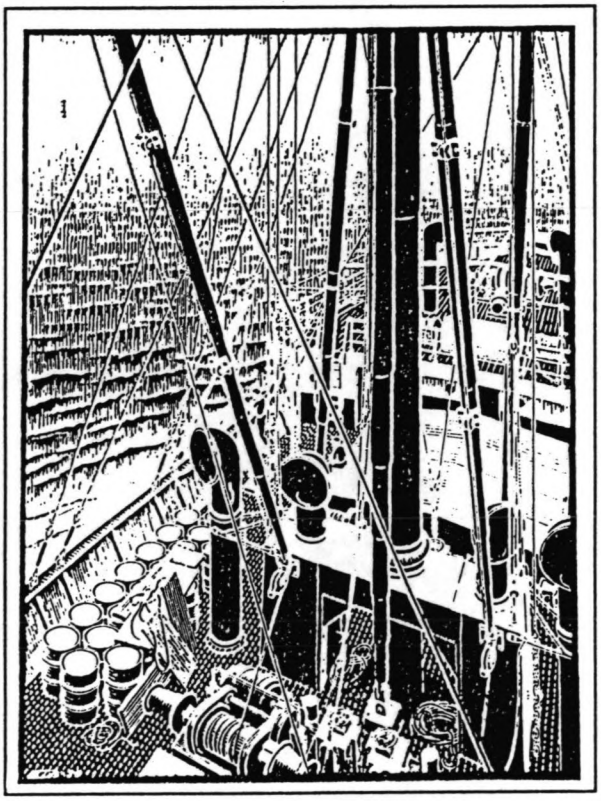
Simulation Model for Port Operations (HASPORT-II)

Volume 4: Users Manual



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Volume 4 HASPORT-II Users Manual

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1 Introduction

1.1 Outline of the model

HASPORT-II is a computer-model for simulation of port operations and can be a strong aid to port planners. It can be used to analyze operations in ports and on terminals and to investigate the performance of all aspects of a port system. The model can be applied to studies of existing and proposed port-situations c.q. present and future cargo-flows .

The model regards the following aspects of port-activities:

* Marine operations: the arrival, residence in the port and departure of ships
* Landside operations: the arrival, storage and departure of cargo
* The interface of marine and landside operations: the cranes and ship's gear handling cargo from ship to shore and vice versa
* The connection with the inland transport

The cargo-types which are handled on the terminals are determined on the basis of:

* Commodity: containers, breakbulk, liquid bulk, dry bulk
* Import or export cargo
* Transhipment-mode: 1) directly from the inland transport modes (trucks, trains, barges) to the ships and vice versa; 2) indirectly from the inland transport to the ships and vice versa, using storage-facilities on the terminal; 3) transhipment from one ship to another (for example a feeder-ship), also using intermediate storage.

Varying environmental, human and operational conditions, which can possibly restrict the operations, are taking into consideration: a tidal window, bad weather conditions, shifts, strikes, equipment-breakdowns and absence of inland transport on weekend-days.

The input-data of the model consists of the characteristics of the ship-classes which attend the port, the characteristics of the terminals and their facilities, the cargo storage- and transport-data, the characteristics of the restrictions and other general information.

The results which are produced by the model concern the performances of the terminals (throughput, storage-utilisation, berth-occupancy, crane-utilisation), the performances of the ships (waiting times and service times) and the specifications of the restrictions on the operations.

HASPORT-II has been developed using the simulation-software Prosim. It has been created as a successor to the HASPORT Fortran- and Prosim-programs. However, HASPORT-II,

offers the facility to simulate bigger and more detailed ports and to produce more extensive and specified results.

1.2 Outline of the user

As stated above, HASPORT-II has been developed using Prosim simulation software. On the basis of this, two types of users can be specified. In the first place users who are not or barely acquainted with Prosim; secondly, users who do have experience with this simulation language.

HASPORT-II is general model for port-simulation. In case a port with very specific characteristics has to be simulated, the latter type of user may wish to adapt the model. This manual is not for this type of user; he/she should use the extensive model description, which has also been written for HASPORT-II, to understand the structure of the model but may of course use this manual as a guide to performing simulation-runs.

This manual is aimed primarily at the first type of user: a port planner with insufficient knowledge of Prosim. To him/her this manual offers guidance in understanding the principles of the model, in producing a set of input data, in performing a simulation-run and in analyzing the results.

1.3 Outline of the manual

The next chapter of this manual will explain the simulation principles of HASPORT-II by means of a verbal description of the model of the program. It will also give a summary of the requested input data and of the output data which are produced. Chapter 3 will discuss the aspects of the simulation software Prosim: the principles of performing a HASPORT-II-simulation with Prosim, the required hardware, the installation-procedure and the use of Prosim-menu's.

The fourth chapter will describe the procedure for creating a set of input data and the fifth chapter will explain how to perform a simulation-run with that set of data. Chapter 6 deals with the facilities for showing the results of a simulation and chapter 7 will discuss the means of analysis of the results. Finally, the last chapter will demonstrate the application of HASPORT-II, with the use of an example.

2 Description of the model

2.1 Verbal model

The model describes a port-system which has the following general characteristics:

The port which is described by the model consists of a user-defined number of terminals. Each terminal is operated separately and can handle a user defined number of cargo-types. These cargo-types have to be chosen from one or more of the four commodities: containers, breakbulk, liquid bulk or dry bulk. Each terminal has a user-defined number of berths. Berths are either single berths at which only one ship can moor or so called *multiple* berths at which several ships can moor at the same time. At multiple berths ships can be shifted, if that would create space for an extra ship, and cranes can be shifted from one ship to another. At the berths ships are unloaded and loaded. Up to five types of cargo can be handled at one berth. Each berth has a user-defined number of cranes at its disposal and each terminal has a user-defined total capacity of other terminal-equipment.

The ships which arrive at the harbour are divided into classes. Each class has its own generator, which generates ships at random inter-arrivaltimes, drawn from user-defined distributions. The generators also allocate several attributes to the ships (for example: DWT, draught, length, consignment-size, the type of cargo it carries, the terminal at which the ship is served).

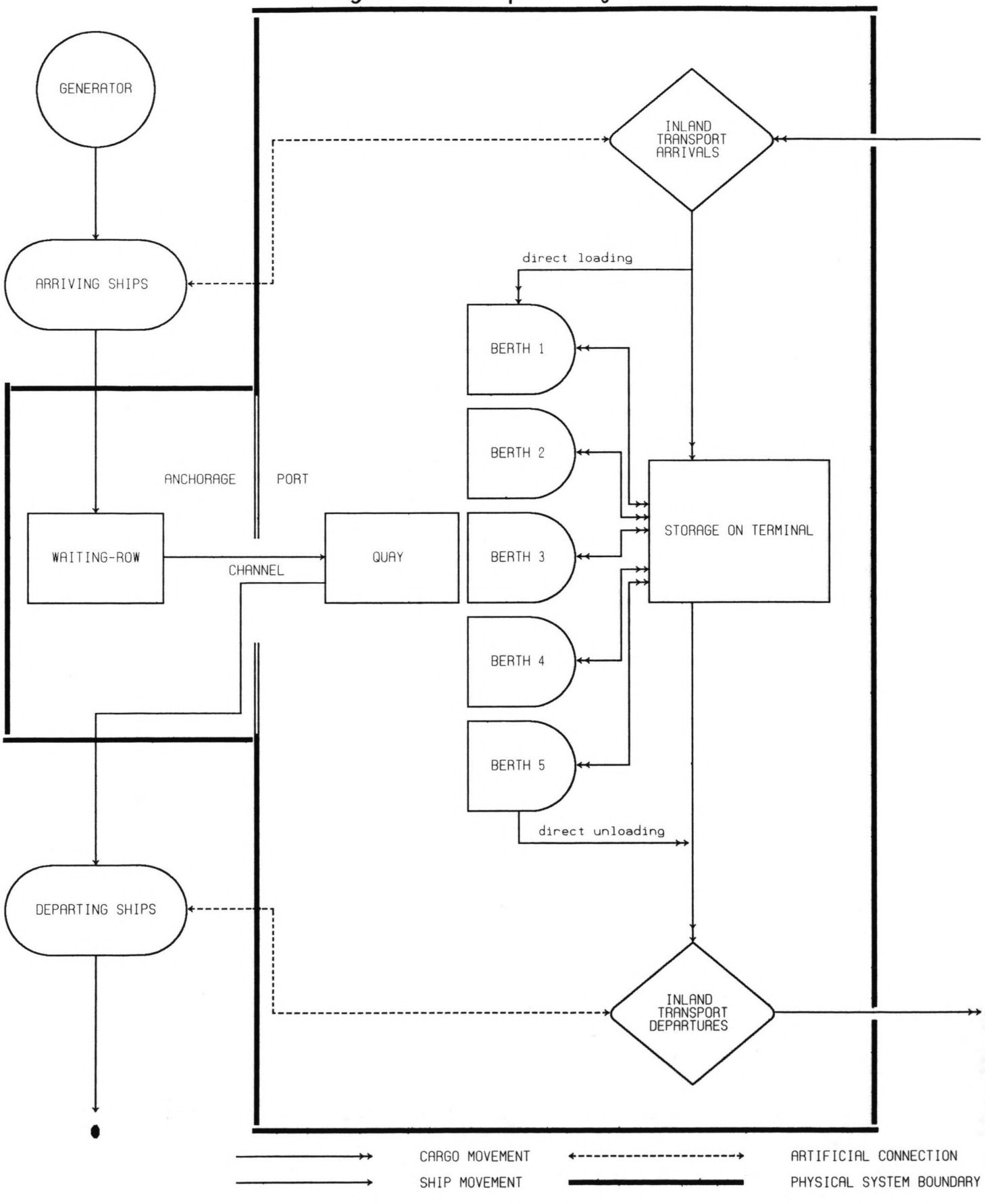
The movements of the ship in the model are the following:

* A ship, which has been generated by the generator of its class, enters the system; it asks the harbour-master of the port for permission to go to a berth; when waiting for permission the ships stays in a waiting-row at the anchorage.

* The harbour-master performs a check-up of the berths, to find a berth, at which the ship can fit and which is free. If the harbour-master finds a positive answer, the harbour-master allocates the ship to that particular berth and gives permission to the ship to sail to the berth.

* When the ship joins the berth, the terminal-master is alerted. He allocates cranes to the ship. When the unloading and loading has finished, the terminal-master registers the amount of cargo which has been unloaded and loaded; next he allows the ship to leave the harbour.

Figure 2.1: port-system



Each terminal has storage-facilities for each type of cargo at that terminal. For containers there are import-, export- and empties-stacks, for breakbulk there is covered storage (in sheds/warehouses) and open storage. Each type of cargo has a user defined dwell-time distribution, for the cargo which arrives at the terminal with inland transport and has to be exported as well as for the cargo which is unloaded from the ships and has to be imported. The dwell-time distribution can be defined for inland transport by road, by rail and by inland-waterway. Cargo can also loaded and unloaded directly to and from trucks, wagons and barges or can be transhipped from one ship to another (for example: cargo brought and collected by feeder-ships)

Once a day the storagemaster of the port registers the size of the deliveries of cargo at all stacks on that day. The quantity of daily arrivals of export-cargo and departures of import-cargo of each cargotype depends on the dwell-time distribution of that cargo-type. This distribution is made dependant of the moment of arrival of the ship at the port for the export-cargo and of the moment at which the ship leaves the port for the import-cargo. This means that during a number of days before the ship arrives it is already artificially present and causes a flow of incoming cargo and that during a number of days after leaving the port it is still artificially present and causing a flow of outgoing cargo.

Consequentially, the movements of export-cargo in the system are as follows:

* Arrival at the terminal by inland transport; the moment of arrival depends on the dwelltime-distribution of the cargo-type and on the time of arrival of the ship it will be exported with; the quantity also depends on that specific ship.

* Direct loading onto the ship or a stay in the storage of the terminal; in the latter case it is loaded onto ship when the ship has moored at the terminal.

* Elimination from the port-system.

The route of the import-cargo is vice versa: the cargo enters the system when it is unloaded from a ship; it either continues directly by inland transport or is stored on the terminal. In the latter case the departure from the terminal by inland transport takes place at a later date, again depending on the dwell-time-distribution and on the moment of departure of the ship with which the cargo was imported.

The movements of ships and cargo in the port-system are illustrated in Figure 2.1.

Port-activities can be restricted by an extensive range of circumstances:

* Weekends: on saturdays and/or sundays inland transport may be absent; secondly unloading and loading may not take place in weekends.

* Shifts: during times when no shifts are active on the terminal, loading and unloading cargo is stopped.

* Tide: ships that wish to enter or leave the port through the entrance channel of the harbour may be restricted in doing so due a tidal window.

* Bad weather conditions: typhoons can occur, causing windspeeds which may be to high for terminal-activities, inland-transport and sailing of ships and causing waveheights which may be to high for ship-manoeuvring.

* Strikes: all terminal-activities are cancelled when a strike is called.

* Breakdowns of cranes: loading and unloading is restricted when one of the active cranes suffers a breakdown.

2.2 Summary of the input

The input information for HASPORT-II is divided into three groups (corresponding with four input-files for the program, as is explained later): the harbour-environment, the shipclasses, the DWT-tables and the terminals with their cargo-types.

The set of input-data for creating a harbour-environment is as follows:

* Characteristics of a typhoon (bad weather conditions): the bad weather-season, the interval-time of bad weather and the length of a bad weather-spell
* Characteristics of a strike: the interval-time of strikes and the length of strikes
* Characteristics of the tidal window: two tidal factors can be simulated (daily low tide and high tide, monthly high tide and dead tide)
* Miscellaneous information: switches for restrictions, simulation-time

The ship-classes are created on the basis of the following input information:

* Characteristics of the interarrival-time in casu the type of distribution, from which the interarrival-time is extracted (Poisson/normal)
* Characteristics of the consignment-size of the import-cargo and the export-cargo of the ship
* Ships' characteristics: DWT, length, draught, capacity of ships' gear etc.
* Characteristics of the ships' cargo
* Miscellaneous: possible destinations within the port for the ships

The set of input-data to create the terminals is as follows:

* General characteristics of a terminal: number of cargo-types, number of berths, number of shifts, availability of cargo-handling-equipment, availability of inland-transport on weekend-days, storage-capacities, operating conditions
* Characteristics of shifts: starting time, duration, availability on weekend-days
* Characteristics of berths: size, compatibility for cargo-types, number of cranes, for multiple berths: capacity of ships
* Characteristics of cranes: capacity, breakdown-characteristics and maintenance-requirements
* Characteristics of cargotypes: type, storage characteristics, requirements for inland transport, dwell-time distributions of indirectly transferred cargo, percentages of directly transferred cargo, both depending on the mode of inland transport

2.3 Summary of the output

HASPORT-II is an aid to the process of port planning and functional design. Therefore the model produces the following output:

* Annual throughput per terminal (in tons or TEU)
* Utilisation of terminal storage for each cargo-type (in m^2 for open or covered storage of breakbulk, in m^3 for liquid and dry bulk storage or in groundslots for container storage)
* Occupancy-rate of the total storage-facility of a terminal (as a percentage of the available storage-capacity)
* Number of trucks, wagons and barges leaving/entering the terminal per year
* Daily quantities of arrivals and departures of cargo at a terminal (in tons/TEU)
* Berth-occupancy (as a percentage of availability)
* Distribution of the time that berths are occupied (in hours per years for single berths, in quay-meter-days per year for multiple-ship berths)

* Utilisation of ship-quay/quay-ship cargohandling equipment (hours per year)
* Indication of the utilisation of other cargo-handling equipment on the terminal (hours per year)
* Ships' waiting time, ships' service time and ships' total time at berth per class of ships (hours)
* Occupied number of waiting spots at the anchorage for entering the port
* Delays to ships and to cargo-handling activities due to equipment breakdowns, climatic downtime, strikes, tide (in hours or quay-meter-days per year for berths, in hours for ships)

3 Using Prosim

3.1 Introduction

Prosim is a simulation-language which has been developed at Delft University of Technology. It originates from computer-language PL1 and can perform both discrete and continuous simulations. Prosim is based on the principle of process simulation: for each component in a system its process in the system is described in a chronological sequence. This sequence is then simulated simultaneously for all components that are present in the system.
The version of Prosim for use on personal computers is Personal Prosim, which has been developed by Sierenberg & de Gans b.v., Waddinxveen. The simulation-model for this model has been developed with the use of version 2.05 of Personal Prosim.

Paragraph 3.2 will discuss the hardware and installation-procedure of Prosim and paragraph 3.3 will describe the use of Prosim menu-structure. However, first this chapter will give details of the procedure to which a simulation-run of HASPORT-II in Prosim is subjected to.

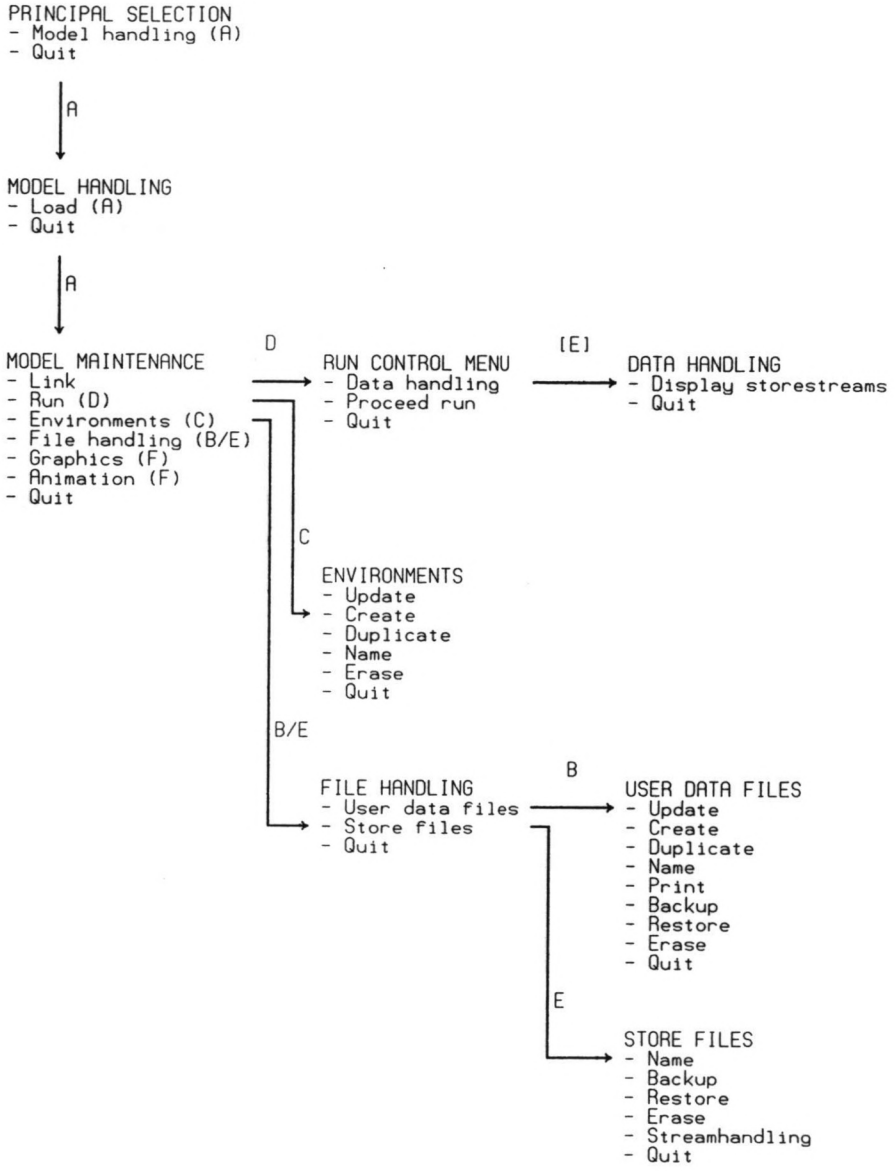
The requirement for performing a simulation-run with HASPORT-II in Prosim is that the model is fed with correct input data. In Prosim input data are assembled in so called User Data Files. These User Data Files are created by the user: HASPORT-II requires four, one with data for the harbour-environment, two with data about the ship-classes and one with information of the terminals and their cargo-commodities. The procedure of setting up User Data Files for the input of a port-system is described in the next chapter.

When the user wishes to perform a simulation-run, he/she must first create a so called environment in which the run can take place. This environment consists of the input-files of the port that the user wishes to simulate and the output-files to which the user wishes the results of a simulation to be written. The names of these files must be entered by the user.

When an environment has been created, the simulation-run can be started. HASPORT-II first reads all the input information and checks this information for errors. After correcting the possible errors in User Data Files, the user can restart the simulation-run and wait for results. The procedure of creating an environment, checking the error-specification and running the program is discussed in Chapter 5.

After HASPORT-II has finished the simulation-run, the user can investigate the results of the run. The results are divided over four modes, of which two are of importance to the non-Prosim-acquainted user. These two are a written report-file, which is shaped as a User Data File, and a set of storestreams of data, with which graphs and histograms can be produced. The handling of the output information is dealt with in chapter 6. This chapter also briefly

Figure 3.1: routes through prosim menus



mentions the possibilities of the other two output-modes: graphics and animation. These options can be viewed by the user for the example model which is described in Chapter 8 of this manual.

3.2 Installation

HASPORT-II can be performed on personal computers which have Prosim installed. Prosim is severely protected and cannot be copied from PC to another without the aid of Sierenberg & de Gans. It is also possible to demonstrate a simulation with HASPORT-II with the use of an executable-file. This manual is not aimed at working with an executable but the procedure is similar to working with Prosim.

