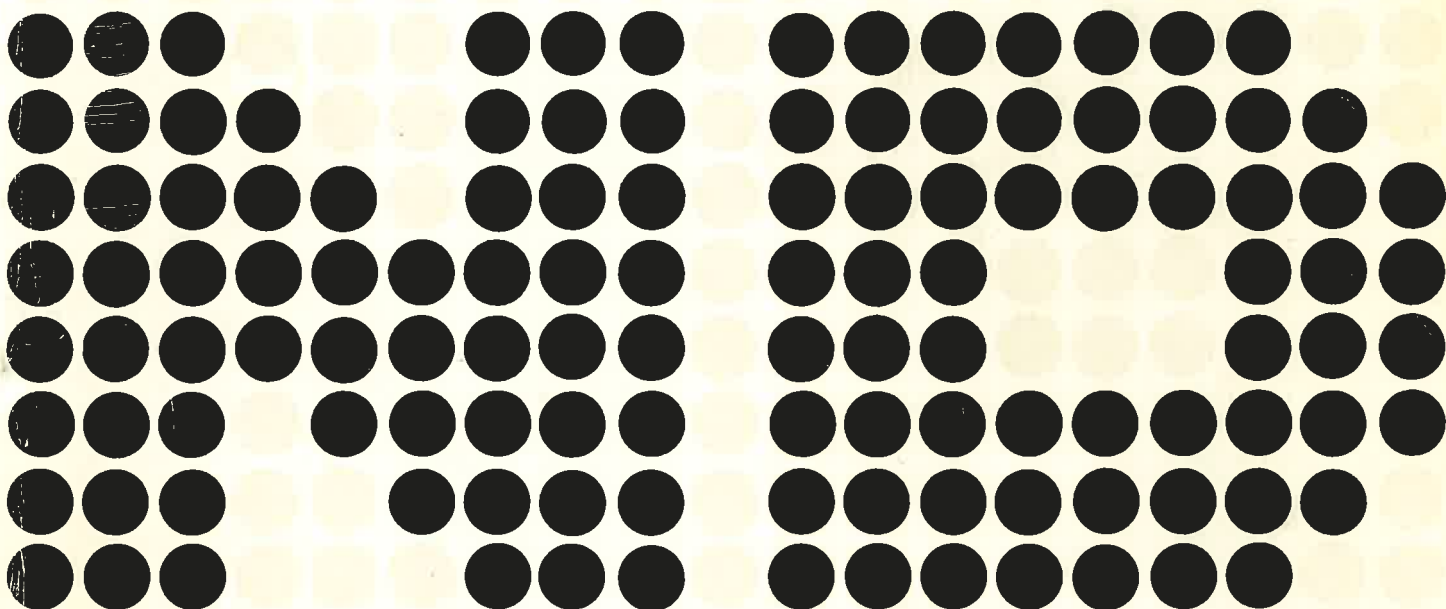


SINTRAN III
System Supervisor

ND-30.003.05

NORSK DATA A.S



SINTRAN III

System Supervisor

ND-30.003.05

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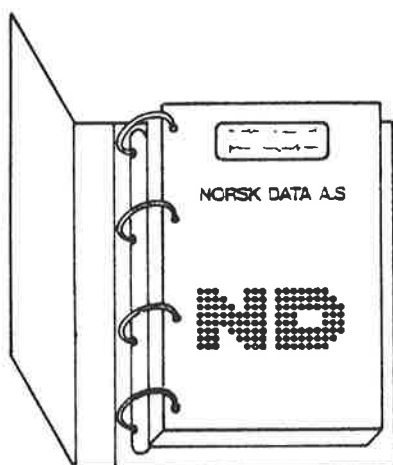
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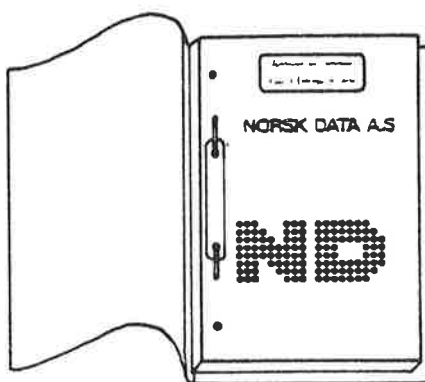
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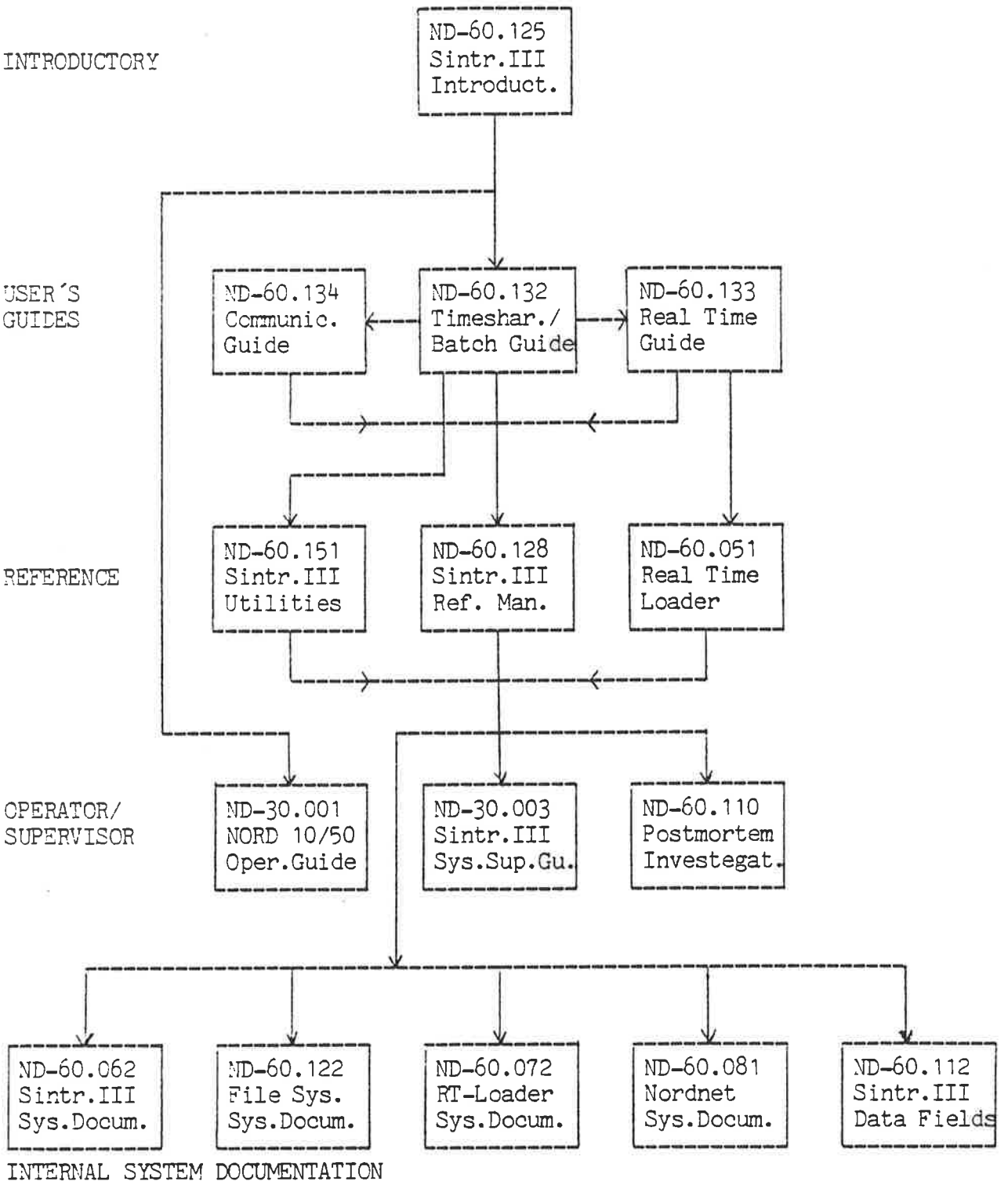
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SINTRAN III/VS

INTRODUCTORY

USER'S
GUIDES

REFERENCE

OPERATOR/
SUPERVISOR

INTERNAL SYSTEM DOCUMENTATION

SINTRAN III/RT

ND-60.082
Sin.III/RT
Ref. Man.

PREFACE

The Product

This manual describes the functions to be performed by a System Supervisor maintaining a machine running SINTRAN III, H Version.

The Reader

There are two types of readers of this manual.

Operators who control the daily operations of the system.

System supervisors who fill system programmer functions as well as operator functions.

Prerequisite Knowledge

Operators do not have to read all the sections in this manual and no prerequisite knowledge is required. System Supervisors are supposed to possess a general knowledge of the SINTRAN III from the background user's point of view. Recommended manuals supplying this knowledge are:

SINTRAN III Time Sharing/Batch Guide (ND—60.132)
SINTRAN III Reference Manual (ND—60.128)

The Manual

Chapter 1 contains the job description of the System Supervisor.

Chapter 2 presents the starting up procedure normally used with SINTRAN III. It also gives information about stopping the installation.

Chapter 3 describes the User System. It includes directory commands, supervision of other users, system utility commands, the accounting system, the BATCH system, information about peripheral devices and remote job entry, commands to initiate and terminate NORDNET, the mail system, utility commands, the spooling system, and the SINTRAN III service program.

Chapter 4 covers error supervising.

Chapter 5 presents preventive maintenance and hardware testing.

Chapter 6 describes the different ways of starting up SINTRAN.

Chapter 7 covers patching.

Chapter 8 describes methods of backup.

Chapters 1, 2 and 8 should be read by all users of the manual.

The appendices contain useful information about an operator's interaction with the ND-100. Logical numbers used, physical layout of disks and memory, the file system, and definitions of key software terms are also covered. Appendices H and I pertain to the Nord-10.

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NOTATIONS

The following notations are used throughout the manual:

The Commands

1. SINTRAN Commands are indicated by a @ (a commercial at). @ is the SINTRAN attention character. On the screen, it indicates that the SINTRAN Operating System is ready to receive a SINTRAN command.
2. SINTRAN commands appear in Norsk Data manuals in uppercase, or capital, letters. Commands are predesignated word groups. The words are separated by hyphens. When commands are entered by a user (i.e., from a terminal) after a @, they can be entered as lowercase, or small, letters.
3. The commands, and abbreviated commands, are underlined in most of the examples in this manual to indicate that the command is to be entered by the user.
4. Each user input must be terminated with a carriage return (CR).

Command Parameters

The rules for reading, writing, and interpreting parameters are as follows:

1. Mandatory, or required, parameters are enclosed in angled brackets, e.g., < >. Two or more required parameters are separated by a *comma* (or a space). The parameter list is separated from the command by a *space* (or a comma). The following example illustrates a command with two required parameters:

```
@LIST-DIRECTORIES-ENTERED <directory name>,<output
file>
```

The lower case used with the angled brackets (< >) implies that the user is to supply the values requested.

