL(2)=AVAIL(2)+PIER(JJ,7)
AVAIL(3)=AVAIL(3)+PIER(JJ,8)
AVAIL(4)=AVAIL(4)+PIER(JJ,6)
AVAIL(5)=AVAIL(5)+PIER(JJ,11)

	SUNNY	TRACE
ROUTINE		

[illegible]

170

60 10 00 11-SMA5G(L,J,2),SMA5G(L,J,0),

8-017116

2010 FORM 7 (5X), 45, 2X, 14, 3X, 40, 3X, 45, 41)

301-602 06
00 CONTINUE

1 1 03153M DIMS 01MOT, H00//1 AUMMO, 1889
17000401711FM

10-71

NEVERMORE SWIPS DO7 DEATH

SECRET

00 78 101.00
00 78 161.00

IF (SMPASC(1:J,4).NE.0) GO TO 70

1711CL-W-01 58 10 99

DATE 10, 2007)

2607 FORMATTI//SN, PSYCHOLOGISTS FOR SLIPS WAT BUREAU
- IN CONNECTION FOR FAILURE /SN

[illegible]

75 IP(SW0956(1,J),1).GE.0) NDA12(0,300), SW=00121

76 SW0956(1,J,2),SW0956(1,J,0)

IF(SNPA56(I,J),2),LT,0) WRITE(6,3007) SNPA56(I,J,1)

W, SAMPAS (J, J, 2), SAMPAS (J, J, 8)
SAMPAS (J, J, 1), SAMPAS (J, J, 1)
SAMPAS (J, J, 1), SAMPAS (J, J, 1)
SAMPAS (J, J, 1), SAMPAS (J, J, 1)

3009 FORM 15X, 9, 1X, 14, 2X, A6, 33X, 16 MINUS SUFFICIENT SPACE

70 CONTINUE
WRITE(6,9992) NV1,NV2,(VERSMIL),L=1,3),YARD

WHITE (6, 2111)

70 2112 JUL 19 1943
7112 MORTICE (6-2113) J, SP (J), IPNR (J, 10)

[illegible]

2113 FORMAY (15, 13, 4X, 15, 5X, 15)

10 CONTINUE

0673

1

1

PAGE 1

CDC 6600 FTM V3.0-P291 OPT=1 06/28/72 15.11.24.

TRACE

OVERLAY(OURFA,3,8)
PROGRAM SAS3
CALL GRAPH
END

E-38

E-39

E-40

13-11-23

06/28/72

COC 6600 FTM V3.0-P291 OPF=1

SUBROUTINE GRAPH TRACE

```

170 DO 110 KK=1,10
    IF (KK.NE.1) GO TO 120
    WRITE(6,1006) PIER(NBER,1)
1006 FORMAT(1X,A5,27X)
120 MPUN=IDLNK
    IF (BERS(LL,KK+1).EQ.0) GO TO 130
    ISN=BERS(LL,KK)
    JSN=BERS(LL,KK+1)
    IF (JSN.LE.0.OR.JSN.LE.0) GO TO 110
    MPUN=ICOM
130 ISN=SMPASG(K,ISN,0).LT.0.AND.SMPASG(K,JSN,0).LT.0) MPUN=IPLUS
    SAVE (NC+1)=SMPASG(K,ISN,1)
    SAVE (NC+2)=SMPASG(K,JSN,2)
    SAVE (NC+3)=MPUN
    NC=NC+3
    IF (BERS(LL,KK+1).EQ.0) GO TO 115
110 CONTINUE
115 WRITE(6,1007) (SAVE(JJ),JJ=1,NC)
1007 FORMAT(13X,7(A5,1X,14,A1)
    IF (NBER.EQ.NBS) GO TO 10
100 CONTINUE
    LINE=0
    IF (I.EQ.NBS) GO TO 10
    WRITE(6,1000) MY1,NY2,I,VERSN(LL),L=1,3,YAND ,IA,IO,IY
1000 FORMAT(1X,1000) MY1,NY2,I,VERSN(LL),L=1,3,YAND ,IA,IO,IY
    DO 31 MH=1,7
    31 BERC(MH) =0
    30 ISAVE=1
    JBERC=1
    BERC(IERC)=1
    JSAVE=0
    BERNL=PIER(I,11)
10 CONTINUE
15 CONTINUE
    RETURN
    END

```

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The Berthing and Utilities Requirements Forecasting (BURF) Program is a management tool designed to determine the berthing requirements for the naval shipyards over a long-range period. The berthing utilities considered by the program are linear space (ft), electric current (ac at 450 volts), fresh and salt water (gpm), and steam power (lb/hr). Given the ships to be berthed in a shipyard for any one day, the system will assign selected ships to berths and forecast the resulting utilities requirements at that yard for that day. By choosing appropriate peak days over the long-range period, an overall forecast for a yard can be produced.		

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