Prosim can be started by typing at the DOS-prompt, depending on the DOS-path in the autoexec.bat file: C:\...\prosim <ENTER>. Prosim is then loaded and the Principal selection-menu is shown on the screen. The first action to be taken then is to load HASPORT-II. This is explained in the next paragraph, because it requires certain knowledge of menu-handling in Prosim.

3.3 Finding one's way in Prosim

Using Prosim involves finding one's way through a big set of menu's. Figure 3.1 shows the tree of menu's which are of importance to the non-Prosim-acquainted user. In each menu options can be chosen in three ways:

* Moving the enlightened beam in the menu with the keys ↑ and ↓ and pressing <ENTER> at the required option;
* Typing the first letter of the option
* Using the Function-key <F10> for quitting a menu

The routes through the menus which are of importance to the user (and their return-routes) are now explained.

Route A Loading HASPORT-II

* Menu: Principal selection
  Choose: Model handling
* Menu: Model handling
  Choose: Load

This last choice will show a list of models on the C:disc. Choose HASPORT-II by moving the enlightened beam to *HASPORT2 - HASKONING model for simulation of port operations*, press <ENTER> and press <F2>.

If HASPORT-II is not on the C:drive, you must restore HASPORT-II from a diskette. To do this return to

* Menu: Model handling
  Choose: Restore

Then choose the drive you want Prosim to restore HASPORT-II from and choose HASPORT-II from the list that is then shown on the screen in the same way as is indicated above.

After loading c.q. restoring HASPORT-II the following menu (Model maintenance menu) is shown. This is the menu from which the following options can be chosen:

* Producing/adapting/reading User Data Files (Route B)
* Creating an environment (Route C)
* Performing a simulation run (Route D)
* Producing storestream-graphs and histograms (Route E)
* Viewing the graphics and animation facility (Route F)

Quitting HASPORT-II and leaving Prosim is performed by choosing the following path:

* Menu: Model maintenance
  Choose: Quit
* Menu: Model handling
  Choose: Quit
* Menu: Principal selection
  Choose: Quit

<u>Route B</u> <u>User Data Files</u>

* Menu: Model maintenance
  Choose: File handling
* Menu: File handling
  Choose: User Data Files
* Menu: User Data Files
  Choose: Create (to create a new file) or Update (to adapt an existing file)

This last menu also offers the possibility to backup, erase, rename, restore, print or duplicate User Data Files. After choosing an option a list of all User Data Files appears; the user can make a choice by moving the enlightened beam and pressing <ENTER>. The procedure for creating or adapting User Data Files is described in the next chapter.

Leaving a User Data File can be performed with saving (by pressing <F9>) or without saving (by pressing <F10>). The list of User Data Files can be quitted by pressing <F10>; then choose the following route for going back to Model maintenance-Menu:

* Menu: User Data Files
Choose: Quit
* Menu: File handling
Choose: Quit

Route C Environments

* Menu: Model maintenance
Choose: Environments
* Menu: Environments
Choose: Create (to create a new environment) or Update (to adapt an existing environment)

This last menu also offers the possibility to rename, erase or duplicate environments. After choosing an option a list of environments appears; the user can make a choice by moving the enlightened beam and pressing <ENTER>. The procedure for creating or adapting an environment is described in chapter 6.

Leaving an environment can be performed with saving (by pressing <F9>) or without saving (by pressing <F10>). The list of environments can be quitted by pressing <F10>; then choose the following route for going back to Model maintenance-menu:

Menu: Environments
Choose: Quit

Route D Performing a simulation-run

When HASPORT-II has not been loaded from C:disc but restored from diskette, the program first has to be linked. This is performed by the following command:

* Menu: Model maintenance
  Choose: Link

To start a simulation-run, choose the following command:

* Menu: Model maintenance
  Choose: Run

Unless only one environment has been created the user is then asked to choose an environment in which the run will be performed. This choice can be made by moving the enlightened beam to the desired environment and pressing <ENTER>. Consequentially the following menu appears in which the run can be started with:

* Menu: Run control
  Choose: Proceed run

NB: before the run is proceeded, the options in the Run control-menu should be set as follows:

* Trace: off
* Clockrate: 0
* Window: Interrup 20
* Breakpoint: -
* Integration: General

Options can be changed by selecting the option, performing the adaptions and returning to the Run control-menu
The return-route from the Run control-menu starts with:

* Menu: Run control
  Choose: Quit

If a simulation-run has been performed the user is then asked whether he/she wishes to keep or discard the Store File of the run (which contains the storestream-information) and the Figure File (which contains animation-information). If keeping is not desired, choosing <Discard> will show the Model maintenance-menu. If these files are required, <Keep> has to be chosen; the user is then asked to specify a name for the files. By pressing <F2> the Model maintenance-menu is shown on the screen.

Route E Storestreams

* Menu: Model maintenance
  Choose: File handling
* Menu: File handling
  Choose: Store files
* Menu: Store files
  Choose Stream-handling

This last menu also offers the possibility to backup, erase, rename, restore or duplicate Store-files. After choosing an option a list of all Store-files appears; the user can make a choice by moving the enlightened beam and pressing <ENTER>. Prosim then displays a list of all streams in that Store-file. In the same way, a stream can be selected with the beam and with <ENTER>. The procedure for reading store-streams and shaping and printing their graphs and histograms is described in the chapter 6.

The list of store-streams can be quitted by pressing <F10>; the list of Store-files idem dito. Then choose the following route for going back to Model maintenance-Menu:

* Menu: Store files
  Choose: Quit
* Menu: File handling
  Choose: Quit

Store-streams of a simulation-run can also be viewed directly after that simulation-run has been performed. The route to followed is as follows:

* Menu: Run control
  Choose: Data handling
* Menu: Data handling
  Choose: Display storestreams

As stated above, the procedure for reading store-streams and shaping and printing their graphs and histograms is described in the chapter 6. The list of store-streams can be quitted by pressing <F10>; then choose the following route for going back to Run control-menu:

* Menu: Data handling
  Choose: Quit

Route F Graphics/Animation

These facilities can be applied for the example model of chapter 8; an animation of this model is not available yet. They can also be used for other simulated ports, if the correct Graphics-files and Figure-files have been created. This must be performed by advanced Prosim-users.

To perform a graphics-demonstration, follow this path:

* Menu: Model maintenance
  Choose: Graphics

The user is then asked to insert the name of the Picture file he/she wants to view; by pressing <F8>, a list is shown with the Picture files, from which the user can chose. Select a file, press <ENTER> and press <F10>. A graph is now shown. If required, an advanced Prosim-user can use this kind of graph to perform a dynamic graph-animation. To return to the Model maintenance-menu: press <F10> twice.

To perform an animation-demonstration, follow this path:

* Menu: Model maintenance
  Choose: Animation

In the same way as choosing a Picture file for the Graphics-facility, choose a Figure file and a Compilation for the Animation-facility. Besides this, the user is also asked to specify some extra animation-characteristics. Choose the following values:

* Start time: 0
* Stop time: 100
* Duration 1 time-unit: 0.5
* Smoothing factor: 10

Press <F2> for go and the simple animation for the demo-model is shown. The animation is interrupted by pressing <F10> and another two times <F10> takes you back to the Model maintenance-menu.

4 Input into the model

4.1 Introduction

HASPORT-II has one important option for the user to feed input-information into the model; this concerns the use of so called User Data Files. In these files all external information which is needed for the model is stored: one containing information about the harbour-environment, two concerning the data of the ship-classes which attend the port and one containing information about the terminal- and cargotype-characteristics. These files can be created or edited before running the program.

A possible alternative for using User Data Files is to adapt values of parameters during a simulation-run. This can be performed with the option <State Analysis> in the Runtime-menu. This option will not be discussed here because it is only of significance to the advanced user. The main options will now be explained, followed by a list of all the input-information that is required.

4.2 User Data Files

As stated above, HASPORT-II requires four input User Data Files; from now on they will be called:

* H-file (for the harbour-environment)
* S-file (for the ship-classes)
* D-file (for the DWT-tables)
* T-file (for the terminals)

The exact meaning of these files will be explained further on this chapter. The files consist of extensive lists of data; it is advised that the data in these lists receive comment-lines, to facilitate editing the files. All characters between @-signs on one line is considered by Prosim as comment.

When a user wishes to build a new set of input-files for a new port-system he/she wishes to simulate, the user can create new files for the input-information or can use existing files and edit them. The latter option is advised because it saves much time in typing the comment-lines. Special dummy-files have been created (called D-dummy, H-dummy, S-dummy and T-dummy), which can be used to act as a basis for the creating input-files. All comments are already in the dummy file; the input-data have entered at the #-signs. Prints of the dummy-files have added to this manual.

The procedure for using the dummy-files is as follows: go to the User Data File-menu, choose option <Duplicate>, duplicate the three dummy-files and name them in accordance to the port which will be simulated. A name consists of up to 10 characters (alfanumerical or '_', a low dash) and must start with a letter. It is advised to use the letters D, H, S and T as first letter for respectively the DWT-tables-, harbour-, shipclasses- and terminals-files.

The input-files can then be edited. (For changing existing files the procedure, which is described further on in this paragraph, can also be applied. First choose <Update> in the User Data File-menu; then choose the suitable file.)

The required number of data in the H-file is identical for all port-system but the D-files, S-files and T-files have varying lengths, according to the number of ship-classes and the number of terminals/berths/cranes/shifts/cargotypes. This requires the user to be able to copy, repeat, move, delete and insert lines and blocks of lines. This can be performed by typing codes at the line number-indications and by using <F4> to close blocks and by using <F2> to delete commands. The codes are as follows:

Copy: copies a line/block at a user defined place in the file

- c.... Copy one line
- cc... Copy a block of lines, starting with this line (and close the block with <F4> on the last line of the block)
- a.... Copy the line, chosen with c...., or the block, chosen with cc..., after this line
- b.... Copy the line, chosen with c...., or the block, chosen with cc..., before this line

Repeat: repeats a line/block directly after the line/block

- rN... Repeat this line N times (default value N=1)
- rrN.. Repeat a block of lines, start with this line (and close the block with <F4> on the last line of the block and enter N for the number of repetitions; default value N=1)

Move: moves a line/block at a user defined place in the file

- m.... Move one line
- mm... Move a block of lines, starting with this line (and close the block with <F4> on the last line of the block)
- a.... Move the line, chosen with m...., or the block, chosen with mm..., after this line
- b.... Move the line, chosen with m...., or the block, chosen with mm..., before

this line

Delete: deletes a line/block

d.... Delete one line

dd... Delete a block of lines, starting with this line (and close the block with <F4> on the last line of the block)

Insert: insert an empty line

iN... Insert N empty lines directly after this line (default value N=1)

As stated above, the H-file does not require any copying of lines or blocks; H-dummy can be adapted without changing lines or blocks.

For the S-file and the D-file, the procedures are quite simple. For the S-file, the procedure is as follows. For every terminal the percentage of a ship-class going to that terminal and the reference number of the cargotype at that terminal (last two lines of S-dummy, between the lines of stars) have to be repeated (N-1) times, with N = the number of terminals. For every ship-class that attends the port, the thus created block of data in S-dummy (between the lines of dashes) is then copied once.

The D-file contains eight tables, in which, for each of the four types of ships (containership, general cargo ships, tankers and bulkcarriers), the user can define the relationship between the dead weight tonnage (DWT) of a ship and either its draught or length. The length of a table (e.g. the number of lines, containing DWT-values against draught or length, which have to be copied) depends on the quantity of information which is available to the user and on the level of detail which the user wishes to apply in the tables.

Creating the T-file is a little more complicated. This file contains data which are valid for all terminals and data which are different for each terminal. The dummy-file consists of the required lines for one terminal, with four cargotypes (one for each commodity - containers, breakbulk, dry bulk and liquid bulk), one berth, one crane and one shift. The form of data of the cargo-type differs for each commodity because each commodity has different storage-characteristics.

First, the complete block for one terminal (between the lines of %-signs) must be repeated for (N-1) times, with N = number of terminals). Then, for each terminal the blocks for the cargotypes (between the lines of dashes) have to be repeated or deleted, depending on the number and commodities of the cargo-types at the terminal. Finally, for each terminal, the lines of the berths and cranes and the blocks of the shifts (two lines, between the lines of stars) have to be repeated, depending on their number.

Each input file ends with the value ~1 to close the list of data. Also each block of cargotype data in the T-file ends with a closing value ~1.

Added to this manual are the files D-dummy, H-dummy, S-dummy and T-dummy and the files D-demo, H-demo, S-demo and T-demo of the example of chapter 8. Please refer to these files as examples of the procedures explained in this paragraph.

4.3 Required input information

H-FILE

CHARACTERISTICS OF A TYPHOON (BAD WEATHER CONDITION)

* Number of the first day of the bad weather-season
* Number of the last day of the bad weather-season
  NB: January 1st = 1; December 31st = 365
* Mean interval-time of typhoons during the season (days)
  NB: The interval-time of typhoons is drawn from an exponential distribution
* Mean duration of a bad weather period (days)
* Standard deviation of duration of a bad weather period (days)
  NB: The duration of a bad weather-spell is drawn from a normal distribution

CHARACTERISTICS OF A STRIKE

* Mean interval-time of strikes (days)
  NB: The interval-time of strikes is drawn from an exponential distribution
* Mean duration of a strike (days)
* Standard deviation of duration of a strike (days)
  NB: The duration of a strike is drawn from a normal distribution

CHARACTERISTICS OF THE TIDE

* Mean water-depth in the entrance channel (m)
* Amplitude of the first tidal-factor (m)
* Period of the first tidal-factor (days)
* Phase angle of the first tidal factor (rad)
* Amplitude of the second tidal-factor (m)
* Period of the second tidal-factor (days)
* Phase angle of the second tidal factor (rad)
  NB: If the user does not want to consider the tidal window, the depth of the entrance-channel should chosen big enough for ships of all shipclasses to enter and the amplitudes of the tidal factor should be set at zero.

MISCELLANEOUS

* Strike-switch (on/off)
* Bad weather-switch (on/off)
* Simulation-time (days)

  NB: The minimum number of ships attending one terminal is 1000, to ensure that the results of the simulation have sufficient accuracy. The simulation time should be chosen on the basis of the minimum number of ships.

S-FILE

* Number of shipclasses

FOR EACH CLASS OF SHIPS:

* CHARACTERISTICS OF THE INTERARRIVAL-TIME
  - Type of the distribution of the interarrival-time (Poisson/normal)
  - Mean interarrival-time (days)
  - Standard deviation of the interarrival-time (days)

  NB: An exponential Poisson-distribution is the regularly chosen distribution for interarrival-times of ships (In this case the value of the standard deviation is not relevant). However, shipping lines can agree with terminal authorities on fixed arrivaltimes of ships. If required, this can be simulated by choosing a normal distribution.

* CHARACTERISTICS OF THE CONSIGNMENT-SIZE
  - Mean total quantity of export-cargo
  - Standard deviation of total quantity of export-cargo
  - Lower boundary of total quantity of export-cargo
  - Upper boundary of total quantity of export-cargo
  - Mean total quantity of import-cargo
  - Standard deviation of total quantity of import-cargo
  - Lower boundary of total quantity of import-cargo
  - Upper boundary of total quantity of import-cargo

  NB: The values for these characteristics are expressed in TEU's for containers and in tons for breakbulk, liquid and dry bulk. A correct way of defining these values is regarding them as percentages of the DWT-values of the ships.

  NB: The import and export quantities are drawn from normal distributions, truncated by the user defined lower and upper boundaries.

* SHIPS' CHARACTERISTICS
  - Lower boundary of DWT
  - Upper boundary of DWT
  - Reference to the corresponding DWT-table in D-file

    NB: The ships' DWT is drawn from a uniform distribution. Depending on the DWT, the length and draught of a ship are drawn from the DWT-tables of the ships' type (containership, general cargo ship, tanker, bulk carrier). HASPORT-II multiplies the values of the length and draught with a safety/operational-margin: 1.10 for the length and 1.15 for the draught

  - Mean mooring time: time required for sailing from the anchorage to a berth (hours)
  - Standard deviation of mooring time (hours)
  - Lower boundary of mooring time (hours)

    NB: The mooring time is drawn from an *unknown* distribution. This is a Prosim-facility for creating a distribution which is the sum of several normal distribution. The unknown distribution is used in cases where creating the exact distribution would involve extensive investigations and where the results only concern first order effects.

  - Required number of cranes to load/unload the ship: this may correspond with the number of hatches
  - Net loading capacity of ships' gear (box/hour for container-ships; tons/hours for other ship-types)
  - Net unloading capacity of ships' gear (box/hour for container-ships; tons/hours for other ship-types)

* CHARACTERISTICS OF THE SHIPS' CARGO
  - Code of the cargo (A for containers, B for breakbulk, C for liquid bulk and D for dry bulk)
  - Reference-number of the cargo-type, depending on at which terminal it is transhipped. In order for the user to keep a clear view of the cargotype-reference-number, it is advised to use the three digit number XYZ, in which X depends on the commodity (1 for containers, 2 for breakbulk, 3 for liquid bulk and 4 for dry bulk), in which Y depends on the cargotype and and in which Z depends on the terminal of destination. See chapter 8 for an example.
  - Percentage of cargo that is transhipped (imported/exported by other ships, not by inland transport)
  - Mean percentage of ships' cargo that is stored under cover
  - Standard deviation of percentage of ships' cargo that is stored under cover

    NB: The percentage of the ships' cargo that is stored under cover is only of

importance to breakbulk-ships. For the other commodities the value of zero should be entered

NB: The percentage of the ships' cargo that is stored under cover is drawn from a normal distribution, truncated by a value of the mean percentage +/- twice the standard deviation

* MISCELLANEOUS
  - Name of the class
  - Percentage of the class destined for each terminal

D-FILE

This file consists of eight tables: one pair for each of the four types of ships. Of a pair of tables, one contains the relationship between the DWT-values of a ship and its draught and the other contains the relationship between the DWT-values of a ship and its length. The four types of ships are: containerships, general cargo ships, tankers, bulkcarriers. The DWT/draught-table consists of a user-defined number of DWT-values and for each DWT value a draught-value. The DWT/length-table consists of a user-defined number of DWT-values and for each DWT value a length-value.

The number of values which are entered into a table by the user depends on the available information which is at the users disposal and on the level of accuracy which the user desires. A favourable option for the user is to use the file D-demo. The tables in this file correspond with the standard ship-size data, as represented in Figures 4.1 to 4.4.

T-FILE

GENERAL INFORMATION

* Number of terminals
* Default value for the length of the arrival-pattern of cargo with inland transport (number of days)
* Default value for the length of the departure-pattern of cargo with inland transport (number of days)

  NB: The default value for the length of the patterns should be equal to the length of the dwelltime of the cargotype with the longest dwelltime.