2. Optional parameters are further enclosed by square brackets, e.g., []. These are placed outside of the angled brackets (e.g., [<sss-sss>]). An example of optional parameters, used in conjunction with required parameters is:

```
@RENAME-DIRECTORY <old directory name,<new directory
name>,<device name> [, <unit>] [ <,'F' or 'R'>]
```

Note that the commas used with optional parameters, to separate the parameters, are inside the square brackets (e.g., [, <unit>]). This is an important consideration — if the optional parameter is not used, the comma associated with it must also be removed. If the optional parameter were removed and the comma were to remain (by virtue of being outside the square bracket), the comma would be understood by SINTRAN to be the default value of a parameter.

3. Optional parameter brackets (e.g., []) can be used inside of a set of angled brackets, as follows:

```
@CREATE-USER <[directory name:]user name>
```

This indicates that the directory name can be entered if the user wishes to do so. In this case, if the directory name is omitted, the main directory is assumed by SINTRAN. (The main directory is the default value.)

4. The character "/" is used in this manual to indicate «must be specified as one or the other». As an example, in the command:

```
*INSERT-IN-TIMER-TABLE <logical unit>,<input/output>
```

the "/" indicates that the parameter <input/output> must be specified as INPUT or OUTPUT.

Note that the * indicates that this is a command from the SINTRAN SERVICE PROGRAM.

5. "/" can also be used to indicate that either one or the other of two parameters should be entered, but not both. For example:

```
*LOOK-ACCUMULATED <user-name>/<project-name>
```

This command, taken from the SINTRAN ACCOUNTING SYSTEM, is looking at a specific entry in the AACCOUNTS:DATA for a given user or a project name, but *not both*.

1 INTRODUCTION

1.1 GENERAL

SINTRAN III is a multiprogramming, multilingual, timesharing and real-time operating system for the NORD-10/S, the ND-100 and the ND-500 computers. It has three variants - VS (Virtual Storage), VSE (Virtual Storage Extended) and VSE 500. The NORD-10/S can use only the VS variation, whereas the ND-100 can use either the VS or the VSE. ND-100/500 systems require the VSE 500 version.

An ND-100 installation is complex. The installation requires a manager. This manager is referred to within the ND computer system as a System Supervisor. This manual provides the System Supervisor with the theoretical knowledge to perform the tasks required.

This manual is not a SINTRAN III user's guide. It does not provide the information required to run jobs under this operating system. This information is provided in the following four manuals:

- ND-100 Reference Manual (ND-05.009)
- SINTRAN III Time Sharing/Batch Guide (ND-60.132)
- SINTRAN III Reference Manual (ND-60.128)
- SINTRAN III Communications Guide (ND-60.134)

These four manuals cover the main characteristics of the ND Computer System. The ND-100 Reference Manual covers hardware information. The other three manuals cover the details of using SINTRAN III. They also indicate how to make efficient application programs utilizing standard hardware and software features. The general idea of the structure of SINTRAN III is also given.

This System Supervisor Manual includes the H Version of SINTRAN III. Minor changes to SINTRAN III, as covered in this manual, will be published in the ND Bulletin. The System Supervisor is cautioned to be alert to pick these changes out of the Bulletin. Major changes to the operating system will be handled by revisions to this manual.

1.2 JOB DESCRIPTION FOR SYSTEM SUPERVISOR

Every ND-100 installation should have one person responsible for the system (i.e., a System Supervisor). The System Supervisor's work is manifold and will be looked at briefly in this chapter.

The System Supervisor should use the console terminal (terminal 1) to communicate with the system. This terminal is different from other terminals in two respects:

1. Error messages from RT programs are normally printed on this terminal. Optionally, this may be altered to another terminal by the command `@SET-ERROR-DEVICE`.
2. The microprogram MOPC can only communicate through this terminal. Optionally, a special terminal for MOPC could have been ordered.
3. When the command `@SET-UNAVAILABLE <text>` is given, it is impossible to log in from terminals other than terminal 1. This condition may be reset by the command `@SET-AVAILABLE`. Both commands are restricted to user SYSTEM.

The System Supervisor should always have complete knowledge of the installation with regard to the hardware configuration, the resource allocation, and the standard software in use.

The work of the System Supervisor can be divided into two parts:

- supervising the installation
- keeping the installation running

Supervising the installation implies:

- loading of SINTRAN III
- loading of subsystems
- implementing new patches
- creating new users and giving them space
- taking care of the accounting system
- formatting disk packs
- taking backup

Keeping the installation running implies that the supervisor should:

- be responsible for starting up, stopping, and restarting the system
- mount and dismount disk packs
- collect and sort output
- perform simple maintenance procedures
- know what action to take if a system failure occurs
- know the different test programs

Additionally, the System Supervisor should keep a library of all documentation, and read the ND Bulletin, which is published every month.

The ND Bulletin contains information for Norsk Data's customers. Of special interest to the System Supervisor are the Software System Reports. These inform the user of any new modifications and corrections in software. Newly registered programs and new program releases are also announced in the ND Bulletin.

The System Supervisor logs in as user SYSTEM and the System Supervisor should be the only one allowed to do so. A SYSTEM password should be created and used by the System Supervisor. This password should be changed regularly.

2 **NORMAL START/STOP OF SINTRAN III**

This chapter presents the start up and stopping procedures.

2.1 **START UP PROCEDURE**

- 1 Switch ON the computer

i.e., press the POWER and MASTER CLEAR buttons.
- 2 Start the disk(s)

How? See section 2.4 in case of error, see section 4.5.
- 3 Turn ON the console terminal

i.e., depress the power button (make sure it has the correct speed, according to the console speed switch setting on the CPU card, and that the local/line switch is set to line).
- 4 Load SINTRAN III.

Assuming the Automatic Load Descriptor (ALD) register is correct (see appendix J.2.5.3), press MASTER CLEAR and LOAD.
- 5 The RUN button will now light up. When SINTRAN III IS RUNNING is printed on the console, one of the following should be done:
 - a) If system initialization is completely automatic and automatic update of the software clock is included, nothing needs to be done.
 - b) If system initialization is completely automatic, but no automatic update of the software clock is included, the clock must be updated manually.
 - c) If system initialization is not completely automatic, the main directory has to be entered and other relevant commands given. A MODE file should exist for giving them.
- 6 Put the operator's panel key in lock position.
- 7 Switch on other terminals and the different peripherals.

Example of output from computer to console (error device) after having pressed MASTER CLEAR and LOAD.

```
BATCH NUMBER =      1
SINTRAN III RUNNING  -

PAGES FOR SWAPPING(OCT. ) 25

***00.00.16 TERMINAL      670
PLEASE UPDATE THE CLOCK

***00.00.18 TERMINAL      670
***SYSTEM AVAILABLE****
```

Of the lines of text, only two are standard, i.e., SINTRAN III RUNNING and PAGES FOR SWAPPING (OCT.):

The other lines are due to output from a batch job and from special commands (see section 3.4.4) which are automatically executed when LOAD is pressed.

2.1.1 The Software Clock

On ND-100 there is an automatic update of the software clock, if nothing else has been specified. So the use of the @UPDATE command to update this clock is not necessary.

If the automatic update is not included, the user must log in (see section 2.3) and update the clock after a warm start.

2.2 WHEN TO STOP AN ND-100 INSTALLATION

It is advisable that both the computer and the disks run day and night during the week. The disk(s) can be stopped but the power should be left ON. During longer periods, like weekends and holidays, the installation could be stopped and turned OFF.

If the installation is to be stopped, then it is important that the disks are switched OFF before the computer is turned OFF.

2.3 LOG IN/LOG OUT PROCEDURE

(ESC)	;press escape button to activate terminal
HH.MM.SS DAY MONTH YEAR	;the date plus installation defined text is printed out
SINTRAN III-VS H	;SINTRAN type and version
user defined title	
ENTER <u>user name</u>	;type your user name
PASSWORD <u>secret word</u>	;hidden input
PROJECT-PASSWORD: <u>password</u>	;used for accounting — only printed if the accounting system is running
PROJECT NAME:	;project name
OK:	;SINTRAN is now in the command mode ready to accept a SINTRAN command
@ * * * *	;different SINTRAN III commands
@ * * * *	
@ * * * *	
@ * * * *	
@ <u>LOGOUT</u>	;terminating a session
HH.MM.SS DAY MONTH YEAR TIME USED NO. S ... SEC. OUT OF ... MIN. ... SEC.	
	;only printed if the accounting system is running
— EXIT —	

Note: The user must type in the underlined parts.

2.3.1 Enter Count

When logging in a count of the number of unsuccessful attempts to give a correct user name and/or password is made. If this exceeds a maximum value, as set by the *SET-MAX-ENTER-COUNT command in the SINTRAN SERVICE PROGRAM (see section 3.13), the error message "TOO MANY ATTEMPTS TO ENTER" is written on the terminal.

On the error device the following message is written:

```
HH.MM.SS DAY MONTH YEAR TOO MANY ATTEMPTS TO ENTER  
ON TERMINAL <LDN>
```

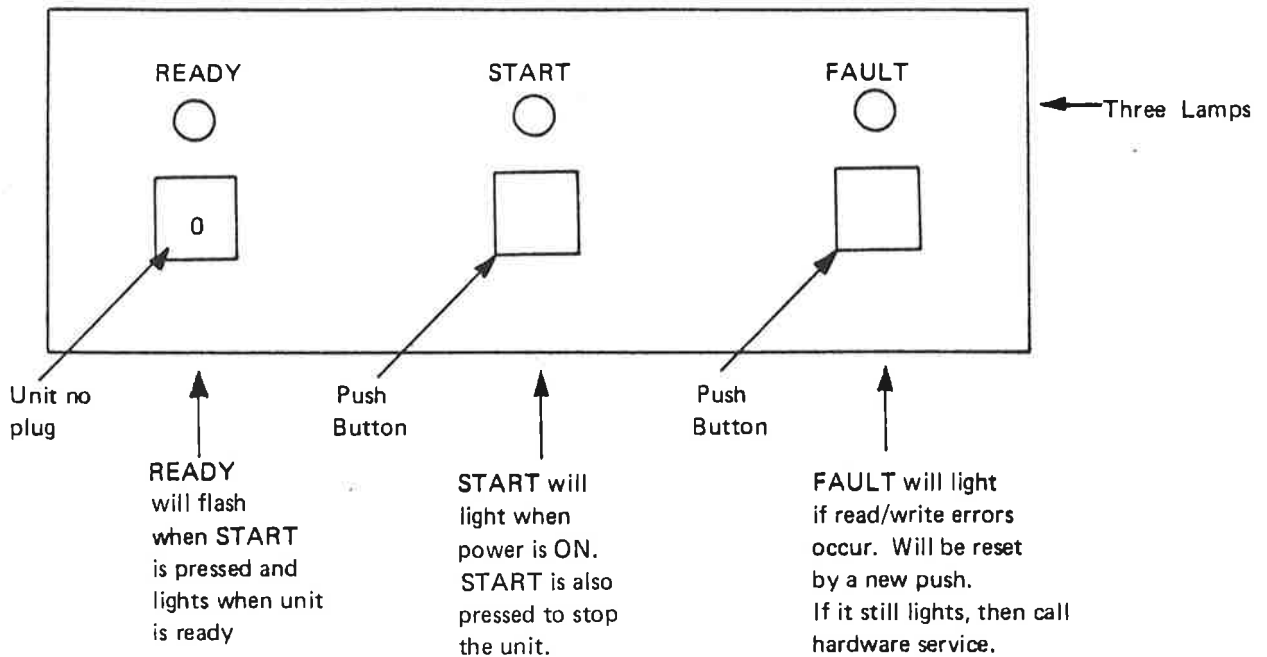
To allow attempts to log in on that terminal again, the enter count has to be cleared. This has to be done by the System Supervisor, using the SINTRAN SERVICE PROGRAM command *CLEAR-ENTER-COUNT.

The enter count can be disabled by using the SINTRAN SERVICE PROGRAM command *SET-MAX-ENTER-COUNT. This can allow an unlimited number of attempts to enter. The same command can be used to set different values for the maximum enter count for individual terminals.

2.4 THE STARTING OF DIFFERENT DISK UNITS

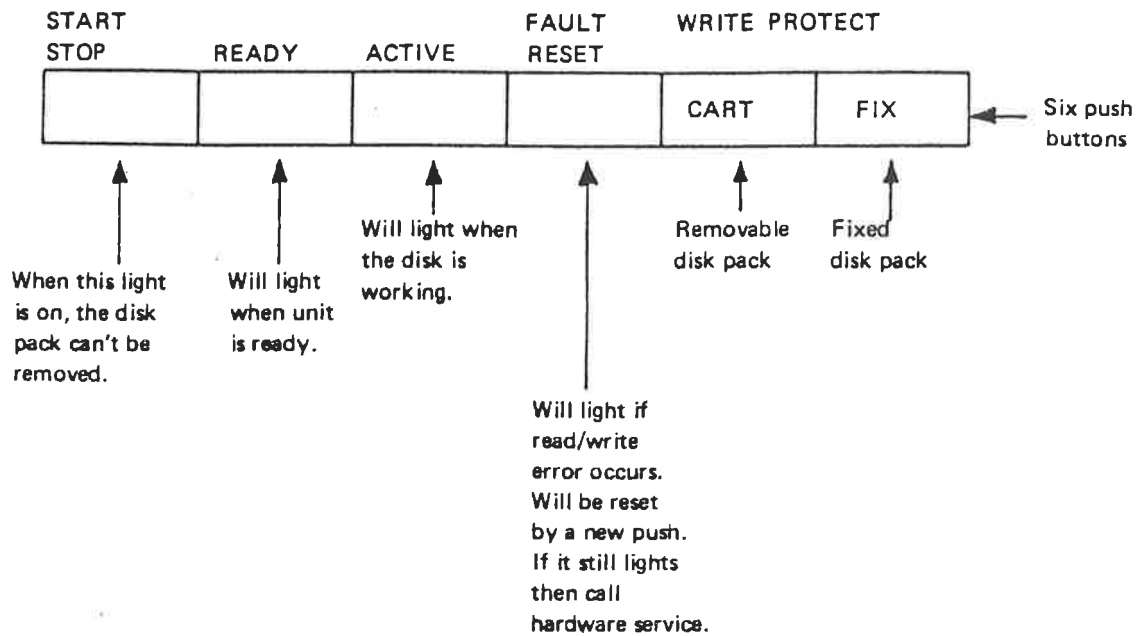
How to start a disk unit depends on which disk units you have.

SMD—33/37/66/75 Mb and SMD—288 Mb (SMD means storage module drive) have the same panel.



HAWK cartridge disk (5 Mb removable and 5 Mb fixed disk pack):

PANEL:

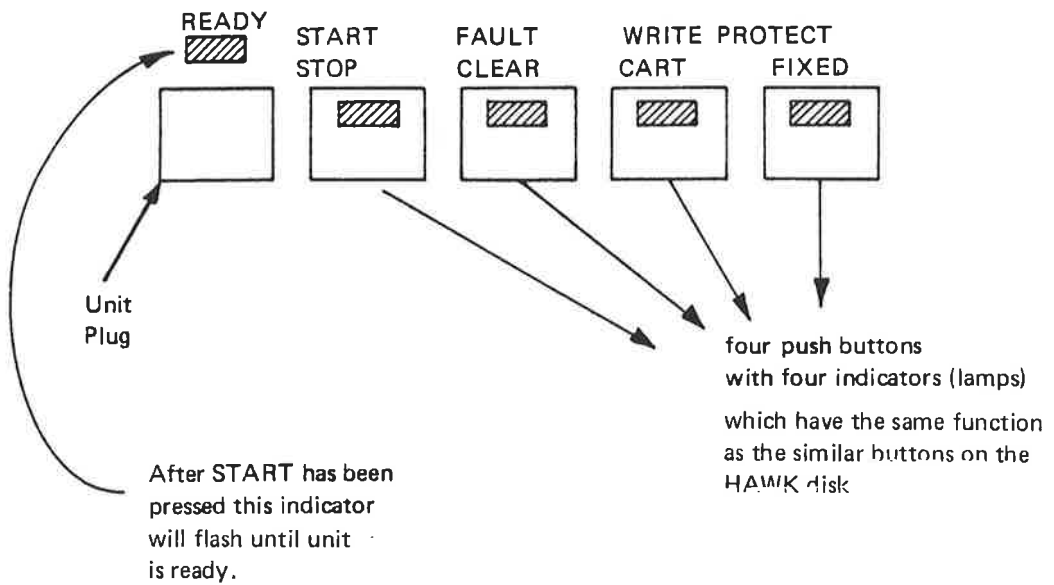


When disk unit is in stop, all buttons are dark.

The FALCON disk (2 x 5 Mb) has no panel and the disk is started when the main power of the computer is switched on.

BIG CARTRIDGE DISK (PHOENIX disk) - (15 Mb removable and 15 Mb or 45 Mb or 75 Mb fixed disk packs):

PANEL



To start these disks (except the Falcon disk):

- Make certain that a disk pack is in place
- Switch on the switches* for power on the back of the disk unit. (two switches for SMD disks, one for the other).
- Press the START button on the disk panel.
- When READY lamp lights, the disk is ready to be accessed.

*Switches are normally located under the covers or behind a door.

3 THE USER SYSTEM

3.1 INTRODUCTION

3.1.1 The System Supervisor and the Use of User System

The System Supervisor is one of the three main categories of users recognized by SINTRAN*. The System Supervisor is the only user in this category. SINTRAN recognizes the System Supervisor by the use of a special user name. This user name is SYSTEM. Hence, user SYSTEM is the System Supervisor.

- * The other two categories of users recognized by SINTRAN are (1) the real-time user, and (2) the time-sharing and batch users.

As a user, the System Supervisor has his own password and space for files. He may, like other time-sharing users, run jobs using the same commands and executes similar programs. The System Supervisor, or user System, may log in from any terminal in the installation. He may, like other users, be active from more than one terminal at a time.

In any installation used by a number of different users, central supervision over the installation is needed. The functions that are a part of central supervision include, among others, the start up and stop of the system, installing a version of the operating system or installing a subsystem, aborting «wild» programs, establishing new users, and controlling the use of mass storage. The above list is not all-inclusive, in fact there are many more functions that will be identified throughout this manual. In SINTRAN III, these functions are performed by the System Supervisor.

The SINTRAN commands reserved for user SYSTEM are a superset of commands. In addition to the commands available to all users, there are extra commands. The extra commands are used for system supervisory functions. To obtain easy access to the common resources of the installation (e.g., the peripherals, the subsystems, PED, FORTRAN), user SYSTEM is normally the «owner» of the peripherals and the system programs. User SYSTEM's mass storage area is automatically searched when another user refers to the common resources of the installation not found in his own area.

The super set of extra commands available to the System Supervisor are very powerful. For this primary reason, only the System Supervisor should have access to user SYSTEM. Only he should know how to log on as SYSTEM. If other persons in an installation are granted access to SYSTEM by the System Supervisor, they should have an in-depth knowledge of the installation and a good knowledge of SINTRAN III. This is especially important in view of the fact that user SYSTEM also exercises system programmer functions as well as operator functions.

This chapter covers the systems and the system commands used by the System Supervisor.

3.1 2 **Command Syntax**

When describing the SINTRAN commands in this manual the following rules are applied:

- All parameters are enclosed in < > brackets
- The names of optional parameters are enclosed in [] brackets.

The command names may be abbreviated as long as they are unambiguous. The command names follow two rules:

- The first word in the command describes the action.
- The second word in the command describes the subject the action is going to be taken upon.

3.2 DIRECTORY COMMANDS

3.2.1 Initializing a Directory

A new directory is created by the command:

```
@CREATE-DIRECTORY <directory name>, <device name>, [ <unit> ],  
[ <'F' or 'R' > ], [ <sub unit> ], <bit file address>
```

where

<directory name>

is the name which will be written onto the new directory. A maximum of 16 alphanumeric characters, including the character ' are permitted.

<device name>

is the name of the mass storage device controller to which the new directory is connected. The device names of the controllers are:

DEVICE NAMES	Mass Storage Device Controller
DISC-10MB-1	Cartridge disk controller 1
DISC-10MB-2	Cartridge disk controller 2
DISC-30MB-1	30 Megabytes big cartridge disk controller 1
DISC-30MB-2	30 Megabytes big cartridge disk controller 2
DISC-33MB-1	33 Megabytes disk controller 1
DISC-33MB-2	33 Megabytes disk controller 2
DISC-38MB-1	38 Megabytes disk controller 1
DISC-38MB-2	38 Megabytes disk controller 2
DISC-60MB-1	60 Megabytes disk controller 1
DISC-60MB-2	60 Megabytes disk controller 2
DISC-66MB-1	66 Megabytes disk controller 1
DISC-66MB-2	66 Megabytes disk controller 2
DISC-75MB-1	75 Megabytes disk controller 1
DISC-75MB-2	75 Megabytes disk controller 2
DISC-90MB-1	90 Megabytes disk controller 1
DISC-90MB-2	90 Megabytes disk controller 2
DISC-288MB-1	288 Megabytes disk controller 1
DISC-288MB-2	288 Megabytes disk controller 2
DRUM-1	Drum controller 1
DRUM-2	Drum controller 2
FLOPPY-DISC-1	Floppy disk controller 1
FLOPPY-DISC-2	Floppy disk controller 2

<unit>

is the unit number. Only specified if more than one unit is connected to the same controller.

Note: If only one unit (no. 0) is installed, the unit number is neither necessary nor permitted in the command.

<'F' or 'R'>

must be specified as F if a fixed cartridge disk pack is used. R must be if a removable cartridge disk pack is used. Otherwise, the parameter is not used.

Fixed (F) or Removable (R) is required for the 10/30/60/90 Mbytes, 2 x 75 Mbyte, and 3 x 75 Mbyte cartridge disks.