Figure 4.1
Containerships

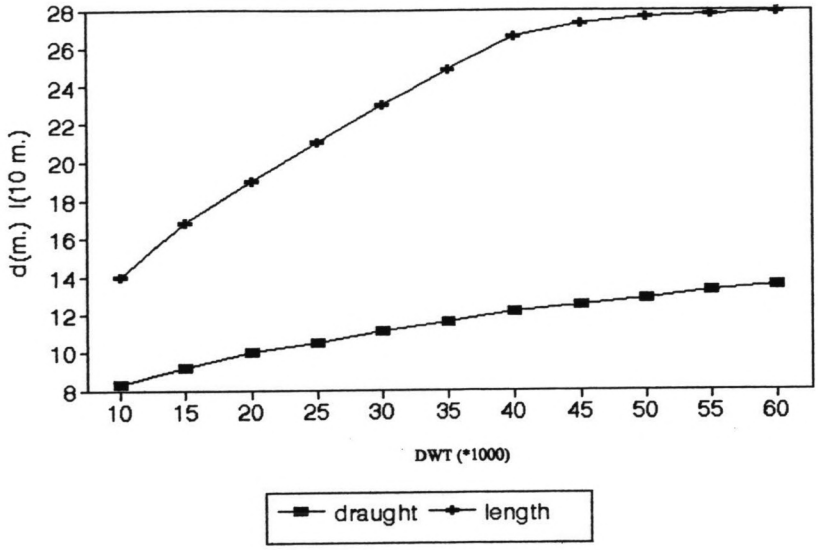


Figure 4.2
General cargo ships

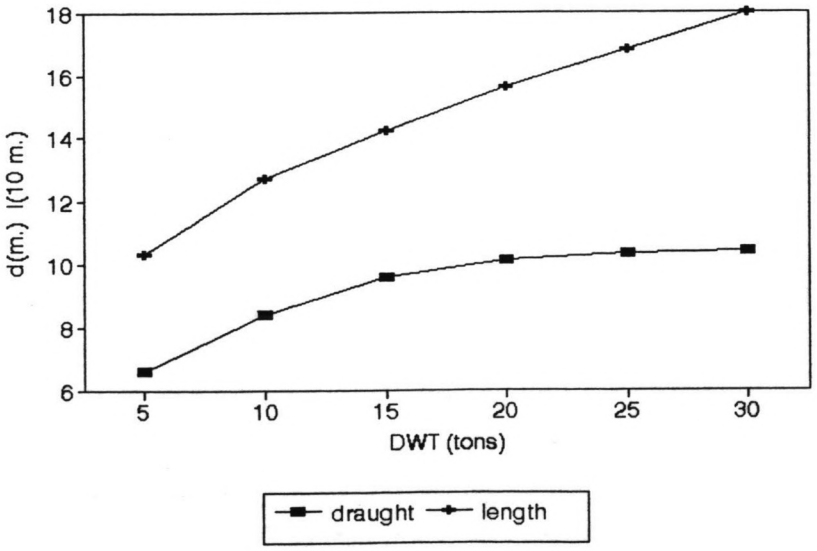


Figure 4.3
Tankers

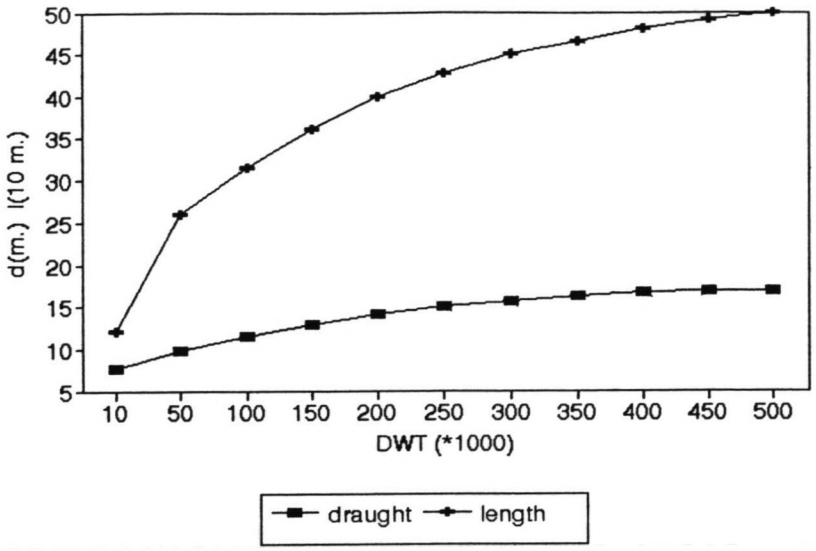
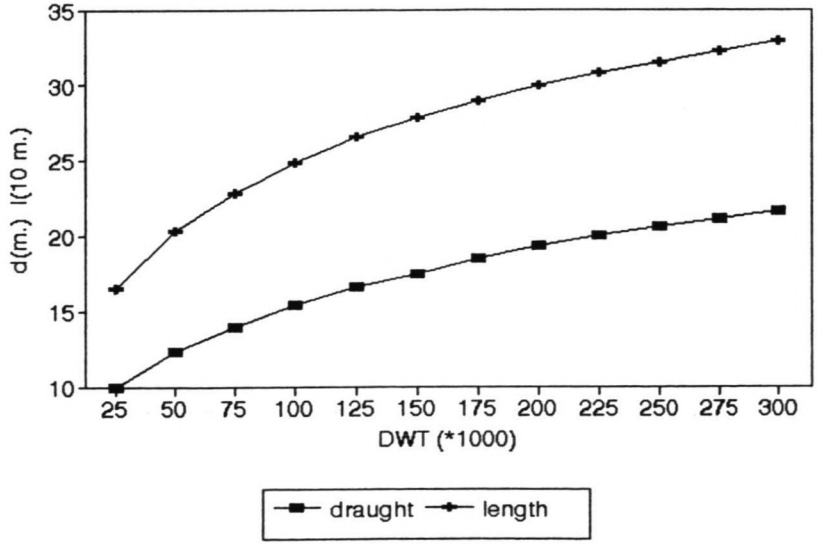


Figure 4.4
Bulk carriers



* Interval-time of maintenance to a crane (hours)
* Mean duration of interval to a crane (hours)
* Mean interval-time of breakdowns of a crane (days)
* Mean duration of a breakdown of a crane (hours)
* Standard deviation of duration of a breakdown of a crane (hours)

  NB: The interval-time of breakdowns of a crane is drawn from an exponential distribution

  NB: The duration of breakdowns of a crane is drawn from a normal distribution

FOR EACH TERMINAL:

* GENERAL CHARACTERISTICS OF A TERMINAL
  - Number of cargo-types
  - Number of berths
  - Number of cranes (or crane-substituting units, for example manual labour or tractors handling Roro-containers from Roro-ships)
  - Daily number of shifts
  - Availability of inland-transport on saturdays
  - Availability of inland-transport on sundays
  - Availability of shifts on saturdays
  - Availability of shifts on sundays
  - Number of equipment-units at the terminal, other than cranes
  - Mean percentage of throughput of cargo that is handled by these equipment-units; this percentage is required to indicate if a certain part of the cargo at a terminal is not handled by terminal-equipment but only by cranes or crane-substituting units.
  - Mean cargo-handling capacity of one equipment unit (tons/hour): also equipment handling containers; in this case the capacity should be calculated using the mean weight of a containers (10 - 15 tons)
  - Total capacity for storage of containers and breakbulk (m^2)
  - Total capacity for storage of liquid and dry bulk (m^3)
  - Net operation factor; this factor indicates the loss of gross capacity during shifts

* FOR EACH SHIFT:
  - Starting time (hours)
  - Gross duration (hours)

    NB: the first shift is the one with the earliest starting time; the maximum of the sum of the durations is 24.

* FOR EACH BERTH:
  - Serial number
  - Type (single/multiple)
  - Capacity (number of ships, one for a single berth; two or more for a multiple berth)
  - Length (m)
  - Water-depth (m)
  - Number of cranes or crane-substituting units
  - Number of cargo-types handled at that berth (maximum: three)
  - For each cargo-type: serial-number

* FOR EACH CRANE OR CRANE-SUBSTITUTING UNIT:
  - Name
  - Serial number
  - Reference number to the berth to which the crane or crane-substituting unit belongs
  - Gross capacity for loading (for containers boxes per hour; for other cargo-types tons/hour)
  - Gross capacity for unloading (for containers boxes per hour; for other cargo-types tons/hour)
  - Minimum and maximum of the crane range on the quay (m): the crane range indicates for a multiple berth the physical range on the quay; if a crane can cover the entire quay the values *zero* and *berth-length* should be entered; for cranes at a single berth default values should be entered (they are not of importance)

* FOR EACH CARGO-TYPE:

  - GENERAL CHARACTERISTICS
    + Name
    + Reference number (which corresponds with the cargo-type-numbers of the ship-classes and the numbers of the cargo-types that are handled each berth)
    + Code of the cargo type (A for containers, B for breakbulk, C for liquid bulk, D for dry bulk; the code corresponds which the code of the shipclass' cargo)

  - STORAGE CHARACTERISTICS
    + Gross factor (factor for travelling lanes etc.)
    + Only for breakbulk, liquid and dry bulk: mean density (ton/m^3)
    + Only for breakbulk: mean stackheight (m)
    + Only for containers: mean stackheight of the export-stack, the import-stack and the empties-stack (expressed in the number of containers)
    + Only for containers: the mean percentage of empties in the export-containers and in the import-containers

+ Only for containers: the mean percentage of forty feet-containers in the export-containers and in the import-containers

- CHARACTERISTICS OF INLAND TRANSPORT MODES
  + Mean capacity of trucks (TEU/truck for containers, ton/truck for the other commodities)
  + Mean capacity of wagons (TEU/wagon for containers, ton/wagon for the other commodities)
  + Mean capacity of barges (TEU/barge for containers, ton/barge for the other commodities)

- CHARACTERISTICS OF ARRIVAL-PATTERN WITH INLAND TRANSPORT
  + For each day in the pattern: the sum of the percentages of cargo arriving on that day with the three modes of transport
  + For each of the three modes: the percentage of arrivals that are loaded directly

  NB: The sum of all these percentages is 100

- CHARACTERISTICS OF DEPARTURE-PATTERN WITH INLAND TRANSPORT
  + For each day in the pattern: the sum of the percentages of cargo departing on that day with the three modes of transport
  + For each of the three modes: the percentage of departures that are unloaded directly

  NB: The sum of all these percentages is 100

5 Performing a simulation

5.1 Introduction

When the user has created or adapted the input-files H-file, S-file, D-file and T-file, a simulation-run can be performed. Summarized, the procedure is as follows:

* The user creates an environment for the simulation-run: this is explained in the next paragraph.
* Next, the user starts the simulation-run, according to the procedure which is stated in chapter 3.
* When HASPORT-II has read all input-data, it interrupts the run; HASPORT-II then indicates the number of errors in the input-files and invites the user to correct these possible errors and to check if all reference-numbers of cargotypes and cranes have been entered correctly. HASPORT-II has created a User Data File which shows a specification of the errors and a summary of the used reference-number. From now on this file is called C-file.
* The user goes to the <Update>-list of User Data Files, checks the C-file, corrects possible errors in the H-file, S-file, D-file and T-file. The error-specification is dealt with in paragraph 5.3.
* Next, the user starts the simulation-run again. Once again the run is interrupted after reading the data and the user may again go to the User Data Files. When the user decides that the input is correct, he/she can continue the simulation-run from the interruption-point, by choosing the option <Proceed> in the Runtime-menu. Specifications of running the program are discussed in paragraph 5.4
* When HASPORT-II finishes the simulation-run, the user can view the results. The facilities for doing so are explained in the next chapter.

5.2 Creating an environment

The environment of a simulation-run consists of the files from which the input-information of the run is extracted and of the files to which the output-information of the run is transferred. (In case graphics or animation are performed for the port-system, the environment also consists of the files that support these facilities. They are called Picture file and Storestream for the graphics-facility and Compilation file for the animation-facility.)

The user must enter names for each of these files. For each input-file (H-file, S-file, D-file, T-file), Picture file, Storestream and Compilation-file Prosim shows the list of files to choose from by pressing <F8>. For the output-files C-file (containing the error-specification and

reference-checklist) and R-file (containing the simulation-report) the user can also choose a name using <F8> but then the chosen report will be overwritten; therefor it is advised to enter new names for the C-file and R-file.

The third output-file of the simulation-run, the Store-file containing the Storestreams does not specifically belong to the environment which has to be specified before a run. The Store-file is given a name after the simulation-run

5.3 Error-handling

When the user has started a run, HASPORT-II reads the input-data and then interrupts the run, giving the user the possibility to ensure that the input-data is faultless. HASPORT-II shows the number of errors in the input-data on the screen. If errors have been made, the user should look into the C-file for the specifications of the errors and update the input-files accordingly. If the number of errors is zero the user can continue the run by choosing the option <Proceed> in the Runtime-menu; however if it is the first time the run has been started, it is advised that the user checks the reference-numbers of the cargotypes and cranes which he/she applied in the input. Errors in the reference-numbers may be a source for an incorrect simulation; nevertheless they are not found by HASPORT-II. The C-file therefore also shows a checklist of reference-numbers.

HASPORT-II distinguishes the following sorts of mistakes:

* Illegal values for a mean interarrival-time (these values should not be 0)
* Values which are too big or too small (for example: boundaries compared to mean values)
* Illegal values for switches (these values should be 0 or 1)
* Sets of percentages which should add up too 100 but do not do so
* Incorrect number of values for the storage-characteristics of a cargo-type
* Input-files which contain too much data

The errors of the above categories are specified in the C-file. Besides this, Prosim automatically stops reading data when the types of variables (characters, reals, integers) are mixed up or when a file does not contain enough data, both indicating the user that errors in the input-files have been made. Naturally these errors are not directly specified in the C-file.

As stated above, the C-file also shows a checklist of reference-numbers. The checklist for reference-numbers of cargotypes consists of:

* (1) A matrix of cargo-reference-numbers, showing the reference-number of cargo of a shipclass at each terminal the ships of that shipclass can attend (this matrix is created on the basis of the information from the S-file)
* (2) For each terminal: the reference-numbers of the cargotypes which are handled at that terminal, according to the T-file
* (3) For each berth: the reference-numbers of the cargo-types which are handled at that berth, according to the T-file

The user can compare checks (1) and (2) and checks (2) and (3) to find possible faults in the cargotype-references.

The checklist for crane-reference numbers consists of:

* (4) For each berth: the number of cranes at that berth, according to the berth-data in the T-file
* (5) For each berth: the names of the cranes at that berth, according to the crane-data in the T-file

The user can compare checks (4) and (5) to find possible faults in the crane-references.

Needless to say, it is advised to not fully perform a simulation-run until all errors have corrected and all references are in order.

5.4 Running the program

When all errors have been excluded from the input-files, the simulation-run can be performed. At the moment HASPORT-II interrupts the run to show the number of errors, the user can proceed the run by choosing <Proceed> in the Runtime-menu. Please note the conditions for the switches in the Runtime-menu (as stated in paragraph 3.3).

In the left-bottom corner of the Runtime-screen, the simulated period of time that has elapsed is shown (in the number of days); the user can use this as a standard to determine the time required until the end of the run.

During the run, the user can freeze the simulation, by pressing <F9> and any key to continue, and the user can interrupt the simulation, by pressing <Esc>. An interruption

causes the Runtime-menu to appear, offering the user several options. The main options for the non-Prosim-acquainted user is:

* Quitting the run.
* Data handling. This option offers the facility to view the graphs and histograms of the storestreams of a simulation-run during or directly after the run. During the run, it shows the streams up to the moment of interruption. The procedure of dealing with storestreams is discussed in paragraph 6.2.
* Proceeding the run.

At the end of the run, any key can be pressed to return to the Runtime-menu. The same options as in the case of interrupting a run are available, except for <Proceed>.

6 Output-facilities

6.1 Introduction

In chapter 2.3 the output-results, which can be achieved with a port simulation using HASPORT-II, are summarized. HASPORT-II offers two important modes to show this information to the user. The first is a written report which Prosim shapes as a User Data File (from now on called R-file). The second is a set of Storestreams based on which graphs, histograms and barcharts can be produced.

Storestreams are discussed in paragraph 6.2. The output-data which can be viewed with Storestreams consist of:

* Utilisation of terminal storage for each cargo-type
* Occupancy-rate of the total storage-facility of a terminal
* Daily quantities of arrival and departing cargo at a terminal
* Occupied number of waiting spots at the anchorage for entering the port
* Number of ships at a berth

The R-file is explained in paragraph 6.3. The output-data which are written to the R-file are:

* Annual throughput per terminal (in tons or TEU)
* Number of trucks, wagons and barges leaving/entering the terminal per year
* Berth-occupancy
* Distribution of the time that berths are occupied
* Utilisation of ship-quay/quay-ship cargohandling equipment
* Indication for the utilisation of other cargo-handling equipment on the terminal
* Ships' waiting time, ships' service time and ships' total time at berth per class of ships
* Delays to ships and to cargo-handling activities due to equipment breakdowns, climatic downtime, strikes, tide

As stated earlier, Prosim also offers facilities for Graphics and Animation. These conditions for these facilities (Pictures files, Figures files etc.) have to be especially created for each model, which is outside the reach of the non-Prosim-acquainted user. However, the example of chapter 8 does possess the possibility for a Graphics-demonstration and a simple Animation-viewing. These facilities are therefor briefly discussed in the fourth paragraph of this chapter.

6.2 Storestreams

Storesteams are arrays of figures, representing the time-dependant behaviour of variables. Prosim can automatically shape these data into graphs, barcharts and histograms. These facilities, especially the histograms, are of great importance for the user for viewing and analyzing the results of a simulation.

As stated above, storestreams are used in HASPORT-II to show the results concerning the utilisation of terminal-storage, the occupancy of the anchorage and the number of ships at berths. When the user has followed the route to the list of storestreams, as indicated in chapter 3, he/she chooses the stream which is required to be viewed; then the user is asked whether the stream should be shaped to a graph, a histogram, a forward-barchart or a backward-barchart. If the streamhandling-facility has been chosen, using the route via the File Handling-menu, then the user has some extra possibilities to create output with the streams, including an option <Info>, which gives a short list of information about the stream.

For graphs and barcharts the user can use the arrow-keys to zoom in on parts of the charts. For histograms it is possible to adapt the class-width and class-boundaries (using <F8> and <F9> to select the option and <F2> to enter the chosen value). For all three charts, prints can be made by pressing <F7>.

The following streams are advised to be viewed as barcharts or histograms:

ROW	Distribution of the number of ships at the anchorage.
Q_BERTHx	Distribution of the number of ships at berth x

The other streams are advised to be viewed as histograms or graphs. They are:

xEXSLyyy	Distribution of the number of occupied groundslots for export-containers on terminal x for (container-) cargotype yyy
xIMSLyyy	Distribution of the number of occupied groundslots for import-containers on terminal x for (container-) cargotype yyy
xEMSLyyy	Distribution of the number of occupied groundslots for empty containers on terminal x for (container-) cargotype yyy
xOPENyyy	Distribution of the occupied open storage area for (container/breakbulk-)

cargotype yyy on terminal x (m^2)

xCOVyyy — Distribution of the occupied covered storage area (sheds, warehouses, etc.) for (breakbulk-) cargotype yyy on terminal x (m^2)

xVOLyyy — Distribution of the occupied storage volume for (liquid or dry bulk) cargotype yyy on terminal x (m^3)

xARRyyy — Distribution of the daily quantity of arrivals of cargotype yyy on terminal x (tons or TEU)

xDEPyyy — Distribution of the daily quantity of departures of cargotype yyy on terminal x (tons or TEU)

xFEEDyyy — Distribution of the quantity of feeder-cargo (cargo which is transhipped from one ship to another without leaving the terminal) of cargotype yyy on terminal x (tons or TEU)

xAREA_OR — Distribution of the occupancy-rate of the total storage-area of terminal x

xSTO_OR — Distribution of the occupancy-rate of the total storage-volume of terminal x

Together with the histogram, the mean, standard deviation, 90%-boundary, 95%-boundary, minimum and maximum values are shown on the screen.

6.3 Report-file

The output-information which is supplied by the T-file can be split up in three basic categories: the performance of the terminals (including all terminal-parts like berths and cranes), the performance of the ships and the delays due to the restrictions on the operations.

The output-data for each terminal consist of:

* Average annual number of ships at the terminal
* Annual throughput of each cargotype
* Annual number of trucks, wagons and barges leaving and entering the terminal
* Annual occupancy-rate of each berth

* Performance of each berth; annual time c.q. quaylength-time not occupied, annual time c.q. quaylength-time occupied; the latter is specified in:
  - Full operation
  - Partial operation, due to the breakdown of a crane
  - Not in operation due to delays: no shifts at work, bad weather, strikes, shifting of ships
* Performance of each crane; specified in:
  - Annual time in operation
  - Annual time not in operation due to a breakdown
  - Annual time not in operation due to delays: no shifts at work, bad weather, strikes, shifting of ships
  - Annual time in maintenance (maintenance is considered to take place during times the quay is not occupied)
  - Annual time at rest
* Average annual number of shifting of ships
* Average annual number of shiftings of cranes
* Indication of the annual average annual time in operation of the terminal equipment

The output-data for each shipclass consist of:

* Average annual number of ships of that shipclass visiting the port
* Average ratio of the annual time spent at the anchorage divided by the time spent at the quay
* Average time spent at the anchorage
* Average mooring time (sailing from the anchorage to the quay)
* Average time spent at the quay; specified in:
  - Time in full operation
  - Time in partial operation (due to the breakdown of a crane)
  - Time not in operation due to a delay: no shifts at work, bad weather, strike, shifting of the ship

The performances of the berths and of the shipclasses are described in greater detail in the part of the R-file which specifies the consequences of the restrictions on the operations: strikes, bad weather, tidal window, breakdowns of cranes, no shifts at work (= gross - net operation time).

For each berth the causes of the delays to the operations at that berth are specified (breakdowns of cranes, strikes, bad weather, shifting of ships, gross - net operation time) and

the causes of the periods of time that the berth is not occupied are specified (tidal window, bad weather, no ships at the anchorage which can moor at the berth).

For each shipclass the causes of the waiting time at the anchorage are specified (all suitable berths are occupied, tide, bad weather) and the causes of delays while moored at the quay are specified (breakdowns of cranes, strikes, bad weather, shifting of ships, gross - net operation time).

A note of caution when reading these specified data is the following: delays can take place at the same time. When this is the case during the simulation, the delayed time is attributed to the restriction on the operations which started first.

6.4 Graphics and animation

With the Graphics-facility of Prosim, different kinds of pictures can be created. For HASPORT-II, the main objective of using this facility concerns the display on the monitor of information on the basis of the Storestreams. Prosim offers two possibilities to do this. The first is depicting graphs and histograms statically, the second is depicting a dynamic graph-animation.

The advantage of using the Graphics-facility for creating graphs instead of the facilities for Stream-handling and Data-handling is that the graphs and histograms can be constructed with user defined features. This means for example that the user can define the size of the graphs, the range of the axes, the number of streams in one graph and the number of graphs on the monitor and that the user can add text to the graphs. Therefore this is a useful facility for demonstrating HASPORT-II. The disadvantage is that the graphs have to be made especially while the Streamhandling and Data-handling facilities create the graphs automatically.

The possibility for depicting a dynamic graph-animation is another way of displaying streams and thereby demonstrating the simulation-model. During a run, the time-dependant behaviour of a stream can be shown. A dynamic graph is created in the same way as a static graph; it is also shaped with user defined characteristics.

The Animation-facility of Prosim can be used to visualize the activities which are simulated by a model. For HASPORT-II several aspects of the port operations are interesting to animate and, if required by the user, such an animation can be produced. For ships the movements through the port-system can be shown: the arrival at the port, the waiting-period at the anchorage, the mooring-operation, the period of unloading and loading at the quay and the operation of sailing out the port. For the cargo-types the cargo-flow in the port-system can

be animated: arrival and departure with inland transport, arrival and departure with ships, storage on the terminal. For the terminals, the operational phases of the cranes and other equipment (in operation, at rest, breakdown) can be depicted. For the port-system, the presence of restrictions (tide, strike, bad weather) can be visualized.