<sub unit>

applies only to fixed big cartridge disk, 2 x 75 Mb, and 3 x 75 Mb.

<bit file address>

may be specified if the user wants to place the bit file in a specific area on the medium. The bit file is used to contain a free/reserved map of the pages on the medium. If this parameter is omitted, the file system will select a medium-dependent optimal value.

Example:

To create a directory called PACK-MINE on the floppy disk controller 1, unit 1, type:

```
@CREATE-DIRECTORY PACK-MINE, F-D-1,1,,
```

To create a directory called PACK4 on the fixed cartridge on disk unit 1, type:

```
@CREATE-DIRECTORY PACK4, DISC-10MB-1, 1, F, ,
```

When the command is executed, the directory name is written onto the first page of the device. The device is tested for bad spots (tracks) and a bit file is created. The bit file has one bit for each page on the unit. This bit is set to one if the page is occupied. On disks, the default value of the bit file allocates the bit file in the middle of the disk, the maximum length of a contiguous file is, thereby, half the total length of the disk.

An old directory will be completely destroyed if a new directory is created on the same device. Pointers to different pages used by different files in the old directory have disappeared. Pages previously used by different files will be marked as free in the new bit file, but they are not cleared (the data still remains). Thus it is possible by using the stand alone program FILE-SYSTEM-INVESTIGATOR (See Section 8.5) to investigate a "destroyed" directory. However detailed knowledge of the file system is necessary.

3.2.2 Enter, Set-Default and Release Directory

When a device (disk pack, floppy disk or magnetic tape) is mounted, it must be activated. This is done by the command:

```
@ENTER-DIRECTORY <directory name>, <device name>, [<unit>]
[<'F' or 'R'>], [<sub unit>]
```

The parameters are the same as by @CREATE-DIRECTORY.

If the specified name matches the name found on the device, the directory is entered, otherwise an error message is given. You may give CR instead of DIR-NAME, system will then get the DIR-NAME from the device.

Example:

To enter the floppy created in the previous paragraph, type:

```
@ENTER-DIRECTORY PACK-MINE, F-D-1, 1
```

To set a directory as default directory the following command is available.

```
@SET-DEFAULT-DIRECTORY <directory name>
```

If a directory is not a default directory, the directory name must be given as a prefix when accessing files on this directory. This is also true if a user has space in more than one default directory.

A directory is released by the command:

```
@RELEASE-DIRECTORY <directory name>
```

A directory may only be released if no files are opened on the directory. The main directory may not be released.

After the directory is released, it may be entered again, or another device may be mounted on the unit.

```
@SET-MAIN-DIRECTORY <directory name>
```

This command defines a directory as a main directory.

Up to 16 directories may be defined as main directories, each with 256 distinct user names. It is thus possible to have 4096 different user names on one system.

A directory on a floppy disk may not be defined as a main directory.

The users on other directories, (i.e., floppy disks or hard disks - whether or not default) must also be defined as users in a main directory.

3.2.3 Directory Information

The command

`@LIST-DIRECTORIES-ENTERED <directory name>, <output file>`

will list the names of entered directories. The directory locations will also be indicated (i.e., device and unit).

Example:

`@LIST-DIRECTORIES-ENTERED P, TERMINAL`

will list all directories with names beginning with P on the terminal, while

`@LIST-DIRECTORIES-ENTERED,,LINE-PRINTER`

will list all entered directories on the line printer.

The command

`@DIRECTORY-STATISTICS <directory name>, <output file>`

will give unit number, directory status (default, main), unreserved and unused space on the specified output device.

These commands may, like all statistical commands, be given by any user, but are of special interest to user SYSTEM.

3.2.4 Maintenance of file system directories and their users

Knowledge of certain features of the SINTRAN III filesystem makes it easier to structure the directories so as to make the most efficient use of available resources, and to minimize the difficulties for users.

3.2.4.1 What is a directory?

A *DIRECTORY* is a logical concept by which the available space on a contiguous area of a hard or floppy disk is organised. It consists of a master block, a user file index and user files, an object file index block (and possibly subindex block) and object files, a bit file, data file indexes and data files. Except for the data files, these entities are "meta—data" and their manipulation is an overhead which should be reduced as much as possible. The worst effects of this have been eliminated in the H-version of SINTRAN III by incorporation of a disk cache for the filesystem. Filesystem performance can be further improved by consideration of a directory structure as described below.

The *DIRECTORY TABLE* is one of the critical tables in the filesystem. The table is found on segment 6. It is organised *sequentially* and there is one entry for each directory in a system. The first word of each entry acts as a flag and can mark the directory as entered or released, as main or default, or as reserved or unreserved for special use.

INDEX	0	1	2
	DIRECTORY ENTRY	DIRECTORY ENTRY	DIRECTORY ENTRY

A *MAIN* directory (hard disk only) is one where a user name can be defined and used by the filesystem without requiring that user name to be defined on any other directory.

A related, but not identical, concept is a *USER'S MAIN DIRECTORY*. This is the main directory of the lowest directory index in which the user is defined. Therefore, if main directories are entered and released, a user's main directory may change. In addition when a user logs-in, his main directory is determined at that time and stored on the terminal's system segment. Because of this, the file system may even determine two different main directories for the same user working on a specific terminal at a given time. This is a source of problems in the filesystem.

Main directories should not be entered or released when the system is running.

A *USER'S DEFAULT DIRECTORY* is the default directory of lowest index in which a user has filespace, ie., it is the directory to be searched for the user's files. A *DEFAULT DIRECTORY* is therefore a directory which is searched to determine a user's default directory. A main directory is always a default directory.

The *SEARCH STRATEGY* used by the filesystem is as follows. If a user name is supplied to the filesystem and the user's main directory is to be determined, the filesystem starts with the lowest directory entered (lowest index) and, if it is main, searches all the user names for a match. It then searches the next main directory and so on until all main directories have been searched. If an *exact match* (identical names including length) is found between the supplied name and a user name on a directory the search need go no further. When all directories have been searched, and if only one match is found, this one is used. If no match is found the user does not exist. If more than one match is found the name is ambiguous. Note that even after more than one match is found the search continues because there may be an exact match.

NOTE that a match here is considered to be where the input (user name) is a subset of the exact name.

An exact match is where the input and the name as used in the table, is identical.

CONCLUSIONS AND HINTS

1. Do not have more main directories than you need. Pack the users on the main directories so they occupy the minimum number of pages. Do not have unused user entries if this means you use an additional page. There are 32 (decimal) user entries per page. It is worth combining users files to achieve this.
2. Do not have more default directories than you need or can use.
3. A user should never be defined in more than one main directory, unless it is absolutely unavoidable.
4. Change the order of the directory entries in the directory table so that directory index 0 is the main directory with users SYSTEM, SCRATCH, RT and others whose files are most frequently used. User entries with the lowest user index should be for users whose files are most used. For example FLOPPY-USER and BPUN should be as high as possible, and on a second or third main directory in a multi-main directory system. The directory entries can be moved with the SINTRAN-SERVICE-PROGRAM command SWAP-DIRECTORY-ENTRIES.
5. Filesystem access during log-in is reduced on a multi-main directory system by specifying main directory before the user name.
6. User's files should be organised so that those accessed most frequently have the lowest index. (The FILE-STATISTICS command gives the total open count.) For example there is no point in SINTRAN:DATA,MACM-AREA:DATA and SEGFILO:DATA having indexes 0,1 and 2, but they almost always do. They can be moved by patching, but not copied.

You first dump the contents of the object entry (@DUMP-OBJECT-ENTRY). The contents of this object entry are patched into the free object entry you choose to use (@CHANGE-OBJECT-ENTRY), thereby also setting the used flag of this object entry. Remember to change the object index and the pointers to the next and previous versions so these agree with the new object file index. At last you patch the first used object entry and set word 0 to 0, thus the entry used bit is reset and the entry is free to use.

7. Organise the directory table carefully to avoid problems with changing user's main and default directory index. The directory with user SYSTEM and the segment file(s) should be directory index 0. Any directories likely to be entered and released as main or default directories should have as high a directory index as possible, and special consideration should be given to which users are found there.
8. Filesystem access is further improved if file names are specified in full. This is of course irksome in interactive mode and this is precisely why abbreviated look-up was introduced. However, in MODE and BATCH jobs full file names, user names and directory names should be used.

Note: If a user is logged in and wishes to access files on his default directory, interactively in mode jobs or in batch jobs, then no directory name or user name should be given as this will slow down the access time.

Example of directory lay-out

A system with a 60 MB Phoenix disk has the following users with the following space requirements. (All numbers decimal.)

- (1) SYSTEM, 7000 pages.
- (2) SCRATCH, 1500 pages (approx).
- (3) BASE, a user having the database files, 5000 pages.
- (4) CLERK-1,...,CLERK-5, five clerks dealing with the accounting ledgers.
- (5) WAGES-1,...,WAGES-5, five wages clerks.
- (6) COSTING-1,...,COSTING-10, ten clerks dealing with job costing.
- (7) STOCKCONTROL-1,...,STOCKCONTROL-3, PRODUCTION-1,..., PRODUCTION-3, six more clerks dealing with stock control and production.

Users (4) to (7) exist in order to control access to the computer system and the database and have no file space. They make frequent use of filesystem facilities by their use of the machine.

- (8) SECRETARY-1,...,SECRETARY-8, eight secretaries each using the NOTIS word-processing system and some other sub-systems. They use the filesystem facilities frequently throughout the day and each has 1000 pages of filespace.
- (9) The source code of the database applications is kept under user SOURCE. These files are accessed about once per week and occupy 2500 pages.
- (10) A further three users, APPLICS-1,...,APPLICS-3 have filespace for developing application programs, documentation and general use of sub-systems. They use the system nearly every day but their use is not heavy. They each have 1000 pages of filespace.
- (11) Five directors also have use of the system; DIREC-1,..., DIREC-5. They occasionally make use of systems like MERCUR, ACCESS, NOTIS-IR but their use is occasional and not heavy. They each have 100 pages of filespace.

The four directories available, each with 7389 pages, should be organised as follows:

Dir. index	disk surface	user index	users present	number of pages.	notes.
0	REMOVABLE	0	SYSTEM	7000	Main and default dir. All users present.
		1	SCRATCH	0	
		2	RT	0	
		3	BASE	0	
		4	CLERK-1	0	
		.	***	.	
		8	CLERK-5	0	
		9	WAGES-1	0	
		.	***	.	
		13	WAGES-5	0	
		14	COSTING-1	0	
		.	***	.	
		23	COSTING-10	0	
		24	STOCKCONTROL-1	0	
		.	***	.	
		26	STOCKCONTROL-3	0	
		27	PRODUCTION-1	0	
		.	***	.	
		29	PRODUCTION-3	0	
		30	SECRETARY-1	0	
		.	***	.	
		37	SECRETARY-8	0	
		38	SOURCE	0	
		39	APPLICS-1	0	
		.	***	.	
		41	APPLICS-3	0	
		42	DIREC-1	100	
		42	DIREC-2	100	
		42	DIREC-3	100	
		42	DIREC-4	0	
		46	DIREC-5	0	
		47	FLOPPY-USER	0	
1	FIXED UNIT 0	0	SCRATCH	1500	Default dir.
		1	BASE	5000	
		2	DIREC-4	100	
		3	DIREC-5	100	
2	FIXED UNIT 1	0	SECRETARY-1	1000	Default dir.
		1	SECRETARY-2	1000	
		.	***	***	
		6	SECRETARY-7	1000	
3	FIXED UNIT-2	0	SECRETARY-8	1000	Default dir.
		1	APPLICS-1	1000	
		.	***	***	
		2	APPLICS-3	1000	
		3	SOURCE	2500	

II. A university has an ND-500 system with a directory structure consisting of six 75MB directories. The following users with the stated space requirements must be arranged on these directories.