Naturally the behaviour of all these system-components cannot be animated at the same time, so when performing an animation a choice has to be made. However the Animation-facility offers a useful possibility to form a better understanding of the behaviour of different aspects of the model and secondly, to demonstrate the features of HASPORT-II.

7 Analysis of results

To ensure that a user of HASPORT-II makes proper use of the output-information of a simulation-run, this chapter will give some remarks which deal with several aspects of the analysis of produced results.

* All data on the performances of terminals, berths and cranes in the Report-file are on an annual basis.

* All data on the performance of ship-classes are average values for one ship of that class.

* The results for storage-occupation of the first 100 days of the simulation are left out of the output-data in order to give an undistorted view of storage-requirements.

* The results can be considered valid if a sufficient length of time and a sufficient number of arriving ships at each terminal have been simulated. A period of time which corresponds with 1000 arriving ships per terminal is suitable.

* HASPORT-II has been verified; results which are produced by the model are of the correct order of magnitude. When a port is simulated, it is of importance that first a calibration of the model is performed by the user, using input-information of the existing port- and terminal-configuration and comparing the output-data with current performances of terminals and ship-classes.

* The output-data in the Report-file for the detailed performances of the berths and the ship-classes contain specifications of the origins of the delays to the berths and shipclasses. As stated in the previous chapter, delays can take place at the same time. In those cases the delay is attributed to the restriction which started first. This implies that, if the user is interested in analyzing the possible causes of delays, several simulation-runs are required to point out those delays. During these runs the effect of the restrictions on the operations should first be analyzed separately, by simultaneously switching the several restrictions on and off, and should only then be considered jointly. This routine is required to ensure that the user does not misinterpret the produced results.

8 Example

The last chapter of this manual is contributed to an example of an imaginary port which is modelled and simulated with HASPORT-II. The input-files of this model are D-demo, H-demo, S-demo and T-demo; prints of these files are added to this manual.

The demo-port has four terminals, with the following general characteristics:

* Terminal 1; cargo-types are containers and general breakbulk; three berths, two single and one multiple with capacity for two ships; 6 cranes; 3 shifts

* Terminal 2; cargo-types are bananas and general breakbulk; one multiple berth with capacity for three ships; 3 cranes; 3 shifts

* Terminal 3; cargo-types are vegetable_oil; two single berths; 2 cranes; 3 shifts

* Terminal 4; cargo-types are wheat and general breakbulk; one multiple berth with capacity for two ships; 2 cranes; 3 shifts

Five shipclasses attend the port, with the following general characteristics:

* Shipclass 1; container-ship carrying containers; Poisson-interarrival-time; no ships' gear; no priority; destination is terminal 1

* Shipclass 2; general cargo-ship carrying breakbulk; Poisson-interarrival-time; ships' gear included; no priority; destinations are terminal 1, 2 and 4

* Shipclass 3; general cargo-ship carrying bananas; Poisson-interarrival-time; ships' gear included; has priority; destination is terminal 2

* Shipclass 4; liquid bulk carrier carrying vegetable oil; Poisson-interarrival-time; ships' gear included; no priority; destination is terminal 3

* Shipclass 5; dry bulk (grains) carrier carrying wheat; Poisson-interarrival-time; ships' gear included; no priority; destination is terminal 4

The port has a tidal window and the switches for strikes and bad weather conditions are on.

Added to this manual are the prints of the checklist-file and the report-file C-demo and R-demo. The store-file of the demo-model is STORE_DE. From this file, the histograms of the following streams have been added:

ROW	Waiting row at the anchorage
Q_BERTH4	Number of ships at (multiple) berth 4
1EXSL101	Number of occupied groundslots for export-containers on terminal 1
1IMSL101	Number of occupied groundslots for export-containers on terminal 1
2OPEN202	Occupied open storage area for general breakbulk on terminal 2 (m^2)
2COV202	Occupied covered storage area for general breakbulk on terminal 2 (m^2)
3ARR301	Daily arrivals of tons of vegetable oil with inland transport at terminal 3
3DEP301	Daily departures of tons of vegetable oil with inland transport from terminal 3
4VOL401	Occupied storage-volume (in m^3) for wheat on terminal 4
4_AREA_OR	Occupation-rate of the total storage-area on terminal 4

With the Graphics-facility the Picture-file Gr-demo1 can be selected. With this file four Storestreams are depicted: a histogram of the stream ROW and graphs of the streams 2OPEN202, 2COV202 and 4_AREA_OR.

The Picture-file Gr-demo2 contains the information for showing the dynamic behaviour of 4VOL401. The dynamic graph-animation can be performed by running the demo-model and choosing the option Window:<Graphics> in the Run Control Menu. After 100 days, the dynamic graph-animation starts.

The Figure-file F-demo and the Compilation-file A-demo contain the information for showing a simple animation of the demo-model. This animation is not yet available.

```
 1 @  INFORMATION-FILE OF HARBOUR  @
 2
 3 @  M, number of first day of typhoon-season (M<365)    @  #
 4 @  N, number of last day of typhoon-season (M<N<366)   @  #
 5 @  Mean inter-arrivaltime of typhoons (days)           @  #
 6 @  Mean duration of typhoons (days)                    @  #
 7 @  Deviation of duration of typhoons (days)            @  #
 8 @  Mean inter-arrivaltime of strikes (days)           @  #
 9 @  Mean duration of strikes (days)                     @  #
10 @  Deviation of duration of strikes (days)            @  #
11 @  Seed of typhoon-inter-arrivaltime  @  12346
12 @  Seed of typhoon-duration           @  45678
13 @  Seed of strike-inter-arrivaltime   @  56780
14 @  Seed of strike-duration            @  67890
15
16 @  Mean water-depth at entrance channel (m.)   @  #
17 @  Amplitude of S2-tide (m.)                   @  #
18 @  Period of S2-tide (days)                    @  #
19 @  Phase angle of S2-tide (rad.)               @  #
20 @  Amplitude of M2-tide (m.)                   @  #
21 @  Period of M2-tide (days)                    @  #
22 @  Phase angle of M2-tide (rad.)               @  #
23
24 @  Strike-restriction:     1=on 0=off  @  #
25 @  Typhoon-restriction:    1=on 0=off  @  #
26
27 @  Simulation time (days)  @  #
28 @  Close file  @  ~1
```

```
 1 @  INFORMATION-FILE OF DWT-TABLES FOR SHIPCLASSES  @
 2
 3 @  1:  CONTAINERSHIPS  @
 4    #
 5 @  DWT        d(m.)     @
 6    #          #
 7    #          #
 8    #          #
 9
10    #
11 @  DWT        l(m.)     @
12    #          #
13    #          #
14    #          #
15
16
17 @  2:  GENERAL CARGO SHIPS  @
18    #
19 @  DWT        d(m.)      @
20    #          #
21    #          #
22    #          #
23
24    #
25 @  DWT        l(m.)      @
26    #          #
27    #          #
28    #          #
29
30
31 @  3:  TANKERS           @
32    #
33 @  DWT        d(m.)      @
34    #          #
35    #          #
36    #          #
37
38    #
39 @  DWT        l(m.)      @
40    #          #
41    #          #
42    #          #
43
44
45 @  4:  BULKCARRIERS      @
46    #
47 @  DWT        d(m.)      @
48    #          #
49    #          #
50    #          #
51
52    #
53 @  DWT        l(m.)      @
54    #          #
```

```
 1 @  INFORMATION-FILE OF SHIPS  @
 2
 3 @  Number of classes  @  #
 4
 5 @  ---- For each class  ------------------------------  @
 6 @  Name  @  #
 7 @  Choose distribution of inter-arrivaltime:              @
 8 @  Poisson=0   Normal(for feeder-service)=1               @  #
 9 @  Mean interarrivaltime (days)                          @  #
10 @  Deviation of interarrivaltime (days;0 if distr=Pois)  @  #
11 @  Percentage of transshipment cargo                     @  #
12 @  Mean total quantity of import-cargo (TEU)             @  #
13 @  Deviation of total quantity of import-cargo (TEU)     @  #
14 @  Minimum value of total quant. of imp.-cargo (TEU)     @  #
15 @  Maximum value of total quant. of imp.-cargo (TEU)     @  #
16 @  Mean total quantity of export-cargo (TEU)             @  #
17 @  Deviation of total quantity of export-cargo (TEU)     @  #
18 @  Minimum value of total quant. of exp.-cargo (TEU)     @  #
19 @  Maximum value of total quant. of exp.-cargo (TEU)     @  #
20
21 @  Minimum value of DWT                                  @  #
22 @  Maximum value of DWT                                  @  #
23 @  Mean mooring time (hours)                             @  #
24 @  Deviation of mooring time (hours)                     @  #
25 @  Lower boundary of mooring time (hours)                @  #
26 @  Mean percentage of cargo to be stored under cover     @  #
27 @  Deviation of percentage of cargo under cover          @  #
28
29 @  Required number of cranes to unload\load the ship     @  #
30 @  Net loading cap. of ships' gear (box c.q. ton\hour)   @  #
31 @  Net unloading cap. of ships' gear (box c.q. ton\hour) @  #
32 @  Do ships of this class receive priority by the        @
33 @  harbour-master  (1=yes 0=no)                          @  #
34
35 @  Cargo-code: #                                         @  #
36 @  Number of terminals: #                                @
37 @  xxxxxxxxxx For each terminal xxxxxxxxxxxxxxxxxxxxxx  @
38 @  Percentage of ships going to terminal #               @  #
39 @  Reference number of the cargotype at this terminal    @  #
40 @  xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx  @
41
42 @  ------------------------------------------------  @
43 @  Close file  @  ~1
44
```

FILE T_DUMMY2 Date: 93/0
Time: 17:1

```
@  INFORMATION-FILE OF TERMINAL(S)  @

@  Number of terminals  @  #
@  Number of days of inland transport-arrivals (M1)    @  #
@  Number of days of inland transport-departures (M2)  @  #

@ %%%%%%%%%%%%%%% FOR EACH TERMINAL %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

@  TERMINAL #  @
@  Number of handled cargo-types at this terminal  @  #

@  -------------- FOR EACH CARGO-TYPE: CONTAINERS --------------------
@  Cargo-type nr. 1      @
@  Name (max. 10 char.)  @  CONTAINERS
@  Reference number      @  #
@  Cargotype-code        @  #
@  Percentage of arrivals on day N  (-M1 ≤ N ≤ -1)  @
@    N          Road\Rail\Barge  Total  @
@   -M1          #    #    #    @    #
@   -(M1-1)      #    #    #    @    #
@    .           .    .    .    @    .
@    .           .    .    .    @    .
@    .           .    .    .    @    .
@   -2           #    #    #    @    #
@   -1           #    #    #    @    #
@  Direct        #    #    #    @    #
@               ---  ---  ---        ---  @
@  Total  @     #    #    #    @  100  @
@  Percentage of departures on day N  (1 ≤ N ≤ M2) @
@    N          Road\Rail\Barge  Total  @
@  Direct        #    #    #    @    #
@   1            #    #    #    @    #
@   2            #    #    #    @    #
@   .            .    .    .    @    .
@   .            .    .    .    @    .
@   .            .    .    .    @    .
@   M2-1         #    #    #    @    #
@   M1           #    #    #    @    #
@               ---  ---  ---        ---  @
@  Total  @     #    #    #    @  100  @

@  Mean stackheight of import-containers                @  #
@  Mean stackheight of export-containers                @  #
@  Mean stackheight of empty containers                 @  #
@  Mean percentage of empty import-containers           @  #
@  Mean percentage of empty export-containers           @  #
@  Mean percentage of fortyfeet import-containers       @  #
@  Mean percentage of fortyfeet export-containers       @  #

@  Gross factor                                         @  #
@  Mean capacity of trucks (TEU\truck)                  @  #
@  Mean capacity of wagons (TEU\wagon)                  @  #
@  Mean capacity of barges (TEU\barge)                  @  #
@  Close input for this cargotype (~1)                  @  ~1
@  ------------------------------------------------------------

@  -------------- FOR EACH CARGO-TYPE: BREAKBULK ---------------------
@  Cargo-type nr. 2      @
@  Name (max. 10 char.)  @  #
```

```
 60 @  Reference number          @  #
 61 @  Cargotype-code            @  #
 62 @  Percentage of arrivals on day N  (-M1 ≤ N ≤ -1)  @
 63 @    N          Road\Rail\Barge  Total  @
 64 @    -M1          #    #    #     @    #
 65 @    -(M1-1)      #    #    #     @    #
 66 @     .           .    .    .     @    .
 67 @     .           .    .    .     @    .
 68 @     .           .    .    .     @    .
 69 @    -2           #    #    #     @    #
 70 @    -1           #    #    #     @    #
 71 @  Direct         #    #    #     @    #
 72 @                ---  ---  ---          ---  @
 73 @  Total  @       #    #    #     @  100  @
 74 @  Percentage of departures on day N  (1 ≤ N ≤ M2) @
 75 @    N          Road\Rail\Barge  Total  @
 76 @  Direct         #    #    #     @    #
 77 @    1            #    #    #     @    #
 78 @    2            #    #    #     @    #
 79 @    .            .    .    .     @    .
 80 @    .            .    .    .     @    .
 81 @    .            .    .    .     @    .
 82 @    M2-1         #    #    #     @    #
 83 @    M1           #    #    #     @    #
 84 @                ---  ---  ---          ---  @
 85 @  Total  @       #    #    #     @  100  @
 86
 87 @  Mean stackheight (m)                                  @  #
 88 @  Mean relative density (ton\m3)                       @  #
 89
 90 @  Gross factor                                          @  #
 91 @  Mean capacity of trucks (ton\truck)                   @  #
 92 @  Mean capacity of wagons (ton\wagon)                   @  #
 93 @  Mean capacity of barges (ton\barge)                   @  #
 94 @  Close input for this cargotype (~1)                   @  ~1
 95 @  ------------------------------------------------------------
 96
 97 @  -------------- FOR EACH CARGO-TYPE: LIQUID BULK  ----------------
 98 @  Cargo-type nr. 3          @
 99 @  Name (max. 10 char.)     @  #
100 @  Reference number          @  #
101 @  Cargotype-code            @  #
102 @  Percentage of arrivals on day N  (-M1 ≤ N ≤ -1)  @
103 @    N          Road\Rail\Barge  Total  @
104 @    -M1          #    #    #     @    #
105 @    -(M1-1)      #    #    #     @    #
106 @     .           .    .    .     @    .
107 @     .           .    .    .     @    .
108 @     .           .    .    .     @    .
109 @    -2           #    #    #     @    #
110 @    -1           #    #    #     @    #
111 @  Direct         #    #    #     @    #
112 @                ---  ---  ---          ---  @
113 @  Total  @       #    #    #     @  100  @
114 @  Percentage of departures on day N  (1 ≤ N ≤ M2) @
115 @    N          Road\Rail\Barge  Total  @
116 @  Direct         #    #    #     @    #
117 @    1            #    #    #     @    #
118 @    2            #    #    #     @    #
119 @    .            .    .    .     @    .
120 @    .            .    .    .     @    .
121 @    .            .    .    .     @    .
```

```
122 @   M2-1          #    #    #    @    #
123 @   M1            #    #    #    @    #
124 @                ---  ---  ---       ---  @
125 @  Total  @       #    #    #    @  100  @
126
127 @  Mean relative density (ton\m3)                          @  #
128
129 @  Gross factor                                            @  #
130 @  Mean capacity of trucks (ton\truck)                     @  #
131 @  Mean capacity of wagons (ton\wagon)                     @  #
132 @  Mean capacity of barges (ton\barge)                     @  #
133 @  Close input for this cargotype (~1)                     @  ~1
134
135 @  -------------- FOR EACH CARGO-TYPE: DRY BULK --------------------
136 @  Cargo-type nr. 4       @
137 @  Name (max. 10 char.)   @  #
138 @  Reference number       @  #
139 @  Cargotype-code         @  #
140 @  Percentage of arrivals on day N  (-M1 ≤ N ≤ -1)  @
141 @    N          Road\Rail\Barge  Total  @
142 @   -M1           #    #    #    @    #
143 @   -(M1-1)       #    #    #    @    #
144 @    .            .    .    .    @    .
145 @    .            .    .    .    @    .
146 @    .            .    .    .    @    .
147 @   -2            #    #    #    @    #
148 @   -1            #    #    #    @    #
149 @  Direct          #    #    #    @    #
150 @                ---  ---  ---       ---  @
151 @  Total  @       #    #    #    @  100  @
152 @  Percentage of departures on day N  (1 ≤ N ≤ M2) @
153 @    N          Road\Rail\Barge  Total  @
154 @  Direct          #    #    #    @    #
155 @   1              #    #    #    @    #
156 @   2              #    #    #    @    #
157 @   .              .    .    .    @    .
158 @   .              .    .    .    @    .
159 @   .              .    .    .    @    .
160 @   M2-1           #    #    #    @    #
161 @   M1             #    #    #    @    #
162 @                ---  ---  ---       ---  @
163 @  Total  @       #    #    #    @  100  @
164
165 @  Mean relative density (ton\m3)                          @  #
166
167 @  Gross factor                                            @  #
168 @  Mean capacity of trucks (ton\truck)                     @  #
169 @  Mean capacity of wagons (ton\wagon)                     @  #
170 @  Mean capacity of barges (ton\barge)                     @  #
171 @  Close input for this cargotype (~1)                     @  ~1
172 @  ------------------------------------------------------------------
173
174 @  Number of berths  @  #
175 @  Berth-|Single=1  |Length|Depth|Nr. of|Number of  |Ref.nr's of|Ship
176 @  number|Multiple=0|(m)   |(m)  |cranes|cargo-types|cargo-types|Cap.
177      #      #          #      #     #      #            #  #  #     #
178 @                                      ----
179 @  Total number of cranes     @    #
180 @  Name (max 10  | Crane-| Range     | Load-| Unload-|Berth   @
181 @  characters)   | number| Min.| Max.| cap. | cap.   |number  @
182       #             #      #      #     #      #       #
183 @  NB: 1) The crane-capacity-unit for container-berths is boxes\hour  @
```

```
184 @          The crane-capacity-unit for other berths is boxes\hour      @
185 @       2) Use all sequential numbers for the crane-numbers; allocate  @
186 @          the crane-numbers in order of physical appearance           @
187 @       3) Enter dummy values for the minimum and maximum of the       @
188 @          crane-range if they belong to a single berth                @
189
190 @  Is there inland-transport on saturday? (1=yes 0=no) @  #
191 @  Is there inland-transport on sunday?   (1=yes 0=no) @  #
192 @  Are shifts taking place on saturday?   (1=yes 0=no) @  #
193 @  Are shifts taking place on sunday?     (1=yes 0=no) @  #
194 @  Capacity of storage-area (m2)                       @  #
195 @  Capacity of storage-volume (m3)                     @  #
196 @  Number of terminal-equipment-units                  @  #
197 @  Mean capacity of one equipment-unit (ton\hour)      @  #
198 @  Percentage of cargo that is handled by the equip.   @  #
199 @  Net operation factor (0 < N < 1)                    @  #
200
201 @  Number of shifts per day (1\2\3)                    @  #
202 @ xxxxxxxxx  for each shift  xxxxxxxxxxxxxxxxxxxxxxxx @
203 @  Starting time of shift nr. #  (hours)              @  #
204 @  Duration of shift nr. #  (hours)                  @  #
205 @ xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx @
206
207 @ %%%%%%%%%% END OF INPUT FOR THIS TERMINAL %%%%%%%%%%%%%%%%%%%%%%%%%%
208
209
210 @  FOR ALL TERMINALS  @
211
212 @  Mean cranebreakdown-interarrivaltime (days)          @  #
213 @  Mean cranebreakdown-duration (hours)                @  #
214 @  Deviation of cranebreakdown-duration (days)         @  #
215 @  Intervaltime of maintenance to cranes (hours)      @  #
216 @  Duration of maintenance to cranes (hours)         @  #
217 @  Seed of cranebreakdown-interarrivaltime           @  121121
218 @  Seed of cranebreakdown-duration                  @  122122
219
220 @  Seed of UNIF23                                    @  123123
221 @  Close file  @  ~1
```