- (1) SYSTEM, 10,000 pages.
- (2) SCRATCH, 4000 pages.
- (3) BPUN, 1000 pages for BPUN and similar files.
- (4) ANALYST-1,...,ANALYST-5, five systems analyst making constant use of the system and each requiring 500 pages.
- (6) POSTGRAD-1,...,POSTGRAD-200, two hundred post-graduate students each requiring 250 pages.
- (7) STUDENT-3-1,...,STUDENT-3-320, three hundred and twenty final year students each requiring 150 pages.
- (8) STUDENT-1,...,STUDENT-680, six hundred and eighty first and second year students each requiring 100 pages.

Apart from SYSTEM, SCRATCH and ANALYST-1,...,ANALYST-5 all other users will probably have roughly equal uses. The only important point to note is that students in a class will be making intense use of the machine simultaneously and it is thus advisable to group student classes so that all user entries for students in a class lie on the same page.

The four directories available, each on 36945 pages, should be organised as follows:

Dir. index	user index	users present	number of pages.	notes.
0	0	SYSTEM	10 000	MAIN & DEFAULT DIRECTORY
	1	SCRATCH	4 000	
	2	RT	0	
	3	ANALYST-1	2 000	
			
			
	7	ANALYST-5	2 000	
	8	STUDENT-3-1	150	
			
			
	89	STUDENT-3-82	150	
	90	STUDENT-1	100	
			
			
	95	STUDENT-6	100	
			36 900 PAGES	

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Dir. index	user index	users present	number of pages.	notes.
1	0	RESEARCH-1	500	
	49	RESEARCH-50	500	
	50	STUDENT-3-83	150	
	67	STUDENT-3-101	150	
	68	STUDENT-7	100	
	159	STUDENT-98	100 36 900 PAGES	
2	0	POSTGRAD-1	250	
	89	POSTGRAD-90	250	
	90	STUDENT-99	100	
	227	STUDENT-236	100 36 300 PAGES	
3	0	POSTGRAD-91	250	
	89	POSTGRAD-180	250	22 500
	90	STUDENT-237	100	
	227	STUDENT-374	100 36 300 PAGES	13 800

Dir. index	user index	users present	number of pages.	notes.
4	0	STUDENT-375	100	

	169	STUDENT-544	100	17 000
	170	STUDENT-3-102	150	

	249	STUDENT-3-181	150	12 000
	250	POSTGRAD-181	250	

	255	POSTGRAD-186	250	1 500
			30 500 PAGES	
5	0	STUDENT-545	100	13 600

	135	STUDENT-680	100	
	136	STUDENT-3-182	150	

	184	STUDENT-3-320	150	7 350
	185	POSTGRAD-187	250	

	198	POSTGRAD-200	250	3 500
	199	BPUN	1 000	
	200	FLOPPY-USER	0	
			25 450 PAGES	

3.2.4.2 Directory Maintenance Commands

A number of commands are available for maintenance of the file system. These are:

@RENAME-DIRECTORY <old directory name>, <new directory name>, <device name>,[<unit>], [<'F' or 'R'>]

@TEST-DIRECTORY <directory name>

@REGENERATE-DIRECTORY <directory name>

All files in a directory must be closed before the TEST-DIRECTORY or REGENERATE-DIRECTORY commands are used on that directory. Note that if the directory in question is the main directory, then all scratch files must also be closed. Recommended procedure:

1. Take backup of directory.
2. Be sure that no users have logged in.
3. Log in as SYSTEM on one terminal.
SET-UNAVAILABLE.
4. Close the scratch file with the CLOSE 100 command.
5. Use the TEST-DIRECTORY or REGENERATE-DIRECTORY command.

The commands TEST-DIRECTORY or REGENERATE-DIRECTORY cannot be executed with open files. They will give the error message: FILES OPEN ON THIS DIRECTORY. Neither of these two commands should be interrupted by pressing escape, since they are using the bit file. Pressing escape may destroy the bit file. Note that these commands may take 2-3 hours on large (288 Mb) disks. You should *always* execute TEST-DIR before REGEN-DIR

@DUMP-DIRECTORY-ENTRY <device name>,[<unit>],[<'F' or 'R'>],
[<sub unit>], <output file>

@CHANGE-DIRECTORY-ENTRY <device name>,[<unit>], [<'F' or 'R'>],
[<sub unit>]

@DUMP-USER-ENTRY <directory name> , <user number> , <output file>

@CHANGE-USER-ENTRY <directory name> , <user number>

@DUMP-OBJECT-ENTRY <user name> , <object number> , <output file>

@CHANGE-OBJECT-ENTRY <user name> , <object number>

@DUMP-BIT-FILE <directory name> , <block number> , <output file>

@CHANGE-BIT-FILE <directory name>, <block number>

@DUMP-PAGE <directory name>, <page address>, <output file>

@CHANGE-PAGE <directory name>, <page address>

See Section 3.2.1. for

<device name>, <unit>, <'F' or 'R'>, <sub unit>, <directory name>

<user number>

a decimal number of the user found by the command @LIST-USERS (default value is zero), addresses are relative within the user entry in the range 0 to 37₈ (*Note*)

<user name>

the name of the user

<output file>

the name of the output file

<object number>

the decimal number of the file, found by @LIST-FILES (default is zero), addresses are relative within the object entry in the range 0 to 37₈ (*Note*)

<block number>

the bit file is divided into 20₈ word blocks, addresses are relative within blocks (0-17₈). (*Note*)

<page address>

an octal address within the directory (default value is zero), addresses are relative within the page in the range 0 to 1777₈ (*Note*)

Also see Appendix D of this manual for file system layout. Note that the manual, File System - System Documentation (ND—60.122.02) gives a detailed description of the ND File System.

Note:

Examination of the contents of a location:

After starting the execution of the commands

@CH-DIR-E

@CH-USER-E

@CH-OBJECT-E

@CH-BIT-FILE

@CH-PAGE

A carriage return (CR) should be given. Further commands are expected. To look at the contents of a location within the page/entry/block, type its address relative to the start of the page/entry/block, (≥ 0), followed by a "/". The contents are then printed. The contents may be changed by typing in a new value, followed by a CR. After the CR, the contents of the next location is given. If no new is entered before the CR, the old value is left unchanged. If an asterisk "*" is typed, the current address is given. To terminate the command and return to SINTRAN, type a full stop "." (period) or a commercial at "@". All addresses are relative to the start of the structure and have the following range:

User Entry:	$0 \leq \text{address} \leq 37_8$
Object Entry:	$0 \leq \text{address} \leq 37_8$
Directory Entry:	$0 \leq \text{address} \leq 17_8$
Bit-file block:	$0 \leq \text{address} \leq 17_8$
Page:	$0 \leq \text{address} \leq 1777_8$

3.3 SUPERVISION OF OTHER USERS

User SYSTEM is responsible for creating and deleting all users, and for the amount of space each of them may use on mass storage devices. A mass storage device contains a certain number of pages. (eg., a 5 MB disk pack contains 2430 pages to be shared by the system and different users.) Note that the file system will occupy some of these.

3.3.1 Creating and Deleting Other Users

A new user is introduced to the system by the command:

```
@CREATE-USER <[directory name:] user name>
```

A user must exist in all directories where he is to be given space. In addition, he must also exist in a main directory. If the directory name is omitted in the above command, main directory is assumed.

When a user is created he has no password.

Example:

Create a new user USER-ONE, assuming he will be given space in directory PACK5, which is not main directory:

```
@CREATE-USER USER-ONE
```

Now he exists in main directory.

```
@CREATE-USER PACK5:USER-ONE
```

Now USER-ONE exists in PACK5.

A user is removed from a directory by the command:

```
@DELETE-USER <[directory name:] user name>
```

It is not allowed to delete a user who has files in the specified directory.

In this case, an error message is given and the user is not removed.

Example:

Assume user USER-ONE has created files in directory PACK5 and is moving to another installation, taking with him the device PACK5. He may then be deleted (if desired) in the main directory by:

```
@DELETE-USER  USER-ONE
```

To use his files at another installation, PACK5 must be mounted and entered there, and USER-ONE has to be created in that main directory, or PACK5 set to main directory.

```
@ENTER-DIRECTORY  PACK5, DISC-10MB-1, 2, R (disk unit 2)
@CREATE-USER  USER-ONE
```

or

```
@ ENTER-DIRECTORY PACKS, DISC-10MB-1,2,R
@SET-MAIN-DIRECTORY PACK5
```

3.3.2 Giving and Taking User Space

A user is given space on a mass storage device, if he is created there, by the command:

```
@GIVE-USER-SPACE  <[directory name:] user name> , <number of pages>
```

Example:

Give user USER-ONE 100 pages (100K words) on PACK5.

```
@GIVE-USER-SPACE  PACK5:USER-ONE, 100
```

The number of pages supplied is decimal and the user space is increased by the same number of pages. An error message is given if there are not that many pages unreserved in the directory.

Unused pages may be taken from a user by:

```
@TAKE-USER-SPACE  <[directory name:] user name> , <number of pages>
```

Like @CREATE- and @DELETE-USER, @GIVE- and @TAKE-USER-SPACE assume main directory if no directory is specified. It is not possible to take away pages which are allocated for files.

3.3.3 Password

The password of any user can be removed (cleared or nullified) by user SYSTEM. The command used by user SYSTEM to thus «clear» a user password is:

@CLEAR-PASSWORD <user name>

There are various reasons why SYSTEM would «clear» a user's password. For example,

- A user may have forgotten his password. SYSTEM can clear this password for the user.
- SYSTEM may decide to enter a user's files. SYSTEM can do this by removing or clearing the user's password.

Note:

When SYSTEM has cleared a user's password, the user's files are then unprotected until another password is created.

3.4 SYSTEM UTILITY COMMANDS

3.4.1 Terminals

The command

@WHO-IS-ON

indicates which terminals are entered into the system, and the number of the terminal being used to execute this command. This terminal is marked by an arrow. For example, if SYSTEM is executing the command from terminal 48, the command WHO (abbreviated) indicates that six other users are using the system.

```
@WHO

==>      36 SINTRAN
          48 SYSTEM
          51 RT
          15 KAY-SQRENSEN
          670 SYSTEM
          384 SSR
          386 FLOPPY-USER
```

@TERMINAL-STATUS <logical unit>,<interval>

where

<logical unit> is the decimal logical device number for the terminal (if equal to zero, all terminals will be present).