ILE H_DEMO3A

Date: 93/08
Time: 17:09:

```
  1 @  INFORMATION-FILE OF HARBOUR  @
  2
  3 @  M, number of first day of typhoon-season (M<365)    @  1
  4 @  N, number of last day of typhoon-season (M<N<366)   @  365
  5 @  Mean inter-arrivaltime of typhoons (days)           @  125
  6 @  Mean duration of typhoons (days)                    @  1
  7 @  Deviation of duration of typhoons (days)            @  0
  8 @  Mean inter-arrivaltime of strikes (days)            @  125
  9 @  Mean duration of strikes (days)                     @  2
 10 @  Deviation of duration of strikes (days)             @  0
 11 @  Seed of typhoon-inter-arrivaltime  @  12346
 12 @  Seed of typhoon-duration           @  45678
 13 @  Seed of strike-inter-arrivaltime   @  56780
 14 @  Seed of strike-duration            @  67890
 15
 16 @  Mean water-depth at entrance channel (m.)   @  13
 17 @  Amplitude of S2-tide (m.)                   @  0.75
 18 @  Period of S2-tide (days)                    @  0.517361
 19 @  Phase angle of S2-tide (rad.)               @  0
 20 @  Amplitude of M2-tide (m.)                   @  0.25
 21 @  Period of M2-tide (days)                    @  14.76
 22 @  Phase angle of M2-tide (rad.)               @  0
 23
 24 @  Strike-restriction:     1=on 0=off  @  1
 25 @  Typhoon-restriction:    1=on 0=off  @  1
 26
 27 @  Simulation time (days)  @  300
 28 @  Close file  @  ~1
```

```
@  INFORMATION-FILE OF DWT-TABLES FOR SHIPCLASSES  @

@  1:  CONTAINERSHIPS  @

    11
@  DWT       d(m.)     @
    10000      8.3
    15000      9.2
    20000     10.0
    25000     10.5
    30000     11.1
    35000     11.6
    40000     12.1
    45000     12.5
    50000     12.8
    55000     13.2
    60000     13.5

    11
@  DWT       l(m.)     @
    10000      140
    15000      168
    20000      190
    25000      210
    30000      230
    35000      248
    40000      266
    45000      273
    50000      276
    55000      278
    60000      279


@  2:  GENERAL CARGO SHIPS  @

    6
@  DWT       d(m.)      @
     5000      6.6
    10000      8.4
    15000      9.6
    20000     10.1
    25000     10.3
    30000     10.4

    6
@  DWT       l(m.)      @
     5000      110
    10000      127
    15000      142
    20000      156
    25000      168
    30000      180


@  3:  TANKERS          @

    11
@  DWT       d(m.)      @
    10000      7.7
    50000      9.8
   100000     11.5
   150000     12.8
```

```
 64    200000      14.1
 65    250000      15.0
 66    300000      15.7
 67    350000      16.3
 68    400000      16.7
 69    450000      16.8
 70    500000      17.0
 71
 72     11
 73 @   DWT         l(m.)        @
 74     10000       122
 75     50000       260
 76    100000       316
 77    150000       362
 78    200000       400
 79    250000       427
 80    300000       450
 81    350000       465
 82    400000       480
 83    450000       491
 84    500000       500
 85
 86
 87 @   4:   BULKCARRIERS        @
 88
 89     12
 90 @   DWT         d(m.)        @
 91     25000       10.0
 92     50000       12.4
 93     75000       14.0
 94    100000       15.4
 95    125000       16.6
 96    150000       17.4
 97    175000       18.5
 98    200000       19.3
 99    225000       26.0
100    250000       26.6
101    275000       27.1
102    300000       27.6
103
104     12
105 @   DWT         l(m.)        @
106     25000       165
107     50000       203
108     75000       228
109    100000       249
110    125000       265
111    150000       278
112    175000       289
113    200000       299
114    225000       308
115    250000       315
116    275000       322
117    300000       329
118
119
120 @   Close file   @   ~1
```

```
  1 @  INFORMATION-FILE OF SHIPS  @
  2
  3 @  Number of classes  @  5
  4
  5 @  ---- For each class  ------------------------------  @
  6 @  Name  @  CONT-CLASS
  7 @  Choose distribution of inter-arrivaltime:            @
  8 @  Poisson=0   Normal(for feeder-service)=1             @  0
  9 @  Mean interarrivaltime (days)                         @  1.3
 10 @  Deviation of interarrivaltime (days;0 if distr=Pois) @  0
 11 @  Percentage of transshipment cargo                    @  5
 12 @  Mean total quantity of import-cargo (TEU)           @  400
 13 @  Deviation of total quantity of import-cargo (TEU)    @  200
 14 @  Minimum value of total quant. of imp.-cargo (TEU)    @  100
 15 @  Maximum value of total quant. of imp.-cargo (TEU)    @  600
 16 @  Mean total quantity of export-cargo (TEU)           @  400
 17 @  Deviation of total quantity of export-cargo (TEU)    @  200
 18 @  Minimum value of total quant. of exp.-cargo (TEU)    @  100
 19 @  Maximum value of total quant. of exp.-cargo (TEU)    @  600
 20
 21 @  Minimum value of DWT                                 @  14000
 22 @  Maximum value of DWT                                 @  18000
 23 @  Mean mooring time (hours)                            @  6
 24 @  Deviation of mooring time (hours)                    @  0
 25 @  Lower boundary of mooring time (hours)               @  1
 26 @  Mean percentage of cargo to be stored under cover    @  0
 27 @  Deviation of percentage of cargo under cover         @  0
 28
 29 @  Required number of cranes to unload\load the ship    @  2
 30 @  Net effective loading cap. of ships' gear(box\hour)  @  0
 31 @  Net effective unloading cap. of ships' gear(box\hour) @  0
 32 @  Do ships of this class receive priority by the       @
 33 @  harbour-master  (1=yes 0=no)                         @  0
 34
 35 @  Cargo-code: A                                        @  1
 36 @  Number of terminals: 4                               @
 37 @  Percentage of ships going to terminal 1              @  100
 38 @  Reference number of the cargo-type at this terminal  @  101
 39 @  Percentage of ships going to terminal 2              @  0
 40 @  Reference number of the cargo-type at this terminal  @  0
 41 @  Percentage of ships going to terminal 3              @  0
 42 @  Reference number of the cargo-type at this terminal  @  0
 43 @  Percentage of ships going to terminal 4              @  0
 44 @  Reference number of the cargo-type at this terminal  @  0
 45 @  ------------------------------------------------    @
 46
 47 @  ---- For each class  ------------------------------  @
 48 @  Name  @  GEN_CARGO1
 49 @  Choose distribution of inter-arrivaltime:            @
 50 @  Poisson=0   Normal(for feeder-service)=1             @  0
 51 @  Mean interarrivaltime (days)                         @  0.7
 52 @  Deviation of interarrivaltime (days;0 if distr=Pois) @  0
 53 @  Percentage of transshipment cargo                    @  0
 54 @  Mean total quantity of import-cargo (ton)           @  4000
 55 @  Deviation of total quantity of import-cargo (ton)    @  2000
 56 @  Minimum value of total quant. of imp.-cargo (ton)    @  1000
 57 @  Maximum value of total quant. of imp.-cargo (ton)    @  7000
 58 @  Mean total quantity of export-cargo (ton)           @  4000
 59 @  Deviation of total quantity of export-cargo (ton)    @  2000
 60 @  Minimum value of total quant. of exp.-cargo (ton)    @  1000
 61 @  Maximum value of total quant. of exp.-cargo (ton)    @  7000
 62
 63 @  Minimum value of DWT                                 @  16000
```

```
64 @  Maximum value of DWT                                        @  18000
65 @  Mean mooring time (hours)                                   @  6
66 @  Deviation of mooring time (hours)                           @  0
67 @  Lower boundary of mooring time (hours)                      @  1
68 @  Mean percentage of cargo to be stored under cover           @  40
69 @  Deviation of percentage of cargo under cover                @  5
70
71 @  Required number of cranes to unload\load the ship           @  1
72 @  Net effective loading cap. of ships' gear(ton\hour)         @  250
73 @  Net effective unloading cap. of ships' gear(ton\hour)       @  250
74 @  Do ships of this class receive priority by the             @
75 @  harbour-master  (1=yes 0=no)                               @  0
76
77 @  Cargo-code: B                                               @  2
78 @  Number of terminals: 4                                     @
79 @  Percentage of ships going to terminal 1                    @  40
80 @  Reference number of the cargo-type at this terminal        @  201
81 @  Percentage of ships going to terminal 2                    @  50
82 @  Reference number of the cargo-type at this terminal        @  202
83 @  Percentage of ships going to terminal 3                    @  0
84 @  Reference number of the cargo-type at this terminal        @  0
85 @  Percentage of ships going to terminal 4                    @  10
86 @  Reference number of the cargo-type at this terminal        @  203
87 @  ------------------------------------------------          @
88
89 @  ---- For each class  ------------------------------        @
90 @  Name  @  GEN_CARGO2
91 @  Choose distribution of inter-arrivaltime:                   @
92 @  Poisson=0   Normal(for feeder-service)=1                    @  0
93 @  Mean interarrivaltime (days)                               @  1.1
94 @  Deviation of interarrivaltime (days;0 if distr=Pois)       @  0
95 @  Percentage of transshipment cargo                          @  0
96 @  Mean total quantity of import-cargo (ton)                  @  4000
97 @  Deviation of total quantity of import-cargo (ton)          @  2000
98 @  Minimum value of total quant. of imp.-cargo (ton)         @  1000
99 @  Maximum value of total quant. of imp.-cargo (ton)         @  7000
100 @  Mean total quantity of export-cargo (ton)                 @  4000
101 @  Deviation of total quantity of export-cargo (ton)         @  2000
102 @  Minimum value of total quant. of exp.-cargo (ton)         @  1000
103 @  Maximum value of total quant. of exp.-cargo (ton)         @  7000
104
105 @  Minimum value of DWT                                      @  16000
106 @  Maximum value of DWT                                      @  18000
107 @  Mean mooring time (hours)                                 @  6
108 @  Deviation of mooring time (hours)                         @  0
109 @  Lower boundary of mooring time (hours)                    @  1
110 @  Mean percentage of cargo to be stored under cover         @  40
111 @  Deviation of percentage of cargo under cover              @  5
112
113 @  Required number of cranes to unload\load the ship         @  1
114 @  Net effective loading cap. of ships' gear(ton\hour)       @  250
115 @  Net effective unloading cap. of ships' gear(ton\hour)     @  250
116 @  Do ships of this class receive priority by the           @
117 @  harbour-master  (1=yes 0=no)                             @  1
118
119 @  Cargo-code: B                                             @  2
120 @  Number of terminals: 4                                   @
121 @  Percentage of ships going to terminal 1                  @  0
122 @  Reference number of the cargo-type at this terminal      @  0
123 @  Percentage of ships going to terminal 2                  @  100
124 @  Reference number of the cargo-type at this terminal      @  211
125 @  Percentage of ships going to terminal 3                  @  0
126 @  Reference number of the cargo-type at this terminal      @  0
127 @  Percentage of ships going to terminal 4                  @  0
128 @  Reference number of the cargo-type at this terminal      @  0
129 @  ------------------------------------------------        @
```

```
130
131 @  ---- For each class  ------------------------------  @
132 @  Name  @  LIQCARRRIER
133 @  Choose distribution of inter-arrivaltime:            @
134 @  Poisson=0   Normal(for feeder-service)=1            @  0
135 @  Mean interarrivaltime (days)                        @  1.2
136 @  Deviation of interarrivaltime (days;0 if distr=Pois) @  0
137 @  Percentage of transshipment cargo                   @  0
138 @  Mean total quantity of import-cargo (ton)          @  8000
139 @  Deviation of total quantity of import-cargo (ton)   @  2000
140 @  Minimum value of total quant. of imp.-cargo (ton)   @  5000
141 @  Maximum value of total quant. of imp.-cargo (ton)   @  11000
142 @  Mean total quantity of export-cargo (ton)          @  8000
143 @  Deviation of total quantity of export-cargo (ton)   @  2000
144 @  Minimum value of total quant. of exp.-cargo (ton)   @  5000
145 @  Maximum value of total quant. of exp.-cargo (ton)   @  11000
146
147 @  Minimum value of DWT                                @  23000
148 @  Maximum value of DWT                                @  33000
149 @  Mean mooring time (hours)                           @  6
150 @  Deviation of mooring time (hours)                   @  0
151 @  Lower boundary of mooring time (hours)              @  1
152 @  Mean percentage of cargo to be stored under cover   @  0
153 @  Deviation of percentage of cargo under cover        @  0
154
155 @  Required number of cranes to unload\load the ship   @  1
156 @  Net effective loading cap. of ships' gear(ton\hour) @  400
157 @  Net effective unloading cap. of ships' gear(ton\hour) @  400
158 @  Do ships of this class receive priority by the      @
159 @  harbour-master  (1=yes 0=no)                        @  0
160
161 @  Cargo-code: C                                       @  3
162 @  Number of terminals: 4                              @
163 @  Percentage of ships going to terminal 1             @  0
164 @  Reference number of the cargo-type at this terminal @  0
165 @  Percentage of ships going to terminal 2             @  0
166 @  Reference number of the cargo-type at this terminal @  0
167 @  Percentage of ships going to terminal 3             @  100
168 @  Reference number of the cargo-type at this terminal @  301
169 @  Percentage of ships going to terminal 4             @  0
170 @  Reference number of the cargo-type at this terminal @  0
171 @  ------------------------------------------------  @
172
173 @  ---- For each class  ------------------------------  @
174 @  Name  @  GRAINSHIP
175 @  Choose distribution of inter-arrivaltime:            @
176 @  Poisson=0   Normal(for feeder-service)=1            @  0
177 @  Mean interarrivaltime (days)                        @  1.4
178 @  Deviation of interarrivaltime (days;0 if distr=Pois) @  0
179 @  Percentage of transshipment cargo                   @  0
180 @  Mean total quantity of import-cargo (ton)          @  8000
181 @  Deviation of total quantity of import-cargo (ton)   @  2000
182 @  Minimum value of total quant. of imp.-cargo (ton)   @  5000
183 @  Maximum value of total quant. of imp.-cargo (ton)   @  11000
184 @  Mean total quantity of export-cargo (ton)          @  8000
185 @  Deviation of total quantity of export-cargo (ton)   @  2000
186 @  Minimum value of total quant. of exp.-cargo (ton)   @  5000
187 @  Maximum value of total quant. of exp.-cargo (ton)   @  11000
188
189 @  Minimum value of DWT                                @  25000
190 @  Maximum value of DWT                                @  35000
191 @  Mean mooring time (hours)                           @  6
192 @  Deviation of mooring time (hours)                   @  0
193 @  Lower boundary of mooring time (hours)              @  1
194 @  Mean percentage of cargo to be stored under cover   @  0
195 @  Deviation of percentage of cargo under cover        @  0
```

```
196
197 @  Required number of cranes to unload\load the ship    @  1
198 @  Net effective loading cap. of ships' gear(ton\hour)  @  350
199 @  Net effective unloading cap. of ships' gear(ton\hour) @  350
200 @  Do ships of this class receive priority by the       @
201 @  harbour-master  (1=yes 0=no)                         @  0
202
203 @  Cargo-code: D                                        @  4
204 @  Number of terminals: 4                               @
205 @  Percentage of ships going to terminal 1              @  0
206 @  Reference number of the cargo-type at this terminal  @  0
207 @  Percentage of ships going to terminal 2              @  0
208 @  Reference number of the cargo-type at this terminal  @  0
209 @  Percentage of ships going to terminal 3              @  0
210 @  Reference number of the cargo-type at this terminal  @  0
211 @  Percentage of ships going to terminal 4              @  100
212 @  Reference number of the cargo-type at this terminal  @  401
213 @  ------------------------------------------------    @
214 @  Close file  @  ~1
215
```