<interval> gives the number of seconds between each time the information is written on the terminal (if equal to zero the status will be written only once).

Periodic output of information can be terminated by pressing the "escape" button on the terminal.

The information listed is:

LOG NO:	logical unit number
USER:	USER name
MODE:	COMMAND or USER (executing user program)
CPU MIN:	CPU time used in minutes
OUT OF:	total time logged in
LAST COMMAND:	last issued SINTRAN command from terminal

For example, if all terminals (,,) are to be displayed every 10 seconds (10), then,

@TERM-STAT, , 10

LOG. NO	USER	MODE	CPU-MIN	OUT OF	LAST COMMAND
36	SINTRAN	COMMAND	0	50	
48	SYSTEM	COMMAND	0	0	TERM-STAT, , 10
51	RT	COMMAND	0	11	TERM-STAT, , ,
15	KAY-SORENSEN	COMMAND	0	60	
670	SYSTEM	COMMAND	0	62	OPERATOR SYSTEM IS A
384	SSR	COMMAND	0	0	SSR
386	FLOPPY-UUSER	COMMAND	0	4	

The command

@STOP-TERMINAL <logical unit>

will log out the specified terminal.

The message ***ABORTED BY SYSTEM*** will be printed on the specified terminal.

This command is used if, for some reason, the user SYSTEM has to log out the terminal or user.

Note, if the command has no effect on a terminal, do NOT use @ABORT on the background program. Instead, use STOP, MASTER CLEAR and LOAD at a convenient time.

When special jobs are to be performed by the user SYSTEM (e.g., to make backup copies of directories, to take down the operating system, etc.) the command

@SET-UNAVAILABLE <text>

may be given. Now, no user may log in from any other terminals than the one with device number 1. If they try, the message

SYSTEM UNAVAILABLE

is issued on that terminal together with the <text> specified. The <text> can, for instance, explain why and for how long the system will be unavailable.

\$ is translated to CR, LF when output to the other terminals. The text should be terminated by \$ CR.

Users who have already logged in may continue their communication with the system until they log out.

This situation remains until the command

@SET-AVAILABLE

is given.

@RESTART-USER <logical device number>

this command is given to restart the user on a terminal after he has used the command @WAIT-FOR-OPERATOR.

<logical device number>

must be a terminal (decimal). This command is permitted for users RT and SYSTEM.

3.4.2 Stopping the Operating System

Sometimes the system has to be stopped, (i.e., for maintenance) (e.g., replacing terminal interfaces).

The command

@STOP-SYSTEM

will simulate a power failure. All information contained in the CPU's registers will be saved. The CPU will go to *stop mode*.

In this case, the CPU is restarted by typing 20! On restart, the logged on users may continue in their programs, a start-up procedure is not necessary. A power fail message is printed out on the console. The clock may have to be updated.

When the system is to be stopped for a longer period the procedure is:

- log out all users
- stop RT-programs
- press the STOP and MASTER CLEAR buttons on the operator's panel

A warm start is now necessary to restart the system.

The disks should *not* be stopped unless temperature, energy, and/or noise conditions require it.

The system should normally be left running, (i.e., even overnight and week-ends). It should only be turned OFF for hardware maintenance.

3.4.3 Restarting the System from Memory Image

The system can be restarted from the memory image kept on mass storage. Push MCL (MASTER CLEAR) and LOAD (See note) buttons. The setting of the ALD-register must be correct.

Note:

Press the MCL button, wait until a # appears on the system console, then press the LOAD button.

The same effect will occur by executing the command (while SINTRAN is running):

@RESTART-SYSTEM

All RT programs and segments loaded by the RT loader will not be changed. All files will or should be closed and no directories will be entered. However, the main directory will be entered if the command @INITIAL-COMMAND (see below) has been executed earlier.

3.4.4 The INITIAL-COMMAND Command

@INITIAL-COMMAND <command string>

is used to specify an @ENTER-DIRECTORY command to be executed at subsequent restarts from memory image. The command string will be saved and executed at restart time. The command @RTENTER will be executed automatically after the last initial-command. Further directories can be entered in a user-written subroutine called from the start-up sequence.

Example:

```
@INITIAL-COMMAND ENT-DIR P-ONE DISC-10MB-1 0 R
```

After the command @INITIAL-COMMAND has been given the following command may be given one or more times:

@NEXT-INITIAL-COMMAND <command string>

will append commands to be executed at system start-up. The command buffer has room for 256 characters.

If a change in this command buffer is necessary, the buffer has to be filled up again starting with a @INITIAL-COMMAND and one or more @NEXT-INITIAL-COMMAND. In case of a cold start, the command buffer is cleared.

Example:

```
@INITIAL-COMMAND ENT-DIR P-ONE DIS-66MB
@NEXT-INIT-COMM BATCH
@NEXT-INIT-COMM AP-BATCH 1 LOAD-MODE SYS-OUT-1
```

The command

@LIST-INITIAL-COMMANDS <output file>

will list all commands defined by the @INITIAL-COMMAND and @NEXT-INITIAL COMMAND commands on the specified output file. Default value of the parameter <output file> is the terminal.

3.4.5 Error Printout Device Setting

Normally, the error messages from RT programs will be written on Terminal 1. However, it is possible to route them to some other terminal by using the command:

```
@SET-ERROR-DEVICE <logical device number>
```

Example:

```
@SET-ERROR-DEVICE 9
```

which will cause the error messages to appear on terminal 2 (which has logical device number 9). See SIN REF.MANUAL APP.C.

To find out on which device the error messages currently are being written on, the command

```
@GET-ERROR-DEVICE
```

may be used.

Example:

```
@GET-ERROR-DEVICE  
ERROR DEVICE 1
```

which means that the error messages will be written on terminal 1.

3.4.6 Loading and Starting of an Alternative Operating System

The following command loads and starts an alternative version of the SINTRAN III operating system:

```
@GET-ALTERNATIVE-SYSTEM <file name 1>, <file name 2>,
    <is RT loader in segment file no. 0?>, [ <file name 3> ], < is alt. "spool-
    ing program" in segment file no. 0?>, [ <file name 4> ]
```

where

<file name 1>

is the name of a contiguous file containing the first part of the initial version of a SINTRAN III operating system. It corresponds to the system file SINTRAN:DATA. This file must consist of 63 pages on disk.

<file name 2>

is the name of a contiguous file allocated immediately after the file specified in <file name 1>. This file contains the rest of the SINTRAN III system except the RT loader, the spooling system, the Nordnet, the SINTRAN-SERVICE program, and the MAIL-System. This file must consist of 64 pages on disk.

<is RT loader in segment file no. 0?>

must be answered with YES if the original system residing in SINTRAN:DATA, MACM-AREA:DATA and segment file no. 0 is wanted to be started. If another system is wanted, or the RT loader segment on segment file no. 0 is destroyed (by using another system), the answer must be NO, and then the parameter

[<file name 3>]

must be specified as the name of the file where the RT loader resides. This file must be a contiguous file (19 pages).

<is alt "spooling-program" in segment-file no. 0?>

must be answered with YES if the user wants to start the original system residing in SINTRAN:DATA, MACM-AREA:DATA and SEGFIL0:DATA. If he wants to start another system or the spooling, program segment on SEGFIL0 is destroyed (by using another system), the answer must be NO and the parameter

[<file name 4>]

must be specified as the name of the file where the spooling program, Nordnet, SINTRAN-SERVICE program and the MAIL-SYSTEM, resides. This file must be a contiguous file, of 24 pages.

This command will transfer the version of the operating system residing on the specified files to the memory image area (SEGFIL0) and start the system. It will be a "cold" start, all RT programs must be reloaded.

Subsequent restarts will use the alternative system. To return to the normal system

```
@GET-ALTERNATIVE-SYSTEM SINTRAN, MACM-AREA, NO,  
S-RTLOADER, YES
```

must be used. The RT loader must have been placed on the file S-RTLOADER:DATA on beforehand with the command

```
@MAKE-ALTERNATIVE-RT-LOADER <file name>
```

where

<file name>

is a contiguous file with a length of 19 pages.

The alternative system can be written into its files by the command

```
@MAKE-ALTERNATIVE-SYSTEM <file name 1>, <file name 2>,  
    <file name 3>, <file name 4>, <file name 5>, <is source RT loader in  
    segment file no. 0?>, [ <file name 6> ], <file name 7>
```

```
<is source spooling program in segment file no. 0?>, [ <file name 8> ]
```

where

<file name 1>

is a contiguous file with the length of 63 pages where the first part of the "alternative" system will be placed.

<file name 2>

is a contiguous file allocated immediately after <file name 1> with the length of 64 pages. This is the file where the second part of the "alternative" system will be placed.

<file name 3>

is a contiguous file with the length of 19 pages where the "alternative" RT loader will be placed.

<file name 4>

is a contiguous file where the first part of the system to make alternative resides.

<file name 5>

is a contiguous file allocated immediately after <file name 2> with the length of 64 pages. This is the file where the second part of the system to make alternative resides.

<is source RT loader in segment file no. 0?>

must be answered with YES if the system to make alternative is the currently running system. If the answer is NO the parameter

[<file name 6>]

must be specified as a contiguous file with the length of 19 pages. In this file the RT loader to be made "alternative" resides.

<file name 7>

is a contiguous file with the length of 24 pages where the "alternative" spooling program, alternate Nordnet, SINTRAN-SERVICE program, and MAIL SYSTEM will be placed. (Must be answered even if the system is made without spooling and NORDNET specifications.)

<is source spooling program in segment file no. 0?>

must be answered with YES if the system to be made alternative is current running system. If the answer if NO, the parameter

[<file name 8>]

must be specified as a contiguous file comprizing of 4 pages. The spooling program to be made "alternative" resides in this file.

After an "alternative system" is used, the normal system residing on the system files SINTRAN:DATA and MACM-AREA:DATA may be started. The normal cold start procedure using the subsystem MACM and the)HENT command can be used, but then the command

@GET-ALTERNATIVE-RT-LOADER <file name>

must be used before any access to the RT loader is done.

<file name>

is the file where the "original" RT loader is placed by the @MAKE-ALTERNATIVE-RT-LOADER command.

All files used in the commands

- @ GET-ALTERNATIVE-SYSTEM
- @ MAKE-ALTERNATIVE-SYSTEM
- @ GET-ALTERNATIVE-RT-LOADER
- @ MAKE-ALTERNATIVE-RT-LOADER

must be placed in the same file directory as the current system.

Older versions of the system than the 1979 version must not be used as "alternative system".

None of the pages used of files in the alternate system must reside on disk address (page address) higher than 77777B.

3.4.7 **Initializing Background Programs**

The command

@INITIALIZE-BACKGROUND-PROGRAMS

initiates the background terminal programs and batch processors. (The background program for Terminal 1 will always be initialized.) Usually, this command must be given once after a "cold start" using the MACM assembler and the)HENT command, and after the necessary segment files are defined (see the subcommand DEFINE-SEGMENT-FILE of the @SINTRAN-SERVICE-PROGRAM).