ILE T_DEMO3 Date: 93/08
Time: 17:16:

```
INFORMATION-FILE OF TERMINAL(S)

Number of terminals                                          4
Number of days of inland transport-arrivals (M1)            10
Number of days of inland transport-departures (M2)          10


TERMINAL 1

Number of handled cargo-types at this terminal               2

.............. FOR EACH CARGO-TYPE: CONTAINERS ..................
Cargo-type nr. 1
Name (max. 10 char.)                                    CONTAINERS
Reference number                                             101
Cargotype-code                                               A
Percentage of arrivals on day N  (-M1 ≤ N ≤ -1)
   N          Road\Rail\Barge  Total
  -10          5    0    0      5
  -9          10    0    0     10
  -8          15    0    0     15
  -7          20   10    0     30
  -6          15    0    0     15
  -5          10    0    0     10
  -4           5    0    0      5
  -3           0    0    0      0
  -2           0    0    0      0
  -1           0    0    0      0
Direct        10    0    0     10
             ---  ---  ---    ---
Total         90   10    0    100
Percentage of departures on day N  (1 ≤ N ≤ M2)
   N          Road\Rail\Barge  Total
Direct        10    0    0     10
   1           0    0    0      0
   2           0    0    0      0
   3           0    0    0      0
   4           5    0    0      5
   5          10    0    0     10
   6          15    0    0     15
   7          20   10    0     30
   8          15    0    0     15
   9          10    0    0     10
  10           5    0    0      5
             ---  ---  ---    ---
Total         90   10    0    100

Mean stackheight of import-containers                        1.5
Mean stackheight of export-containers                        1.5
Mean stackheight of empty containers                         1.5
Mean percentage of empty import-containers                   20
Mean percentage of empty export-containers                   20
Mean percentage of fortyfeet import-containers               20
Mean percentage of fortyfeet export-containers               20

Gross factor                                                 2
Mean capacity of trucks (TEU\truck)                          1.5
Mean capacity of wagons (TEU\wagon)                          2
Mean capacity of barges (TEU\barge)                          50
```

```
60 @  Close input for this cargotype (~1)                    @  ~1
61 @  ..........................................................
62
63 @  ............. FOR EACH CARGO-TYPE: BREAKBULK ..................
64 @  Cargo-type nr. 2       @
65 @  Name (max. 10 char.)   @  BREAKBULK
66 @  Reference number       @  201
67 @  Cargotype-code          @  B
68 @  Percentage of arrivals on day N  (-M1 ≤ N ≤ -1)  @
69 @    N          Road\Rail\Barge  Total  @
70 @   -10          5    0    0     @    5
71 @   -9          10    0    0     @   10
72 @   -8          15    0    0     @   15
73 @   -7          20   10    0     @   30
74 @   -6          15    0    0     @   15
75 @   -5          10    0    0     @   10
76 @   -4           5    0    0     @    5
77 @   -3           0    0    0     @    0
78 @   -2           0    0    0     @    0
79 @   -1           0    0    0     @    0
80 @  Direct        10    0    0     @   10
81 @               ---  ---  ---        ---  @
82 @  Total  @      90   10    0     @  100  @
83 @  Percentage of departures on day N  (1 ≤ N ≤ M2) @
84 @    N          Road\Rail\Barge  Total  @
85 @  Direct        10    0    0     @   10
86 @   1            0    0    0     @    0
87 @   2            0    0    0     @    0
88 @   3            0    0    0     @    0
89 @   4            5    0    0     @    5
90 @   5           10    0    0     @   10
91 @   6           15    0    0     @   15
92 @   7           20   10    0     @   30
93 @   8           15    0    0     @   15
94 @   9           10    0    0     @   10
95 @   10           5    0    0     @    5
96 @               ---  ---  ---        ---  @
97 @  Total  @      90   10    0     @  100  @
98
99 @  Mean stackheight (m)                                   @  2
100 @  Mean relative density (ton\m3)                        @  0.8
101
102 @  Gross factor                                          @  2
103 @  Mean capacity of trucks (ton\truck)                   @  10
104 @  Mean capacity of wagons (ton\wagon)                   @  30
105 @  Mean capacity of barges (ton\barge)                   @  200
106 @  Close input for this cargotype (~1)                   @  ~1
107 @  ..........................................................
108
109 @  Number of berths  @  3
110 @  Berth-|Single=1  |Length|Depth|Nr. of|Number of  |Ref. nr's of|Ship
111 @  number|Multiple=0|(m)   |(m)  |cranes|cargo-types|cargo-types|Cap.
112      1       1          225   11.5   2       1           101          1
113      2       1          225   11.5   2       1           101          1
114      3       0          450   11.5   2       1           201          2
115 @                                    ----
116 @  Total number of cranes     @    6
117 @  Name (max 10  | Crane-| Range     | Load-| Unload-|Berth   @
118 @  characters)   | number| Min.| Max.| cap. | cap.   |number  @
119 @                                     (boxes\hour)          @
120      CONT_CR1         1      0       0    12     12       1
121      CONT_CR2         2      0       0    12     12       1
```

```
122     CONT_CR3          3       0        0     12      12        2
123     CONT_CR4          4       0        0     12      12        2
124 @                   |       | (m.)| (m.)|  (ton\hour)   |        @
125     CRANE1            5       0      450    120     120        3
126     CRANE2            6       0      450    120     120        3
127 @   NB: 1) Use all sequential numbers for the crane-numbers; allocate  @
128 @          the crane-numbers in order of physical appearance          @
129 @       2) Enter dummy values for the minimum and maximum of the       @
130 @          crane-range if they belong to a single berth               @
131
132 @   Is there inland-transport on saturday? (1=yes 0=no) @  1
133 @   Is there inland-transport on sunday?   (1=yes 0=no) @  0
134 @   Are shifts taking place on saturday?   (1=yes 0=no) @  1
135 @   Are shifts taking place on sunday?     (1=yes 0=no) @  1
136 @   Capacity of storage-area (m2)                        @  150000
137 @   Capacity of storage-volume (m3)                      @  0
138 @   Number of terminal-equipment-units                   @  24
139 @   Mean capacity of one equipment-unit (ton\hour)      @  50
140 @   Percentage of cargo that is handled by the equip.   @  100
141 @   Net operation factor (0 < N < 1)                     @  0.875
142 @   Number of shifts per day (1\2\3)                     @  3
143 @   Starting time of shift nr. 1  (hours)               @  0
144 @   Duration of shift nr. 1  (hours)                    @  8
145 @   Starting time of shift nr. 2  (hours)               @  8
146 @   Duration of shift nr. 2  (hours)                    @  8
147 @   Starting time of shift nr. 3  (hours)               @  16
148 @   Duration of shift nr. 3  (hours)                    @  8
149
150
151 @   TERMINAL 2  @
152
153 @   Number of handled cargo-types at this terminal  @  2
154
155 @   ..............  FOR EACH CARGO-TYPE: BREAKBULK .....................
156 @   Cargo-type nr. 1       @
157 @   Name (max. 10 char.)   @  BREAKBULK
158 @   Reference number       @  202
159 @   Cargotype-code         @  B
160 @   Percentage of arrivals on day N  (-M1 ≤ N ≤ -1)  @
161 @     N          Road\Rail\Barge  Total  @
162 @    -10          5     0     0     @    5
163 @    -9          10     0     0     @   10
164 @    -8          15     0     0     @   15
165 @    -7          20    10     0     @   30
166 @    -6          15     0     0     @   15
167 @    -5          10     0     0     @   10
168 @    -4           5     0     0     @    5
169 @    -3           0     0     0     @    0
170 @    -2           0     0     0     @    0
171 @    -1           0     0     0     @    0
172 @   Direct        10     0     0     @   10
173 @                ---   ---   ---         ---  @
174 @   Total  @      90    10     0     @  100  @
175 @   Percentage of departures on day N  (1 ≤ N ≤ M2) @
176 @    N          Road\Rail\Barge  Total  @
177 @   Direct        10     0     0     @   10
178 @    1            0     0     0     @    0
179 @    2            0     0     0     @    0
180 @    3            0     0     0     @    0
181 @    4            5     0     0     @    5
182 @    5           10     0     0     @   10
183 @    6           15     0     0     @   15
```

```
@    7          20   10    0    @   30
@    8          15    0    0    @   15
@    9          10    0    0    @   10
@    10          5    0    0    @    5
@              ---  ---  ---       ---  @
@  Total  @     90   10    0    @  100  @

@  Mean stackheight (m)                                    @  2
@  Mean relative density (ton\m3)                          @  0.8

@  Gross factor                                            @  2
@  Mean capacity of trucks (ton\truck)                     @  10
@  Mean capacity of wagons (ton\wagon)                     @  30
@  Mean capacity of barges (ton\barge)                     @  200
@  Close input for this cargotype (~1)                     @  ~1
@  ..........................................................
@  ............. FOR EACH CARGO-TYPE: BREAKBULK ..................
@  Cargo-type nr. 1       @
@  Name (max. 10 char.)   @  BANANAS
@  Reference number       @  211
@  Cargotype-code         @  B
@  Percentage of arrivals on day N  (-M1 ≤ N ≤ -1)  @
@    N          Road\Rail\Barge  Total  @
@   -10          5    0    0    @    5
@   -9          10    0    0    @   10
@   -8          15    0    0    @   15
@   -7          20   10    0    @   30
@   -6          15    0    0    @   15
@   -5          10    0    0    @   10
@   -4           5    0    0    @    5
@   -3           0    0    0    @    0
@   -2           0    0    0    @    0
@   -1           0    0    0    @    0
@  Direct       10    0    0    @   10
@              ---  ---  ---       ---  @
@  Total  @     90   10    0    @  100  @
@  Percentage of departures on day N  (1 ≤ N ≤ M2) @
@   N          Road\Rail\Barge  Total  @
@  Direct       10    0    0    @   10
@   1            0    0    0    @    0
@   2            0    0    0    @    0
@   3            0    0    0    @    0
@   4            5    0    0    @    5
@   5           10    0    0    @   10
@   6           15    0    0    @   15
@   7           20   10    0    @   30
@   8           15    0    0    @   15
@   9           10    0    0    @   10
@   10           5    0    0    @    5
@              ---  ---  ---       ---  @
@  Total  @     90   10    0    @  100  @

@  Mean stackheight (m)                                    @  2
@  Mean relative density (ton\m3)                          @  0.8

@  Gross factor                                            @  2
@  Mean capacity of trucks (ton\truck)                     @  10
@  Mean capacity of wagons (ton\wagon)                     @  30
@  Mean capacity of barges (ton\barge)                     @  200
@  Close input for this cargotype (~1)                     @  ~1
@  ..........................................................
```

```
246
247 @  Number of berths  @  1
248 @  Berth-|Single=1  |Length|Depth|Nr. of|Number of  |Ref. nr's of|Ship
249 @  number|Multiple=0|(m)   |(m)  |cranes|cargo-types|cargo-types|Cap.
250      4       0          675   11.5    3      2          202  211    3
251 @                                      ----
252 @  Total number of cranes      @    3
253 @  Name (max 10  | Crane-| Range     | Load-| Unload-|Berth   @
254 @  characters)   | number| Min.| Max.| cap. | cap.   |number  @
255 @               |       | (m.)| (m.)|  (ton\hour)   |        @
256    CRANE3           7      0     675   120    120       4
257    CRANE4           8      0     675   120    120       4
258    CRANE5           9      0     675   120    120       4
259 @  NB: 1) Use all sequential numbers for the crane-numbers; allocate
260 @         the crane-numbers in order of physical appearance
261 @      2) Enter dummy values for the minimum and maximum of the
262 @         crane-range if they belong to a single berth
263
264 @  Is there inland-transport on saturday? (1=yes 0=no) @  1
265 @  Is there inland-transport on sunday?   (1=yes 0=no) @  0
266 @  Are shifts taking place on saturday?   (1=yes 0=no) @  1
267 @  Are shifts taking place on sunday?     (1=yes 0=no) @  1
268 @  Capacity of storage-area (m2)                       @  150000
269 @  Capacity of storage-volume (m3)                     @  0
270 @  Number of terminal-equipment-units                  @  18
271 @  Mean capacity of one equipment-unit (ton\hour)      @  50
272 @  Percentage of cargo that is handled by the equip.   @  100
273 @  Net operation factor (0 < N < 1)                    @  0.875
274 @  Number of shifts per day (1\2\3)                    @  3
275 @  Starting time of shift nr. 1  (hours)               @  0
276 @  Duration of shift nr. 1  (hours)                   @  8
277 @  Starting time of shift nr. 2  (hours)              @  8
278 @  Duration of shift nr. 2  (hours)                   @  8
279 @  Starting time of shift nr. 3  (hours)              @  16
280 @  Duration of shift nr. 3  (hours)                   @  8
281
282
283 @  TERMINAL 3  @
284
285 @  Number of handled cargo-types at this terminal  @  1
286
287 @  ..............  FOR EACH CARGO-TYPE: LIQUID BULK  ..................
288 @  Cargo-type nr. 1       @
289 @  Name (max. 10 char.)  @  VEGET_OIL
290 @  Reference number       @  301
291 @  Cargotype-code         @  C
292 @  Percentage of arrivals on day N  (-M1 ≤ N ≤ -1)  @
293 @    N          Road\Rail\Barge  Total  @
294 @   -10          25    0    0    @   25
295 @   -9           30   10    0    @   40
296 @   -8           25    0    0    @   25
297 @   -7            0    0    0    @    0
298 @   -6            0    0    0    @    0
299 @   -5            0    0    0    @    0
300 @   -4            0    0    0    @    0
301 @   -3            0    0    0    @    0
302 @   -2            0    0    0    @    0
303 @   -1            0    0    0    @    0
304 @  Direct        10    0    0    @   10
305 @               ---  ---  ---       ---  @
306 @  Total  @      90   10    0    @  100  @
307 @  Percentage of departures on day N  (1 ≤ N ≤ M2) @
```

```
@   N          Road\Rail\Barge  Total  @
@  Direct      10    0    0    @   10
@   1           0    0    0    @    0
@   2           0    0    0    @    0
@   3           0    0    0    @    0
@   4           0    0    0    @    0
@   5           0    0    0    @    0
@   6           0    0    0    @    0
@   7           0    0    0    @    0
@   8          25    0    0    @   25
@   9          30   10    0    @   40
@   10         25    0    0    @   25
@             ---  ---  ---        ---  @
@  Total  @    90   10    0    @  100  @

@  Mean relative density (ton\m3)                          @  0.5

@  Gross factor                                            @  2
@  Mean capacity of trucks (ton\truck)                     @  10
@  Mean capacity of wagons (ton\wagon)                     @  30
@  Mean capacity of barges (ton\barge)                     @  200
@  Close input for this cargotype (~1)                     @  ~1
@  ..........................................................

@  Number of berths  @  2
@  Berth-|Single=1  |Length|Depth|Nr. of|Number of  |Ref. nr's of|Ship
@  number|Multiple=0|(m)   |(m)  |cranes|cargo-types|cargo-types|Cap.
    5      1          280   13     1      1           301          1
    6      1          255   13     1      1           301          1
@                                 ----
@  Total number of cranes     @    2
@  Name (max 10  | Crane-| Range     | Load-| Unload-|Berth   @
@  characters)   | number| Min.| Max.| cap. | cap.   |number  @
@                |       | (m.)| (m.)|  (ton\hour)   |        @
    PUMP1            10     0      0    200    200       5
    PUMP2            11     0      0    200    200       6
@  NB: 1) Use all sequential numbers for the crane-numbers; allocate  @
@         the crane-numbers in order of physical appearance          @
@      2) Enter dummy values for the minimum and maximum of the       @
@         crane-range if they belong to a single berth               @

@  Is there inland-transport on saturday? (1=yes 0=no) @  1
@  Is there inland-transport on sunday?   (1=yes 0=no) @  1
@  Are shifts taking place on saturday?   (1=yes 0=no) @  1
@  Are shifts taking place on sunday?     (1=yes 0=no) @  1
@  Capacity of storage-area (m2)                       @  0
@  Capacity of storage-volume (m3)                     @  500000
@  Number of terminal-equipment-units                  @  10
@  Mean capacity of one equipment-unit (ton\hour)      @  100
@  Percentage of cargo that is handled by the equip.   @  100
@  Net operation factor (0 < N < 1)                    @  0.875
@  Number of shifts per day (1\2\3)                    @  3
@  Starting time of shift nr. 1  (hours)               @  0
@  Duration of shift nr. 1  (hours)                    @  8
@  Starting time of shift nr. 2  (hours)               @  8
@  Duration of shift nr. 2  (hours)                    @  8
@  Starting time of shift nr. 3  (hours)               @  16
@  Duration of shift nr. 3  (hours)                    @  8


@  TERMINAL 4  @

```

```
370 @  Number of handled cargo-types at this terminal  @  2
371
372 @  ..............  FOR EACH CARGO-TYPE: DRY BULK .....................
373 @  Cargo-type nr. 1       @
374 @  Name (max. 10 char.)  @  WHEAT
375 @  Reference number       @  401
376 @  Cargotype-code         @  D
377 @  Percentage of arrivals on day N  (-M1 ≤ N ≤ -1)  @
378 @    N          Road\Rail\Barge  Total  @
379 @   -10          25    0    0    @   25
380 @   -9           30   10    0    @   40
381 @   -8           25    0    0    @   25
382 @   -7            0    0    0    @    0
383 @   -6            0    0    0    @    0
384 @   -5            0    0    0    @    0
385 @   -4            0    0    0    @    0
386 @   -3            0    0    0    @    0
387 @   -2            0    0    0    @    0
388 @   -1            0    0    0    @    0
389 @  Direct        10    0    0    @   10
390 @                ---  ---  ---       ---  @
391 @  Total  @      90   10    0    @  100  @
392 @  Percentage of departures on day N  (1 ≤ N ≤ M2) @
393 @    N          Road\Rail\Barge  Total  @
394 @  Direct        10    0    0    @   10
395 @   1            0    0    0    @    0
396 @   2            0    0    0    @    0
397 @   3            0    0    0    @    0
398 @   4            0    0    0    @    0
399 @   5            0    0    0    @    0
400 @   6            0    0    0    @    0
401 @   7            0    0    0    @    0
402 @   8           25    0    0    @   25
403 @   9           30   10    0    @   40
404 @   10          25    0    0    @   25
405 @                ---  ---  ---       ---  @
406 @  Total  @      90   10    0    @  100  @
407
408 @  Mean relative density (ton\m3)                    @  0.8
409
410 @  Gross factor                                       @  2
411 @  Mean capacity of trucks (ton\truck)               @  10
412 @  Mean capacity of wagons (ton\wagon)               @  30
413 @  Mean capacity of barges (ton\barge)               @  200
414 @  Close input for this cargotype (~1)               @  ~1
415 @  ..........................................................
416
417 @  ..............  FOR EACH CARGO-TYPE: BREAKBULK .....................
418 @  Cargo-type nr. 1       @
419 @  Name (max. 10 char.)  @  BREAKBULK
420 @  Reference number       @  203
421 @  Cargotype-code         @  B
422 @  Percentage of arrivals on day N  (-M1 ≤ N ≤ -1)  @
423 @    N          Road\Rail\Barge  Total  @
424 @   -10          5    0    0    @    5
425 @   -9           10    0    0    @   10
426 @   -8           15    0    0    @   15
427 @   -7           20   10    0    @   30
428 @   -6           15    0    0    @   15
429 @   -5           10    0    0    @   10
430 @   -4            5    0    0    @    5
431 @   -3            0    0    0    @    0
```

```
@    -2          0    0    0    @    0
@    -1          0    0    0    @    0
@  Direct       10    0    0    @   10
@              ---  ---  ---        ---  @
@  Total  @     90   10    0    @  100  @
@  Percentage of departures on day N  (1 ≤ N ≤ M2) @
@   N          Road\Rail\Barge  Total  @
@  Direct       10    0    0    @   10
@   1            0    0    0    @    0
@   2            0    0    0    @    0
@   3            0    0    0    @    0
@   4            5    0    0    @    5
@   5           10    0    0    @   10
@   6           15    0    0    @   15
@   7           20   10    0    @   30
@   8           15    0    0    @   15
@   9           10    0    0    @   10
@   10           5    0    0    @    5
@              ---  ---  ---        ---  @
@  Total  @     90   10    0    @  100  @

@  Mean stackheight (m)                                  @  2
@  Mean relative density (ton\m3)                        @  0.8

@  Gross factor                                          @  2
@  Mean capacity of trucks (ton\truck)                   @  10
@  Mean capacity of wagons (ton\wagon)                   @  30
@  Mean capacity of barges (ton\barge)                   @  200
@  Close input for this cargotype (~1)                   @  ~1
@  ..........................................................

@  Number of berths  @  1
@  Berth-|Single=1  |Length|Depth|Nr. of|Number of  |Ref. nr's of|Ship
@  number|Multiple=0|(m)   |(m)  |cranes|cargo-types|cargo-types|Cap.
   7       0           550   13     2      2           401 203       2
@                                    ----
@  Total number of cranes     @    2
@  Name (max 10  | Crane-| Range     | Load-| Unload-|Berth   @
@  characters)   | number| Min.| Max.| cap. | cap.   |number  @
@                |       | (m.)| (m.)|  (ton\hour)   |        @
   CRANE6           12     0     450   200    200       7
   CRANE7           13     0     450   200    200       7
@  NB: 1) Use all sequential numbers for the crane-numbers; allocate  @
@         the crane-numbers in order of physical appearance          @
@      2) Enter dummy values for the minimum and maximum of the       @
@         crane-range if they belong to a single berth               @

@  Is there inland-transport on saturday? (1=yes 0=no) @  1
@  Is there inland-transport on sunday?   (1=yes 0=no) @  0
@  Are shifts taking place on saturday?   (1=yes 0=no) @  1
@  Are shifts taking place on sunday?     (1=yes 0=no) @  1
@  Capacity of storage-area (m2)                       @  50000
@  Capacity of storage-volume (m3)                     @  250000
@  Number of terminal-equipment-units                  @  16
@  Mean capacity of one equipment-unit (ton\hour)      @  50
@  Percentage of cargo that is handled by the equip.   @  100
@  Net operation factor (0 < N < 1)                    @  0.875
@  Number of shifts per day (1\2\3)                    @  3
@  Starting time of shift nr. 1  (hours)               @  0
@  Duration of shift nr. 1  (hours)                    @  8
@  Starting time of shift nr. 2  (hours)               @  8
@  Duration of shift nr. 2  (hours)                    @  8
```

```
494 @  Starting time of shift nr. 3  (hours)                @  16
495 @  Duration of shift nr. 3  (hours)                    @  8
496
497
498
499 @  FOR ALL TERMINALS  @
500
501 @  Mean cranebreakdown-interarrivaltime (hours)        @  1000
502 @  Mean cranebreakdown-duration (hours)                @  30
503 @  Deviation of cranebreakdown-duration (days)         @  3
504 @  Intervaltime of maintenance to cranes (hours)      @  1000
505 @  Duration of maintenance to cranes (hours)          @  24
506 @  Seed of cranebreakdown-interarrivaltime            @  121121
507 @  Seed of cranebreakdown-duration                    @  122122
508
509 @  Seed of UNIF23                                     @  123123
510 @  Close file  @  ~1
```

```
 1
 2 ############################
 3 CHECKLIST FOR:
 4 - ERRORS IN INPUT-FILES
 5 - CORRECTNESS OF REFERENCES
 6 ############################
 7
 8
 9 ----------------
10 REPORT OF ERRORS
11 ----------------
12
13
14 ##############################
15 TOTAL NUMBER OF ERRORS IS   0
16 ##############################
17
18
19 --------------------
20 CARGOTYPE-REFERENCES
21 --------------------
22
23 ACCORDING TO S-FILE:
24 TERMINAL     1      2      3      4
25 CLASS   1    101    -      -      -
26 CLASS   2    201    202    -      203
27 CLASS   3    -      211    -      -
28 CLASS   4    -      -      301    -
29 CLASS   5    -      -      -      401
30
31 ACCORDING TO T-FILE:
32 CARGOTYPES ON TERMINAL  1:    101    201
33 CARGOTYPES AT BERTH:
34  1: 101
35  2: 101
36  3: 201
37 CARGOTYPES ON TERMINAL  2:    202    211
38 CARGOTYPES AT BERTH:
39  4: 202 211
40 CARGOTYPES ON TERMINAL  3:    301
41 CARGOTYPES AT BERTH:
42  5: 301
43  6: 301
44 CARGOTYPES ON TERMINAL  4:    401    203
45 CARGOTYPES AT BERTH:
46  7: 401 203
47
48
49 ----------------------
50 BERTH\CRANE-REFERENCES
51 ----------------------
52
53 BERTH  1    NUMBER OF CRANES  2
54 ALLOCATED TO THIS BERTH:  CONT_CR1    CONT_CR2
55
56 BERTH  2    NUMBER OF CRANES  2
57 ALLOCATED TO THIS BERTH:  CONT_CR3    CONT_CR4
58
59 BERTH  3    NUMBER OF CRANES  2
60 ALLOCATED TO THIS BERTH:  CRANE1      CRANE2
61
62 BERTH  4    NUMBER OF CRANES  3
63 ALLOCATED TO THIS BERTH:  CRANE3      CRANE4      CRANE5
```

```
64
65 BERTH  5     NUMBER OF CRANES  1
66 ALLOCATED TO THIS BERTH:   PUMP1
67
68 BERTH  6     NUMBER OF CRANES  1
69 ALLOCATED TO THIS BERTH:   PUMP2
70
71 BERTH  7     NUMBER OF CRANES  2
72 ALLOCATED TO THIS BERTH:   CRANE6       CRANE7
73
74
75 ########################
76 CHECK ALL REFERENCES !!
77 ########################
78
```

```
 1
 2 ########## PERFORMANCE OF THE TERMINALS ##########
 3
 4
 5 -----------
 6 TERMINAL  1
 7 -----------
 8
 9 AVERAGE ANNUAL NUMBER OF SHIPS AT THIS TERMINAL =  496.45
10
11 ANNUAL THROUGHPUT OF CONTAINERS =  222494 TEU
12   DISTRIBUTION OF OCCUPIED STORAGE-AREA FOR CONTAINERS :
13   SEE STORESTREAM  1OPEN101
14   DISTRIBUTIONS OF OCCUPIED GROUNDSLOTS OF CONTAINERS :
15   EXPORT: SEE STORESTREAM  1EXSL101
16   IMPORT: SEE STORESTREAM  1IMSL101
17   EMPTIES: SEE STORESTREAM  1EMSL101
18
19 ANNUAL THROUGHPUT OF BREAKBULK  = 1643427 TONS
20   DISTRIBUTION OF OCCUPIED OPEN STORAGE-AREA FOR BREAKBULK  :
21   SEE STORESTREAM  1OPEN201
22   DISTRIBUTION OF OCCUPIED COVERED STORAGE-AREA FOR BREAKBULK  :
23   SEE STORESTREAM  1COV201
24
25 DISTRIBUTIONS OF THE OCCUPANCY-RATE OF THE TOTAL STORAGE-AREA
26 C.Q.  THE TOTAL STORAGE-VOLUME
27 SEE STORESTREAMS  1AREA_OR  AND   1VOL_OR
28
29 ANNUAL NUMBER OF TRUCKS LEAVING THIS TERMINAL    =  139292
30 ANNUAL NUMBER OF TRUCKS ENTERING THIS TERMINAL   =  142113
31 ANNUAL NUMBER OF WAGONS LEAVING THIS TERMINAL    =    8264
32 ANNUAL NUMBER OF WAGONS ENTERING THIS TERMINAL   =    8339
33 ANNUAL NUMBER OF BARGES LEAVING THIS TERMINAL    =       0
34 ANNUAL NUMBER OF BARGES ENTERING THIS TERMINAL   =       0
35
36 PERFORMANCE OF BERTH....1
37 THIS BERTH IS A SINGLE BERTH
38 ANNUAL OCCUPATION-RATE = 0.586
39 ANNUAL OCCUPATIONTIME (HOURS):
40    A) IN OPERATION  (NET OPERATION TIME)          =    4977
41    B) IN PARTIAL OPERATION (BREAKDOWN OF CRANE)   =       0
42    C) NOT IN OPERATION DUE TO DELAYS              =     153
43    TOTAL                                          =            5130
44 ANNUAL TIME NOT OCCUPIED (HOURS)                  =            3630
45
46 PERFORMANCE OF CRANES AT THIS BERTH
47 CONT_CR1   ; ANNUAL TIME SPENT (HOURS):
48    A) IN OPERATION                                =    4939
49    B) NOT IN OPERATION DUE TO A BREAKDOWN         =      45
50    C) NOT IN OPERATION DUE TO DELAYS              =     153
51    D) IN MAINTENANCE                              =     119
52    E) AT REST                                     =    3504
53 CONT_CR2   ; ANNUAL TIME SPENT (HOURS):
54    A) IN OPERATION                                =    4941
55    B) NOT IN OPERATION DUE TO A BREAKDOWN         =      40
56    C) NOT IN OPERATION DUE TO DELAYS              =     153
57    D) IN MAINTENANCE                              =     119
58    E) AT REST                                     =    3508
59
60 PERFORMANCE OF BERTH....2
61 THIS BERTH IS A SINGLE BERTH
62 ANNUAL OCCUPATION-RATE = 0.439
63 ANNUAL OCCUPATIONTIME (HOURS):
```

```
    A) IN OPERATION  (NET OPERATION TIME)          =     3842
    B) IN PARTIAL OPERATION (BREAKDOWN OF CRANE)   =        0
    C) NOT IN OPERATION DUE TO DELAYS              =       ~0
    TOTAL                                          =             3842
ANNUAL TIME NOT OCCUPIED (HOURS)                   =             4918

PERFORMANCE OF CRANES AT THIS BERTH
CONT_CR3   ; ANNUAL TIME SPENT (HOURS):
    A) IN OPERATION                                =     3842
    B) NOT IN OPERATION DUE TO A BREAKDOWN         =        0
    C) NOT IN OPERATION DUE TO DELAYS              =        0
    D) IN MAINTENANCE                              =       92
    E) AT REST                                     =     4826
CONT_CR4   ; ANNUAL TIME SPENT (HOURS):
    A) IN OPERATION                                =     3842
    B) NOT IN OPERATION DUE TO A BREAKDOWN         =        0
    C) NOT IN OPERATION DUE TO DELAYS              =        0
    D) IN MAINTENANCE                              =       92
    E) AT REST                                     =     4826

PERFORMANCE OF BERTH....3
THIS BERTH IS A MULTIPLE BERTH
ANNUAL OCCUPATION-RATE = 0.190
ANNUAL OCCUPATIONTIME (METER-DAYS):
    A) IN OPERATION                                =    30375
    B) IN PARTIAL OPERATION (BREAKDOWN OF CRANE)   =        0
    C) NOT IN OPERATION DUE TO DELAYS              =      907
    TOTAL                                          =            31282
ANNUAL TIME NOT OCCUPIED (METER-DAYS)              =           132968
(TOTAL ANNUAL AVAILABLE METER-DAYS  = 365 x  450 =             164250)

DISTR. OF NUMBER OF SHIPS AT THIS BERTH: SEE STORESTREAM Q_BERTH 3
ANNUAL AVERAGE NUMBER OF SHIFTINGS OF SHIPS =  15
ANNUAL AVERAGE NUMBER OF SHIFTINGS OF CRANES =   0

PERFORMANCE OF CRANES AT THIS BERTH
CRANE1     ; ANNUAL TIME SPENT (HOURS):
    A) IN OPERATION                                =     2731
    B) NOT IN OPERATION DUE TO A BREAKDOWN         =        0
    C) NOT IN OPERATION DUE TO DELAYS              =       92
    D) IN MAINTENANCE                              =       66
    E) AT REST                                     =     5871
CRANE2     ; ANNUAL TIME SPENT (HOURS):
    A) IN OPERATION                                =     1592
    B) NOT IN OPERATION DUE TO A BREAKDOWN         =        0
    C) NOT IN OPERATION DUE TO DELAYS              =       31
    D) IN MAINTENANCE                              =       38
    E) AT REST                                     =     7100


-----------
TERMINAL  2
-----------

AVERAGE ANNUAL NUMBER OF SHIPS AT THIS TERMINAL =  624.07

ANNUAL THROUGHPUT OF BREAKBULK  = 2128177 TONS
  DISTRIBUTION OF OCCUPIED OPEN STORAGE-AREA FOR BREAKBULK  :
  SEE STORESTREAM  2OPEN202
  DISTRIBUTION OF OCCUPIED COVERED STORAGE-AREA FOR BREAKBULK  :
  SEE STORESTREAM  2COV202

ANNUAL THROUGHPUT OF BANANAS    = 2930912 TONS
  DISTRIBUTION OF OCCUPIED OPEN STORAGE-AREA FOR BANANAS    :
  SEE STORESTREAM  2OPEN211
  DISTRIBUTION OF OCCUPIED COVERED STORAGE-AREA FOR BANANAS    :
```

```
130   SEE STORESTREAM  2COV211
131
132 DISTRIBUTIONS OF THE OCCUPANCY-RATE OF THE TOTAL STORAGE-AREA
133 C.Q.  THE TOTAL STORAGE-VOLUME
134 SEE STORESTREAMS  2AREA_OR  AND   2VOL_OR
135
136 ANNUAL NUMBER OF TRUCKS LEAVING THIS TERMINAL     =  229142
137 ANNUAL NUMBER OF TRUCKS ENTERING THIS TERMINAL    =  226176
138 ANNUAL NUMBER OF WAGONS LEAVING THIS TERMINAL     =    8487
139 ANNUAL NUMBER OF WAGONS ENTERING THIS TERMINAL    =    8377
140 ANNUAL NUMBER OF BARGES LEAVING THIS TERMINAL     =       0
141 ANNUAL NUMBER OF BARGES ENTERING THIS TERMINAL    =       0
142
143 PERFORMANCE OF BERTH....4
144 THIS BERTH IS A MULTIPLE BERTH
145 ANNUAL OCCUPATION-RATE = 0.399
146 ANNUAL OCCUPATIONTIME (METER-DAYS):
147    A) IN OPERATION                                =   96217
148    B) IN PARTIAL OPERATION (BREAKDOWN OF CRANE)   =       0
149    C) NOT IN OPERATION DUE TO DELAYS              =    2122
150    TOTAL                                          =          98338
151 ANNUAL TIME NOT OCCUPIED (METER-DAYS)             =         148037
152 (TOTAL ANNUAL AVAILABLE METER-DAYS  = 365 x  675 =         246375)
153
154 DISTR.  OF NUMBER OF SHIPS AT THIS BERTH:  SEE STORESTREAM Q_BERTH 4
155 ANNUAL AVERAGE NUMBER OF SHIFTINGS OF SHIPS =   9
156 ANNUAL AVERAGE NUMBER OF SHIFTINGS OF CRANES =   0
157
158 PERFORMANCE OF CRANES AT THIS BERTH
159 CRANE3     ; ANNUAL TIME SPENT (HOURS):
160    A) IN OPERATION                                =    4552
161    B) NOT IN OPERATION DUE TO A BREAKDOWN         =       0
162    C) NOT IN OPERATION DUE TO DELAYS              =      61
163    D) IN MAINTENANCE                              =     109
164    E) AT REST                                     =    4038
165 CRANE4     ; ANNUAL TIME SPENT (HOURS):
166    A) IN OPERATION                                =    3408
167    B) NOT IN OPERATION DUE TO A BREAKDOWN         =       0
168    C) NOT IN OPERATION DUE TO DELAYS              =     123
169    D) IN MAINTENANCE                              =      82
170    E) AT REST                                     =    5148
171 CRANE5     ; ANNUAL TIME SPENT (HOURS):
172    A) IN OPERATION                                =    2953
173    B) NOT IN OPERATION DUE TO A BREAKDOWN         =       0
174    C) NOT IN OPERATION DUE TO DELAYS              =      92
175    D) IN MAINTENANCE                              =      71
176    E) AT REST                                     =    5644
177
178
179 -----------
180 TERMINAL  3
181 -----------
182
183 AVERAGE ANNUAL NUMBER OF SHIPS AT THIS TERMINAL =  285.87
184
185 ANNUAL THROUGHPUT OF VEGET_OIL  = 4677125 TONS
186   DISTRIBUTION OF STORAGE-VOLUME FOR VEGET_OIL  :
187   SEE STORESTREAM  3VOL301
188
189 DISTRIBUTIONS OF THE OCCUPANCY-RATE OF THE TOTAL STORAGE-AREA
190 C.Q.  THE TOTAL STORAGE-VOLUME
191 SEE STORESTREAMS  3AREA_OR  AND   3VOL_OR
192
193 ANNUAL NUMBER OF TRUCKS LEAVING THIS TERMINAL     =  206942
194 ANNUAL NUMBER OF TRUCKS ENTERING THIS TERMINAL    =  214000
195 ANNUAL NUMBER OF WAGONS LEAVING THIS TERMINAL     =    7665
```

```
196 ANNUAL NUMBER OF WAGONS ENTERING THIS TERMINAL   =     7926
197 ANNUAL NUMBER OF BARGES LEAVING THIS TERMINAL    =        0
198 ANNUAL NUMBER OF BARGES ENTERING THIS TERMINAL   =        0
199
200 PERFORMANCE OF BERTH....5
201 THIS BERTH IS A SINGLE BERTH
202 ANNUAL OCCUPATION-RATE = 0.522
203 ANNUAL OCCUPATIONTIME (HOURS):
204    A) IN OPERATION  (NET OPERATION TIME)          =     4535
205    B) IN PARTIAL OPERATION (BREAKDOWN OF CRANE)   =       39
206    C) NOT IN OPERATION DUE TO DELAYS              =        0
207    TOTAL                                          =             4574
208 ANNUAL TIME NOT OCCUPIED (HOURS)                  =             4186
209
210 PERFORMANCE OF CRANES AT THIS BERTH
211 PUMP1       ; ANNUAL TIME SPENT (HOURS):
212    A) IN OPERATION                                =     4535
213    B) NOT IN OPERATION DUE TO A BREAKDOWN         =       39
214    C) NOT IN OPERATION DUE TO DELAYS              =        0
215    D) IN MAINTENANCE                              =      109
216    E) AT REST                                     =     4077
217
218 PERFORMANCE OF BERTH....6
219 THIS BERTH IS A SINGLE BERTH
220 ANNUAL OCCUPATION-RATE = 0.381
221 ANNUAL OCCUPATIONTIME (HOURS):
222    A) IN OPERATION  (NET OPERATION TIME)          =     3336
223    B) IN PARTIAL OPERATION (BREAKDOWN OF CRANE)   =        0
224    C) NOT IN OPERATION DUE TO DELAYS              =        0
225    TOTAL                                          =             3336
226 ANNUAL TIME NOT OCCUPIED (HOURS)                  =             5424
227
228 PERFORMANCE OF CRANES AT THIS BERTH
229 PUMP2       ; ANNUAL TIME SPENT (HOURS):
230    A) IN OPERATION                                =     3336
231    B) NOT IN OPERATION DUE TO A BREAKDOWN         =        0
232    C) NOT IN OPERATION DUE TO DELAYS              =        0
233    D) IN MAINTENANCE                              =       80
234    E) AT REST                                     =     5344
235
236
237 -----------
238 TERMINAL  4
239 -----------
240
241 AVERAGE ANNUAL NUMBER OF SHIPS AT THIS TERMINAL =  319.06
242
243 ANNUAL THROUGHPUT OF WHEAT      = 4240491 TONS
244   DISTRIBUTION OF STORAGE-VOLUME FOR WHEAT      :
245   SEE STORESTREAM  4VOL401
246
247 ANNUAL THROUGHPUT OF BREAKBULK  =  482419 TONS
248   DISTRIBUTION OF OCCUPIED OPEN STORAGE-AREA FOR BREAKBULK  :
249   SEE STORESTREAM  4OPEN203
250   DISTRIBUTION OF OCCUPIED COVERED STORAGE-AREA FOR BREAKBULK  :
251   SEE STORESTREAM  4COV203
252
253 DISTRIBUTIONS OF THE OCCUPANCY-RATE OF THE TOTAL STORAGE-AREA
254 C.Q.  THE TOTAL STORAGE-VOLUME
255 SEE STORESTREAMS  4AREA_OR  AND   4VOL_OR
256
257 ANNUAL NUMBER OF TRUCKS LEAVING THIS TERMINAL    =  211192
258 ANNUAL NUMBER OF TRUCKS ENTERING THIS TERMINAL   =  213870
259 ANNUAL NUMBER OF WAGONS LEAVING THIS TERMINAL    =    7822
260 ANNUAL NUMBER OF WAGONS ENTERING THIS TERMINAL   =    7921
261 ANNUAL NUMBER OF BARGES LEAVING THIS TERMINAL    =       0
```

```
ANNUAL NUMBER OF BARGES ENTERING THIS TERMINAL    =        0

PERFORMANCE OF BERTH....7
THIS BERTH IS A MULTIPLE BERTH
ANNUAL OCCUPATION-RATE = 0.351
ANNUAL OCCUPATIONTIME (METER-DAYS):
   A) IN OPERATION                                 =    68786
   B) IN PARTIAL OPERATION (BREAKDOWN OF CRANE)    =        0
   C) NOT IN OPERATION DUE TO DELAYS               =     1608
   TOTAL                                           =            70394
ANNUAL TIME NOT OCCUPIED (METER-DAYS)              =           130356
(TOTAL ANNUAL AVAILABLE METER-DAYS  = 365 x  550 =             200750)

DISTR. OF NUMBER OF SHIPS AT THIS BERTH: SEE STORESTREAM Q_BERTH 7
ANNUAL AVERAGE NUMBER OF SHIFTINGS OF SHIPS =  28
ANNUAL AVERAGE NUMBER OF SHIFTINGS OF CRANES =   0

PERFORMANCE OF CRANES AT THIS BERTH
CRANE6     ; ANNUAL TIME SPENT (HOURS):
   A) IN OPERATION                                 =     4472
   B) NOT IN OPERATION DUE TO A BREAKDOWN          =        0
   C) NOT IN OPERATION DUE TO DELAYS               =       31
   D) IN MAINTENANCE                               =      107
   E) AT REST                                      =     4150
CRANE7     ; ANNUAL TIME SPENT (HOURS):
   A) IN OPERATION                                 =     3584
   B) NOT IN OPERATION DUE TO A BREAKDOWN          =        0
   C) NOT IN OPERATION DUE TO DELAYS               =       92
   D) IN MAINTENANCE                               =       86
   E) AT REST                                      =     4998


########## PERFORMANCE OF SHIPS ###########

---------------------
CLASS  1 : CONT-CLASS
---------------------

ANNUAL NUMBER OF SHIPS =   299.91
AVERAGE RATIO (TIME AT ANCHORAGE\TIME AT QUAY) =  0.274

AVERAGE TIME AT ANCHORAGE (HOURS)      =            8.20
AVERAGE MOORING TIME (HOURS)           =            5.97
AVERAGE TIME AT QUAY (HOURS):
   A)  IN OPERATION                    =   29.16
   B)  IN PARTIAL OPERATION            =    0.25
   C)  NOT IN OPERATION DUE TO DELAYS  =    0.51
   TOTAL                               =           29.92


---------------------
CLASS  2 : GEN_CARGO1
---------------------

ANNUAL NUMBER OF SHIPS =   515.59
AVERAGE RATIO (TIME AT ANCHORAGE\TIME AT QUAY) =  0.342

AVERAGE TIME AT ANCHORAGE (HOURS)      =            7.84
AVERAGE MOORING TIME (HOURS)           =            5.97
AVERAGE TIME AT QUAY (HOURS):
   A)  IN OPERATION                    =   22.50
   B)  IN PARTIAL OPERATION            =    0.00
   C)  NOT IN OPERATION DUE TO DELAYS  =    0.44
   TOTAL                               =           22.94
```

```
328 ---------------------
329 CLASS  3 : GEN_CARGO2
330 ---------------------
331
332 ANNUAL NUMBER OF SHIPS =   362.45
333 AVERAGE RATIO (TIME AT ANCHORAGE\TIME AT QUAY) =  0.476
334
335 AVERAGE TIME AT ANCHORAGE (HOURS)      =          11.08
336 AVERAGE MOORING TIME (HOURS)          =           6.00
337 AVERAGE TIME AT QUAY (HOURS):
338    A)  IN OPERATION                    =   22.50
339    B)  IN PARTIAL OPERATION            =    0.00
340    C)  NOT IN OPERATION DUE TO DELAYS  =    0.78
341    TOTAL                               =          23.28
342
343
344 ---------------------
345 CLASS  4 : LIQCARRRIE
346 ---------------------
347
348 ANNUAL NUMBER OF SHIPS =   285.87
349 AVERAGE RATIO (TIME AT ANCHORAGE\TIME AT QUAY) =  0.213
350
351 AVERAGE TIME AT ANCHORAGE (HOURS)      =           5.89
352 AVERAGE MOORING TIME (HOURS)          =           5.95
353 AVERAGE TIME AT QUAY (HOURS):
354    A)  IN OPERATION                    =   27.53
355    B)  IN PARTIAL OPERATION            =    0.14
356    C)  NOT IN OPERATION DUE TO DELAYS  =    0.00
357    TOTAL                               =          27.67
358
359
360 ---------------------
361 CLASS  5 : GRAINSHIP
362 ---------------------
363
364 ANNUAL NUMBER OF SHIPS =   260.35
365 AVERAGE RATIO (TIME AT ANCHORAGE\TIME AT QUAY) =  0.422
366
367 AVERAGE TIME AT ANCHORAGE (HOURS)      =          12.87
368 AVERAGE MOORING TIME (HOURS)          =           5.97
369 AVERAGE TIME AT QUAY (HOURS):
370    A)  IN OPERATION                    =   29.94
371    B)  IN PARTIAL OPERATION            =    0.00
372    C)  NOT IN OPERATION DUE TO DELAYS  =    0.57
373    TOTAL                               =          30.50
374
375
376 ########## DETAILED PERFORMANCE OF THE BERTHS ##########
377
378 BERTH....1 (SINGLE BERTH)
379 ANNUAL OCCUPATIONTIME (HOURS):
380    A) IN OPERATION  (NET OPERATION TIME)          =    4977
381    B) IN PARTIAL OPERATION (BREAKDOWN OF CRANE)   =       0
382    C) NOT IN OPERATION:
383       1) GROSS - NET OPERATION TIME               =       0
384       2) DUE TO STRIKE                            =     123
385       3) DUE TO BAD WEATHER                       =      31
386 ANNUAL TIME NOT OCCUPIED (HOURS):
387    A) DUE TO BAD WEATHER                          =      31
388    B) DUE TO TIDE                                 =       0
389    C) NO SHIPS FOR THIS BERTH AT ANCHORAGE        =    3599
390
391 BERTH....2 (SINGLE BERTH)
392 ANNUAL OCCUPATIONTIME (HOURS):
393    A) IN OPERATION  (NET OPERATION TIME)          =    3842
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   B) IN PARTIAL OPERATION (BREAKDOWN OF CRANE) =        0
   C) NOT IN OPERATION:
      1) GROSS - NET OPERATION TIME             =       ~0
      2) DUE TO STRIKE                          =        0
      3) DUE TO BAD WEATHER                     =        0
ANNUAL TIME NOT OCCUPIED (HOURS):
   A) DUE TO BAD WEATHER                        =        0
   B) DUE TO TIDE                               =        0
   C) NO SHIPS FOR THIS BERTH AT ANCHORAGE      =     4918

BERTH....3 (MULTIPLE BERTH)
ANNUAL OCCUPATIONTIME (METER-DAYS):
   A) IN OPERATION  (NET OPERATION TIME)        =    30375
   B) IN PARTIAL OPERATION (BREAKDOWN OF CRANE) =        0
   C) NOT IN OPERATION:
      1) GROSS - NET OPERATION TIME             =        0
      2) DUE TO STRIKE                          =      414
      3) DUE TO BAD WEATHER                     =      415
      4) DUE TO SHIFTING OF SHIPS               =       78
ANNUAL TIME NOT OCCUPIED (METER-DAYS):
   A) DUE TO BAD WEATHER                        =      415
   B) DUE TO TIDE                               =        0
   C) NO SHIPS FOR THIS BERTH AT ANCHORAGE      =   132553

BERTH....4 (MULTIPLE BERTH)
ANNUAL OCCUPATIONTIME (METER-DAYS):
   A) IN OPERATION  (NET OPERATION TIME)        =    96217
   B) IN PARTIAL OPERATION (BREAKDOWN OF CRANE) =        0
   C) NOT IN OPERATION:
      1) GROSS - NET OPERATION TIME             =        0
      2) DUE TO STRIKE                          =     1658
      3) DUE TO BAD WEATHER                     =      403
      4) DUE TO SHIFTING OF SHIPS               =       61
ANNUAL TIME NOT OCCUPIED (METER-DAYS):
   A) DUE TO BAD WEATHER                        =      403
   B) DUE TO TIDE                               =        0
   C) NO SHIPS FOR THIS BERTH AT ANCHORAGE      =   147634

BERTH....5 (SINGLE BERTH)
ANNUAL OCCUPATIONTIME (HOURS):
   A) IN OPERATION  (NET OPERATION TIME)        =     4535
   B) IN PARTIAL OPERATION (BREAKDOWN OF CRANE) =       39
   C) NOT IN OPERATION:
      1) GROSS - NET OPERATION TIME             =        0
      2) DUE TO STRIKE                          =        0
      3) DUE TO BAD WEATHER                     =        0
ANNUAL TIME NOT OCCUPIED (HOURS):
   A) DUE TO BAD WEATHER                        =        0
   B) DUE TO TIDE                               =        0
   C) NO SHIPS FOR THIS BERTH AT ANCHORAGE      =     4186

BERTH....6 (SINGLE BERTH)
ANNUAL OCCUPATIONTIME (HOURS):
   A) IN OPERATION  (NET OPERATION TIME)        =     3336
   B) IN PARTIAL OPERATION (BREAKDOWN OF CRANE) =        0
   C) NOT IN OPERATION:
      1) GROSS - NET OPERATION TIME             =        0
      2) DUE TO STRIKE                          =        0
      3) DUE TO BAD WEATHER                     =        0
ANNUAL TIME NOT OCCUPIED (HOURS):
   A) DUE TO BAD WEATHER                        =        0
   B) DUE TO TIDE                               =        0
   C) NO SHIPS FOR THIS BERTH AT ANCHORAGE      =     5424

BERTH....7 (MULTIPLE BERTH)
ANNUAL OCCUPATIONTIME (METER-DAYS):
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460    A) IN OPERATION  (NET OPERATION TIME)          =   68786
461    B) IN PARTIAL OPERATION (BREAKDOWN OF CRANE)   =       0
462    C) NOT IN OPERATION:
463       1) GROSS - NET OPERATION TIME               =       0
464       2) DUE TO STRIKE                            =     901
465       3) DUE TO BAD WEATHER                       =     505
466       4) DUE TO SHIFTING OF SHIPS                 =     203
467 ANNUAL TIME NOT OCCUPIED (METER-DAYS):
468    A) DUE TO BAD WEATHER                          =     505
469    B) DUE TO TIDE                                 =     985
470    C) NO SHIPS FOR THIS BERTH AT ANCHORAGE        =  128867
471
472
473 ####### INDICATION FOR PERFORMANCE OF TERMINAL-EQUIPMENT ######
474
475 INDICATION OF ANNUAL AVERAGE NUMBER OF HOURS IN OPERATION
476
477 TERMINAL.1 :  3466 HOURS
478
479 TERMINAL.2 :  6044 HOURS
480
481 TERMINAL.3 :  5029 HOURS
482
483 TERMINAL.4 :  6348 HOURS
484
485
486 ########## DETAILED PERFORMANCE OF SHIPS ###########
487
488 CLASS  1 : CONT-CLASS
489 AVERAGE TIME AT ANCHORAGE (HOURS):
490    A)  WAITING DUE TO FULL PORT                   =    8.10
491    B)  WAITING DUE TO BAD WEATHER                 =    0.10
492    C)  WAITING DUE TO TIDE                        =    0.00
493 AVERAGE MOORING TIME (HOURS)                      =    5.97
494 AVERAGE TIME AT QUAY (HOURS):
495    A)  IN OPERATION (NET OPERATION TIME)          =   29.16
496    B)  IN PARTIAL OPERATION (CRANE-BREAKDOWN)     =    0.25
497    C)  NOT IN OPERATION:
498       1)  GROSS - NET OPERATION TIME              =    0.00
499       2)  WAITING DUE TO STRIKES                  =    0.41
500       3)  WAITING DUE TO BAD WEATHER              =    0.10
501       4)  WAITING DUE TO SHIFTING                 =    0.00
502 NB.  AVERAGE WAITING IN PORT DUE TO TIDE          =    0.00
503
504 CLASS  2 : GEN_CARGO1
505 AVERAGE TIME AT ANCHORAGE (HOURS):
506    A)  WAITING DUE TO FULL PORT                   =    7.67
507    B)  WAITING DUE TO BAD WEATHER                 =    0.17
508    C)  WAITING DUE TO TIDE                        =    0.00
509 AVERAGE MOORING TIME (HOURS)                      =    5.97
510 AVERAGE TIME AT QUAY (HOURS):
511    A)  IN OPERATION (NET OPERATION TIME)          =   22.50
512    B)  IN PARTIAL OPERATION (CRANE-BREAKDOWN)     =    0.00
513    C)  NOT IN OPERATION:
514       1)  GROSS - NET OPERATION TIME              =    0.00
515       2)  WAITING DUE TO STRIKES                  =    0.24
516       3)  WAITING DUE TO BAD WEATHER              =    0.17
517       4)  WAITING DUE TO SHIFTING                 =    0.03
518 NB.  AVERAGE WAITING IN PORT DUE TO TIDE          =    0.00
519
520 CLASS  3 : GEN_CARGO2
521 AVERAGE TIME AT ANCHORAGE (HOURS):
522    A)  WAITING DUE TO FULL PORT                   =   11.00
523    B)  WAITING DUE TO BAD WEATHER                 =    0.08
524    C)  WAITING DUE TO TIDE                        =    0.00
525 AVERAGE MOORING TIME (HOURS)                      =    6.00
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AVERAGE TIME AT QUAY (HOURS):
   A)  IN OPERATION (NET OPERATION TIME)       =    22.50
   B)  IN PARTIAL OPERATION (CRANE-BREAKDOWN) =     0.00
   C)  NOT IN OPERATION:
      1)  GROSS - NET OPERATION TIME           =     0.00
      2)  WAITING DUE TO STRIKES               =     0.68
      3)  WAITING DUE TO BAD WEATHER           =     0.08
      4)  WAITING DUE TO SHIFTING              =     0.02
NB. AVERAGE WAITING IN PORT DUE TO TIDE        =     0.00

CLASS  4 : LIQCARRRIE
AVERAGE TIME AT ANCHORAGE (HOURS):
   A)  WAITING DUE TO FULL PORT                =     5.89
   B)  WAITING DUE TO BAD WEATHER              =     0.00
   C)  WAITING DUE TO TIDE                     =     0.00
AVERAGE MOORING TIME (HOURS)                   =     5.95
AVERAGE TIME AT QUAY (HOURS):
   A)  IN OPERATION (NET OPERATION TIME)       =    27.53
   B)  IN PARTIAL OPERATION (CRANE-BREAKDOWN) =     0.14
   C)  NOT IN OPERATION:
      1)  GROSS - NET OPERATION TIME           =     0.00
      2)  WAITING DUE TO STRIKES               =     0.00
      3)  WAITING DUE TO BAD WEATHER           =     0.00
      4)  WAITING DUE TO SHIFTING              =     0.00
NB. AVERAGE WAITING IN PORT DUE TO TIDE        =     0.00

CLASS  5 : GRAINSHIP
AVERAGE TIME AT ANCHORAGE (HOURS):
   A)  WAITING DUE TO FULL PORT                =    12.17
   B)  WAITING DUE TO BAD WEATHER              =     0.24
   C)  WAITING DUE TO TIDE                     =     0.46
AVERAGE MOORING TIME (HOURS)                   =     5.97
AVERAGE TIME AT QUAY (HOURS):
   A)  IN OPERATION (NET OPERATION TIME)       =    29.94
   B)  IN PARTIAL OPERATION (CRANE-BREAKDOWN) =     0.00
   C)  NOT IN OPERATION:
      1)  GROSS - NET OPERATION TIME           =     0.00
      2)  WAITING DUE TO STRIKES               =     0.24
      3)  WAITING DUE TO BAD WEATHER           =     0.24
      4)  WAITING DUE TO SHIFTING              =     0.10
NB. AVERAGE WAITING IN PORT DUE TO TIDE        =     0.27


AVERAGE ANNUAL NUMBER OF TYPHOONS IN THIS PORT =  1.28
AVERAGE ANNUAL NUMBER OF STRIKES IN THIS PORT  =  2.55
```