This command will also allocate space for background segments on the segment file(s). If an extended address space of 128K words is desired for background programs, this must be specified after using the INITIALIZE-BACKGROUND-PROGRAMS command. This may be specified through the command

@CHANGE-BACKGROUND-SEGMENT-SIZE <logical device no.> <no. of pages>

This command will set up the segment table entry for the associated background program according to the second parameter.

The commands above are legal for the user SYSTEM only.

Note: @INITIALIZE-BACKGROUND PROGRAMS must be executed BEFORE
@CHANGE-BACKGROUND-SEGMENT-SIZE.

3.4.8 The CLEAR-DEVICE Command

The command

```
@CLEAR-DEVICE <logical unit>
```

where

<logical unit>

is the octal, logical device number of a peripheral device,

executes a clear device operation (IOX instruction) and clears the device buffer. This command may, for instance, be used to stop the line printer if an attempt is made to print non-alphanumeric information or the command may be used to stop a search for a non-existent EOF mark on a magnetic tape to prevent the tape from winding off. Note: CLEAR-DEVICE on a magnetic tape operates on the mag. tape controller. I.e., if several mag. tape stations are connected to the same controller, they will all be cleared through one CLEAR-DEVICE command, except for STC (6250 bpi) - magnetic tape where a @DEVICE-FUNCTION to clear one selected unit is available.

3.4.9 **The INITIALIZE-ERROR-LOG Command**

All errors concerning hardware may be put on a segment. The command to initialize this segment is:

@INITIALIZE-ERROR-LOG

3.4.10 **The PRINT-ERROR-LOG Command**

The contents of the error log is printed by the command

@PRINT-ERROR-LOG <output file>

3.4.11 **The DEFINE-ESCAPE-CHARACTER Command**

The value of the "escape character", i.e., the character which can perform the "user break" function, can be defined by the command

@DEFINE-ESCAPE-CHARACTER <terminal>, <character value>

where

<terminal>

is the number of the terminal for which the escape character is defined. Default value is the terminal where the command is given.

<character value>

is the ASCII value of the new escape character. Default value of the escape character is 33_a

(@SINTRAN—SERVICE—PROGRAM, *CHANGE—DATAFIELD is another way to change escape character.)

3.4.12 **System CPU Histogram**

`@DEFINE-SYSTEM-HISTOGRAM <level>, <start address>, <interval>`

where

`<level>`

is any interrupt level lower than 13.

`<start address>`

is the start address in memory where the measurement begins.

`<interval>`

is the number of words in each of the 64 intervals. All intervals will be of this length and will immediately follow each other.

This command used together with the commands `@START-HISTOGRAM`, `@STOP-HISTOGRAM` and `@PRINT-HISTOGRAM` can be used to measure the CPU time spent in various parts of the memory on a specified interrupt level.

3.4.13 Program Measurement

Two commands are available to measure system usage by programs in a time interval.

@START-PROGRAM-LOG <interrupts/sample>

starts the measurement. The parameter is the sampling rate in number of interrupts on the terminal between each sample.

The command

@STOP-PROGRAM-LOG <output file>

will stop the measurement and print the result on the specified output file. Default value of the parameter <output file> is the terminal. The result written will be the name of the programs and the time in percentage of the measuring period, the program has been active.

@RT—PROGRAM—LOG.

See also related **@START-PROGRAM-LOG**.

Function:

Measure the usage of computer resources by logging the requirements of a particular RT program together with the total system requirements. The usage of one or two logical units can also be logged.

Format:

@RT—PROGRAM—LOG <program name> , <report interval> , <interrupts/sample> , <logical device no.> , [<input or output>] , [<logical device no.>] , [<input or output>] , <output file>

Parameters:

<program name>

is the name of the RT program to be measured or the address of its RT description (DEF = log only total system usage).

<report interval>

gives the number of seconds between each report time.

<interrupts/sample>

is the number of output interrupts of the own terminal between each sample.

<logical device no.>

is any existing logical device to be measured. Two devices can be measured at one time (DEC:DEF = no log).

<input/output>

input or output of the log device.

0 = input

1 = output

<output file>

destination of the report (DEF = TERMINAL).

Rules:

1. Permitted only for users RT and SYSTEM.
2. The usage sampling is connected to the output interrupt response time of the terminal. If the own terminal is of high speed, e.g., 9600 baud, a sample on each interrupt would give a considerable system load. The parameter <interrupts/sample> should specify a reasonable number depending on the situation.
3. The information returned is:
 - CPU time used
 - disk channel time for swapping
 - disk channel time for file access
 - the time the disk was reserved. This is the total of swap and file access
 - time the logical unit(s) is (are) reserved

when the operating system itself or an RT program is measured. For RT programs additional information about

- time when program was passive
- time when program was waiting for I/O interrupts

is given.

All information is given as percentages. If, for instance, "20/45" is returned as CPU load, it means that the RT program uses 20% of the total CPU time available, while the total system uses 45%. The rest of the time, the CPU is idle.

4. To terminate the log, press "escape".
5. The command is not permitted from remote terminals.

Example:

@RT—PROGRAM—LOG BAK02,1,1,,

CPU	SWAP	FILES	DISK	PASSIVE	IO WAIT
00/ 95	00/ 00	00/ 00	00	94	04
41/ 98	00/ 00	13/ 13	13	00	60
44/ 97	00/ 00	03/ 03	03	00	57
63/100	00/ 00	00/ 00	00	00	24
24/100	00/ 00	00/ 00	00	00	10
65/100	00/ 00	00/ 00	00	00	33
63/100	00/ 00	01/ 01	01	00	33
04/100	00/ 00	00/ 00	00	00	00
63/100	00/ 00	01/ 01	01	00	33
65/100	00/ 00	00/ 00	00	00	33
65/100	00/ 00	01/ 01	01	00	32
05/100	00/ 00	00/ 00	00	00	00
10/100	00/ 00	01/ 01	01	00	04
03/100	00/ 00	00/ 00	00	00	00
50/100	00/ 00	03/ 03	03	00	28
04/100	00/ 00	00/ 00	00	00	00

The program BAK02 is logged every second. One sample is taken on every interrupt of the terminal 2. The second row shows that CPU was utilized 98% of the time and BAK02 used 41% of that. The disk was reserved 13% of the time and all was used for BAK02 file access. Finally, BAK02 was in IO—WAIT 60% of the time. The sum of CPU time, passive time and IO—WAIT is 101%, probably due to inaccuracy in rounding off.

3.4.14 The LOOK-AT Command

This command may be used to examine and modify memory locations and registers.

The format is:

@LOOK-AT# <area>

where

<area> may be;

MEMORY

meaning user's virtual memory space. This is allowed for all users.

ALT-MEMORY

Used to look at the upper 64K word memory area on terminals with 128K wordaddress range (background segment). The addresses are specified from 0 to 177777.

SEGMENT

A segment on mass storage may be reached. A segment number must be given as an additional parameter. This is allowed only for the users RT and SYSTEM. A modification causes permanent change of the specified location on the segment.

RTCOMMON

Locations of the common area for RT programs may be reached. This is allowed only for the users RT and SYSTEM. A modification takes place in the memory and the modification is valid until a new value is inserted by an RT program or a new value is loaded into the location by the RT loader.

IMAGE

Locations of the memory image of the resident part of SINTRAN III on mass storage can be reached. This is allowed only for the user SYSTEM. A modification causes a permanent change of the specified location.

RESIDENT

All existing memory addresses in the lowest 64K (0 - 177777₈) may be reached. This includes the resident parts of the SINTRAN III operating system. This is allowed only for the user SYSTEM. A modification takes place in the memory and leads only to a change until the next load from the image of the specified location. The next time the corresponding core image is loaded to the memory, the "old" values are retained.

Access to the address area 177400₈ to 177777₈ will go to the page index tables

(177400₈ - 177477₈ to PIT0, 177500₈ - 177577₈ to PIT1, 177600₈ - 177677₈ to PIT2 and 177700₈ - 177777₈ to PIT3).

* If SINTRAN III USE or SINTRAN III USE—500 (Extended mode) 177000 - 177177 to PIT0, 177200 — 177377 to PIT1, 177400 — 177577 to PIT2 and 177600 — 177777 to PIT3.

REGISTERS

All registers on all hardware program levels may be examined and the registers on the levels 2, 5, 6, 7, 8, 9 and 15 may be changed. The register to be examined is specified by an octal number indicating the level, followed by the register name.

Example:

The X register on level 5 is examined through 5X/.

Only user SYSTEM and user RT are allowed to use the @LOOK-AT REGISTERS command.

When the <space reference> given has been checked for legality and made available if mass storage segments are involved, the message READY is typed.

To examine a location, the octal address should be typed followed by a slash (/). The octal contents will then be printed. The contents may now be changed by typing an octal value, followed by a carriage return. If only a cr, without a new value, is given the contents remain unchanged and the contents of the next location is printed.

If an asterisk (*) is typed, the current address will be printed.

The contents of registers can be accessed in the same way, using a single letter to specify the register. The letters are:

P, X, T, A, D, L, S and B.

When a character not mentioned above is typed, a question mark is printed. Illegal characters will have no effect. The command is terminated by a dot (.) or by a commercial at (@).

If locations on mass storage segments are changed, the pages will be written out so that "patches" will be made permanent. Locations changed in the user's virtual memory or the resident part of the operating system are changed temporarily. They may be altered when loading a user program or reloading the system.

EXAMPLES:

@LOOK-AT RESIDENT

READY:

<address> / <old value> <new value> (CR)
<value of address + 1>

— END

@

@LOOK-AT IMAGE

READY:

<address> / <old value> <new value> (CR)
<value of address + 1>

— END

@

@LOOK-AT SEGMENT

NUMBER: 6

READY

<address> / <old value> <new value> (CR)
<value of address + 1>

— END

@

The user types in the underlined parts.

3.4.15 **The OPCOM Command**

This command is only available on ND-100 computers and is the same function as pushing the OPCOM button on the ND-100 panel. The command is only available for user SYSTEM on the console terminal, or terminal 1 if RT-version. This command must *not* be used in mode or batch jobs.

@OPCOM

Return to SINTRAN—III by pressing ESCAPE.

3.5 THE ACCOUNTING SYSTEM

This system provides the facility to account for usage of certain of the computer system's resources. Options can be chosen when your SINTRAN III is generated to permit accounting of:

- 1) CPU time used for background users, RT-programs and ND-500 users.
- 2) Connect time, ie., the time you have been logged in on the computer, for background users accessing a NORD-10, ND-100 or ND-500.
- 3) Block IO transfers through the file system (1K pages written to or read from files on disk).
- 4) Number of pages printed on printers to which output is spooled using the ND Spooling System.

The accounting is done on the basis of a project name which is protected by a project password for background usage. For RT-programs the RT name is associated with the project name.