PERSONAL PROSIM HISTOGRAM FACILITY == FILE STORE_DE== SELECTION ROW
Licensed to HASKONING bv te NIJMEGEN

Mean : 2.660503 Minimum: 0.000
Deviation: 2.393445 Maximum: 15.000
90% : 5.157143 95% : 6.608

Upper Bound	Cum Perc	2704 Entries
0.0000	13.54	366
1.0000	38.20	667
2.0000	57.47	521
3.0000	72.08	395
4.0000	82.69	287
5.0000	89.35	180
6.0000	93.49	112
7.0000	95.97	67
8.0000	97.37	38
9.0000	98.15	21
10.0000	98.52	10
11.0000	98.78	7
12.0000	99.11	9
13.0000	99.45	9
14.0000	99.78	9

F7:Print == F8:Lower bound == F9:Classwidth == F10:Quit

PERSONAL PROSIM HISTOGRAM FACILITY == FILE STORE_DE== SELECTION Q_BERTH 4
Licensed to HASKONING bv te NIJMEGEN

Mean : 1.957621 Minimum: 0.000
Deviation: 0.793662 Maximum: 3.000
90% : 2.617898 95% : 2.808

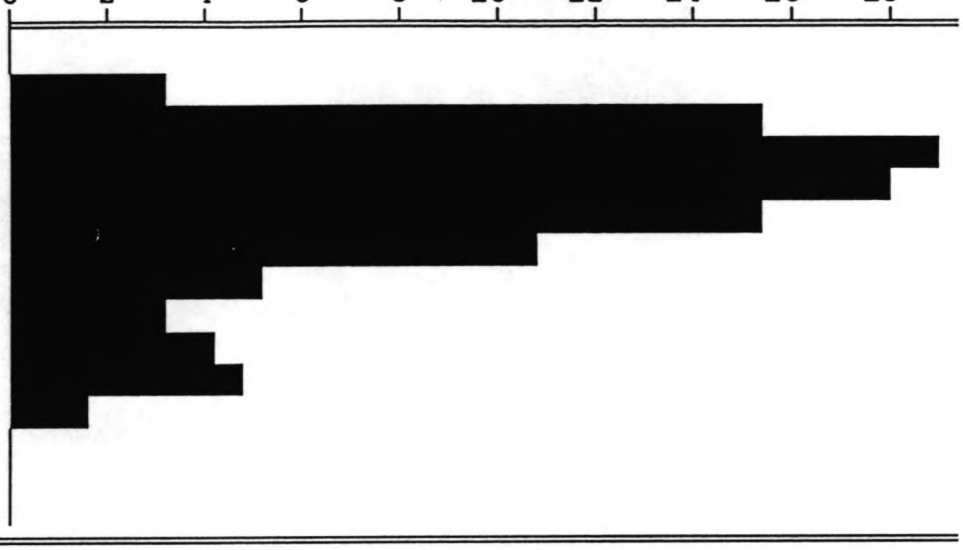
Upper Bound	Cum Perc	1345 Entries
0.00000	3.27	44
1.00000	27.14	321
2.00000	73.83	628
3.00000	100.00	352
4.00000	100.00	0
5.00000	100.00	0
6.00000	100.00	0
7.00000	100.00	0
8.00000	100.00	0
9.00000	100.00	0
10.00000	100.00	0
11.00000	100.00	0
12.00000	100.00	0
13.00000	100.00	0
14.00000	100.00	0

F7:Print == F8:Lower bound == F9:Classwidth == F10:Quit

PERSONAL PROSIM HISTOGRAM FACILITY == FILE STORE_DE== SELECTION 1EXSL101
Licensed to HASKONING bv te NIJMEGEN

Mean : 1437.463867 Minimum: 677.414
Deviation: 469.555969 Maximum: 2736.107
90% : 2212.500000 95% : 2450.000

Upper Bound	Cum Perc	195 Entries
600.00	0.00	0
800.00	3.08	6
1000.00	18.46	30
1200.00	37.44	37
1400.00	55.38	35
1600.00	70.77	30
1800.00	81.54	21
2000.00	86.67	10
2200.00	89.74	6
2400.00	93.85	8
2600.00	98.46	9
2800.00	100.00	3
3000.00	100.00	0
3200.00	100.00	0
3400.00	100.00	0



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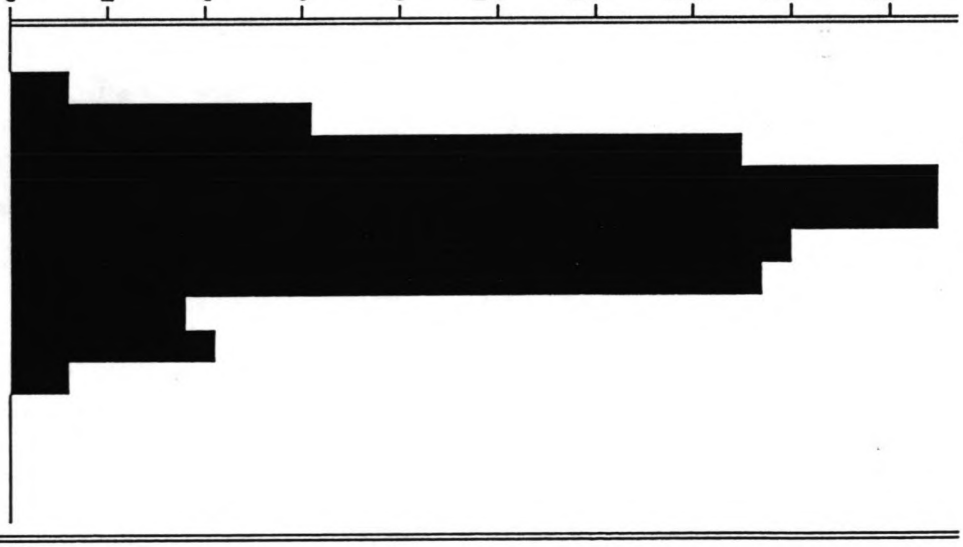
PERSONAL PROSIM HISTOGRAM FACILITY == FILE STORE_DE== SELECTION 1IMSL101
Licensed to HASKONING bv te NIJMEGEN

Mean : 1107.493286 Minimum: 324.292
Deviation: 366.439484 Maximum: 2147.870
90% : 1583.333252 95% : 1806.250

Upper Bound	Cum Perc	195 Entries
200.00	0.00	0
400.00	1.03	2
600.00	7.18	12
800.00	22.05	29
1000.00	41.03	37
1200.00	60.00	37
1400.00	75.90	31
1600.00	91.28	30
1800.00	94.87	7
2000.00	98.97	8
2200.00	100.00	2
2400.00	100.00	0
2600.00	100.00	0
2800.00	100.00	0
3000.00	100.00	0



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= PERSONAL PROSIM HISTOGRAM FACILITY == FILE STORE_DE== SELECTION 2OPEN202
Licensed to HASKONING bv te NIJMEGEN

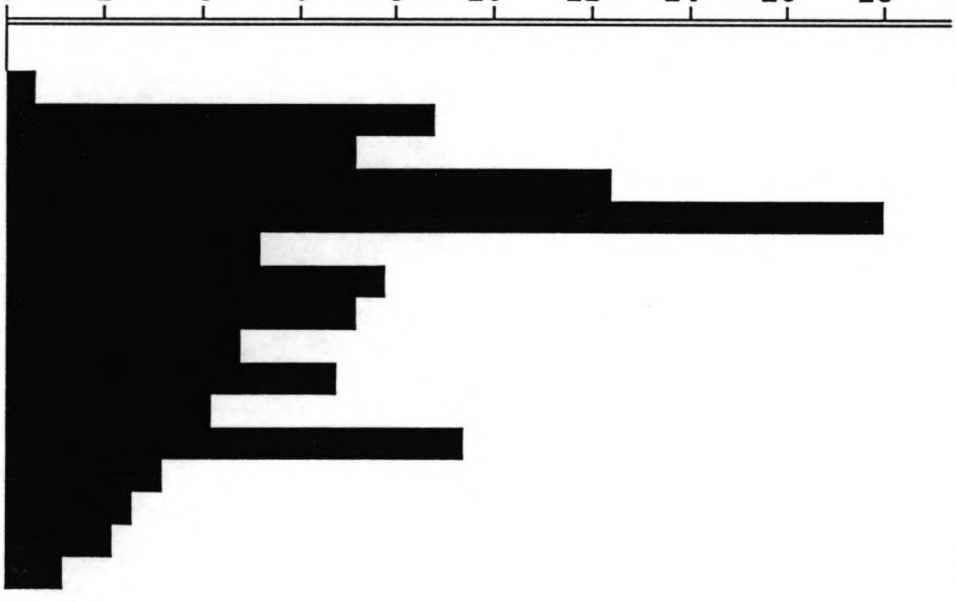
Mean : 34195.921875 Minimum: 15963.997
Deviation: 11486.479492 Maximum: 59773.031
90% : 50863.636719 95% : 54843.746

Upper Bound	Cum Perc	195 Entries
15000.0	0.00	0
18000.0	3.08	6
21000.0	10.26	14
24000.0	20.51	20
27000.0	37.95	34
30000.0	48.21	20
33000.0	53.33	10
36000.0	59.49	12
39000.0	66.15	13
42000.0	69.23	6
45000.0	74.87	11
48000.0	84.62	19
51000.0	90.26	11
54000.0	93.85	7
57000.0	97.95	8
60000.0	100.00	4

= PERSONAL PROSIM HISTOGRAM FACILITY == FILE STORE_DE== SELECTION 2COV202
Licensed to HASKONING bv te NIJMEGEN

Mean : 23098.634766 Minimum: 11480.552
Deviation: 7310.128906 Maximum: 40662.027
90% : 33722.222656 95% : 36500.007

Upper Bound	Cum Perc	195 Entries
10000.0	0.00	0
12000.0	0.51	1
14000.0	9.23	17
16000.0	16.41	14
18000.0	28.72	24
20000.0	46.67	35
22000.0	51.79	10
24000.0	59.49	15
26000.0	66.67	14
28000.0	71.28	9
30000.0	77.95	13
32000.0	82.05	8
34000.0	91.28	18
36000.0	94.36	6
38000.0	96.92	5
40000.0	98.97	4
42000.0	100.00	2



= PERSONAL PROSIM HISTOGRAM FACILITY == FILE STORE_DE== SELECTION 3ARR301
Licensed to HASKONING bv te NIJMEGEN

Mean : 5883.198730 Minimum: 0.000
Deviation: 4237.179688 Maximum: 25876.496
90% : 11666.666016 95% : 13450.000

Upper Bound	Cum Perc	195 Entries
0.0	11.79	23
2000.0	17.95	12
4000.0	40.51	44
6000.0	52.82	24
8000.0	71.79	37
10000.0	83.59	23
12000.0	91.28	15
14000.0	96.41	10
16000.0	98.46	4
18000.0	99.49	2
20000.0	99.49	0
22000.0	99.49	0
24000.0	99.49	0
26000.0	100.00	1

= PERSONAL PROSIM HISTOGRAM FACILITY == FILE STORE_DE== SELECTION 3DEP301
Licensed to HASKONING bv te NIJMEGEN

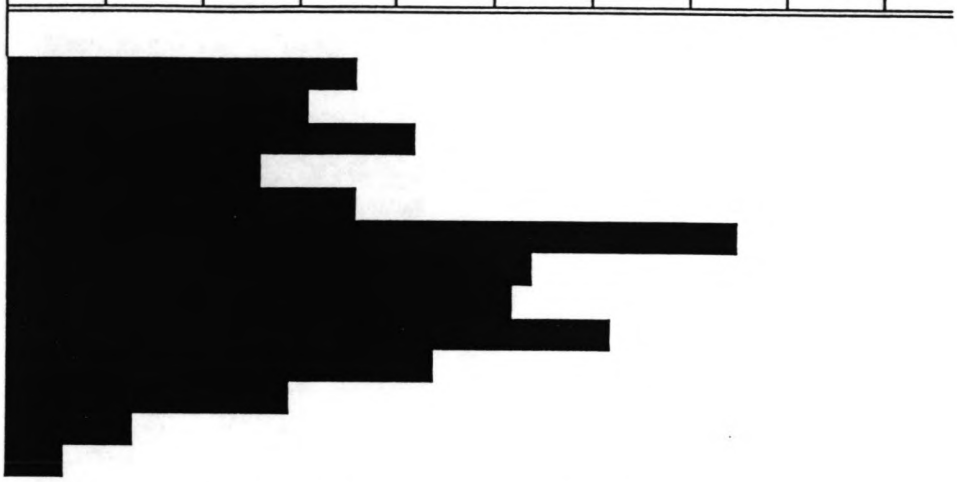
Mean : 5874.117676 Minimum: 0.000
Deviation: 2843.011475 Maximum: 11849.968
90% : 9785.711914 95% : 10589.284

Upper Bound	Cum Perc	195 Entries
0.0	5.13	10
1000.0	5.13	0
2000.0	9.74	9
3000.0	16.41	13
4000.0	26.67	20
5000.0	38.97	24
6000.0	48.21	18
7000.0	63.59	30
8000.0	76.41	25
9000.0	87.18	21
10000.0	90.77	7
11000.0	97.95	14
12000.0	100.00	4

= PERSONAL PROSIM HISTOGRAM FACILITY == FILE STORE_DE== SELECTION 4VOL401
Licensed to HASKONING bv te NIJMEGEN

Mean : 299977.125000 Minimum: 180502.062
Deviation: 60843.917969 Maximum: 439119.687
90% : 378235.281250 95% : 395000.000

Upper Bound	Cum Perc	195 Entries
180000.0	0.00	0
200000.0	7.18	14
220000.0	13.33	12
240000.0	21.54	16
260000.0	26.67	10
280000.0	33.85	14
300000.0	48.72	29
320000.0	59.49	21
340000.0	69.74	20
360000.0	82.05	24
380000.0	90.77	17
400000.0	96.41	11
420000.0	98.97	5
440000.0	100.00	2



= PERSONAL PROSIM HISTOGRAM FACILITY == FILE STORE_DE== SELECTION 4AREA_OR
Licensed to HASKONING bv te NIJMEGEN

Mean : 0.255678 Minimum: 7.46536
Deviation: 0.146385 Maximum: 0.645
90% : 0.455769 95% : 0.493

Upper Bound	Cum Perc	195 Entries
0.000000	0.00	0
0.050000	9.23	18
0.100000	15.90	13
0.150000	25.64	19
0.200000	40.00	28
0.250000	51.79	23
0.300000	60.51	17
0.350000	68.72	16
0.400000	81.03	24
0.450000	89.23	16
0.500000	95.90	13
0.550000	98.97	6
0.600000	99.49	1
0.650000	100.00	1