The project name and the project password can consist of a maximum of 16 characters each.

The accounting system consists of:

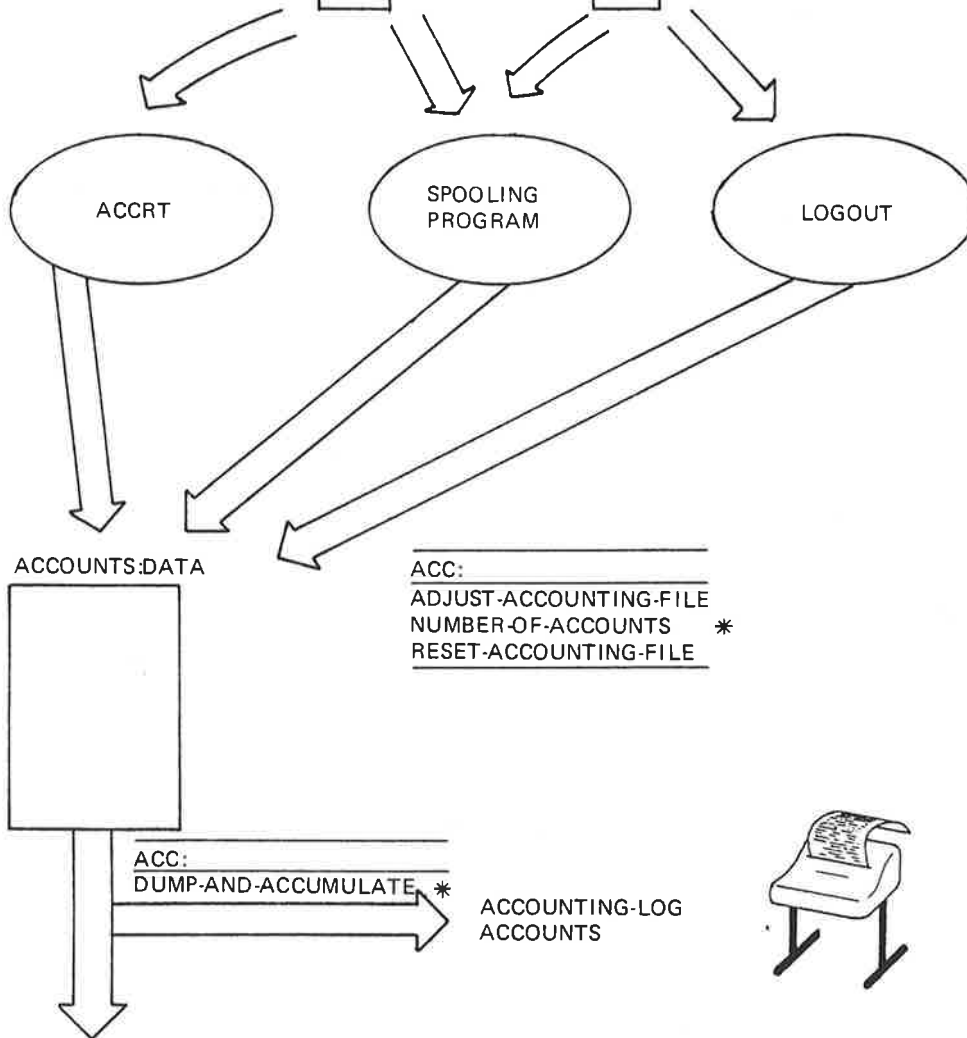
- i) pointers, flags and tables within SINTRAN
- ii) SINTRAN commands
- iii) files belonging to user SYSTEM
- iv) an RT-program to provide RT-accounting (option) and
- v) a service program to manage the accounting files and to produce reports from the accounting data collected.

ACC:
 RESET-RT-PROJECT-TABLE
 CREATE-RT-PROJECT
 DELETE-RT-PROJECT
 LIST-RT-PROJECT

RTPROJ:DATA

PROJNAM:DATA

ACC:
 RESET-BACKGROUND-PROJECT-TAB
 CREATE-BACKGROUND-PROJECT
 DELETE-BACKGROUND-PROJECT
 LIST-BACKGROUND-PROJECTS



ACC:
 ADJUST-ACCOUNTING-FILE
 NUMBER-OF-ACCOUNTS *
 RESET-ACCOUNTING-FILE

ACC:
 DUMP-AND-ACCUMULATE *

ACCOUNTING-LOG
 ACCOUNTS

ACCOUNTS:DATA

ACC:
 LOOK-ACCUMULATED *
 DELETE-ACCUMULATED-PROJECT *
 DELETE-ACCUMULATED-USER *

ACC:
 PRINT-ACCUMULATED-ACCOUNTS

ACCOUNTS

* Output from these commands
 can be written to a file by:

ACC:
 SET-INFORMATION-FILE

It is the system supervisor's responsibility to supervise the accounting system. (In the following information references to RT-accounting can be ignored if your SINTRAN has not been generated with RT-accounting.) The following files are used by the accounting routines in SINTRAN III and will be created and the correct access set by SINTRAN or the ACCOUNTING SERVICE PROGRAM as necessary.

ACCOUNTS:DATA. This is an indexed file; its structure and contents are given in TABLE III.

PROJNAM:DATA. This is an indexed file; its structure and contents are given in table I.

RTPROJ:DATA. This is an indexed file; its structure and contents are given in table II.

Using the ACCOUNTS-SERVICE-PROGRAM, desired combination of PROJECT NAME/PROJECT PASSWORD should be entered into PROJNAM:DATA and desired combinations of RT-PROGRAM NAME/PROJECT NAME should be entered into RTPROJ:DATA. The supervisor should notify users of their PROJECT-NAMES and PROJECT-PASSWORDS.

Accounting should be initialized with the SINTRAN command @INIT-ACCOUNTING. After initialization, accounting should be controlled by @START-ACCOUNTING (preferably in the LOAD MODE file) and @STOP-ACCOUNTING.

The accounting data accumulated in ACCOUNTS:DATA should be periodically dumped to the file AACCOUNTS:DATA using the ACCOUNTING-SERVICE-PROGRAM, which will create this file and the file AACCOUNTS:ISAM. The ACCOUNTING-SERVICE-PROGRAM can be used to maintain the accounting file and also to produce accounting reports.

TABLE I: THE FILE PROJNAM:DATA

This contains the legal combinations of PROJECT PASSWORD and PROJECT NAME and should have access:

PUBLIC	:	NONE			
FRIEND	:	READ			
OWNER	:	READ,	WRITE,	APPEND,	COMMON,
		DIRECTORY			

Format of PROJNAM:DATA file:

Block size	:	16 words (Decimal; all words are 16 bit)
Block 0	:	word 0 (first word) : index of last block in file, (= 0 if file is empty)
Block n	:	words 0-7 PROJECT-PASSWORD words 8-15 PROJECT-NAME

Project password and project name are both ASCII character strings with unfilled character positions containing spaces (ASCII 40 Octal). They are not terminated by apostrophes.

TABLE II: The file RTPROJ:DATA

Each user RT-program can be associated with a PROJECT NAME. The RT-PROGRAM NAME/PROJECT NAME pairs are stored in this file. It should have access:

PUBLIC	:	NONE			
FRIEND	:	READ			
OWNER	:	READ,	WRITE,	APPEND,	COMMON,
		DIRECTORY			

This file is maintained by the ACCOUNTING-SERVICE-PROGRAM.

Format of RTPROJ:DATA file:

Block size	:	12 words (decimal)
Block 0	:	word 0 (first word): index of last block in file.
Block n	:	words 0-3 RT-PROGRAM NAME (Upper case; no parity set) words 4-11 PROJECT-NAME

RT-program name and project name are both ASCII character strings with unfilled character positions containing spaces (ASCII 40 Octal). They are not terminated by apostrophes.

TABLE III: STRUCTURE AND CONTENTS OF ACCOUNTS:DATA

This file contains accounting records written by LOGOUT, the ACCRT RT program, the spooling program(s) and the ND-500 monitor. It should have access:

PUBLIC : NONE
 FRIEND : READ, WRITE, APPEND
 OWNER : READ, WRITE, APPEND, DIRECTORY

Block size : 26 words (decimal)
 Block 0 : word 0-No. of records on the file.
 word 1-desired No. of accounts.
 word 2-maximum No. of accounts.

Block n: Format of entries				
WORD	BACKGROUND	RT	SPOOLING	ND-500
0	USER NAME	RT-PROG-NAME	USER NAME	USER NAME
1	USER NAME	RT-PROG-NAME	USER NAME	USER NAME
2	USER NAME	RT-PROG-NAME	USER NAME	USER NAME
3	USER NAME	RT-PROG-NAME	USER NAME	USER NAME
4	USER NAME	RT-PROG-NAME	USER NAME	USER NAME
5	USER NAME	RT-PROG-NAME	USER NAME	USER NAME
6	USER NAME	RT-PROG-NAME	USER NAME	USER NAME
7	USER NAME	RT-PROG-NAME	USER NAME	USER NAME
10	0 (BACKGROUND)	1 (RT)	2 (SPOOLING)	3 (ND-500)
11	LOGOUT TIME	DUMP TIME	PRINT TIME	LOGOUT TIME
12	LOGOUT TIME	DUMP TIME	PRINT TIME	LOGOUT TIME
13	TERMINAL TIME	0	0	TERMINAL TIME
14	TERMINAL TIME	0	0	TERMINAL TIME
15	TERMINAL No.	0	SPOOL DEV No.	0
16	TIME USED	TIME USED	No. OF PAGES	ND-500 CPU
17	TIME USED	TIME USED	PRINTED.	TIME USED
20	PROJECT NAME	PROJECT NAME	PROJECT NAME	PROJECT NAME
21	PROJECT NAME	PROJECT NAME	PROJECT NAME	PROJECT NAME
22	PROJECT NAME	PROJECT NAME	PROJECT NAME	PROJECT NAME
23	PROJECT NAME	PROJECT NAME	PROJECT NAME	PROJECT NAME
24	PROJECT NAME	PROJECT NAME	PROJECT NAME	PROJECT NAME
25	PROJECT NAME	PROJECT NAME	PROJECT NAME	PROJECT NAME
26	PROJECT NAME	PROJECT NAME	PROJECT NAME	PROJECT NAME
27	PROJECT NAME	PROJECT NAME	PROJECT NAME	PROJECT NAME
30	BLOCK IO	BLOCK IO	0	0
31	TRANSFERS	TRANSFERS	0	0

FORMAT OF THESE ENTRIES

BLOCK IO TRANS.	The number of pages read from or written to disk files in the file system. This is not necessarily the same as the number of pages read and written from a user's program.
DUMP TIME	The time and data when the ACCRT program dumped the RT system usage data to the file. All times and dates are as packed by SINTRAN, ie. year, month, day, hour, minute and second packed as 6,4,5,5,6 and 6 bits respectively.
LOGOUT TIME	The time and date when the user logged out.
No. OF PAGES	Total number of pages printed including header and trailer.
PRINT TIME	The time printing of the file finished.
RT-PROGRAM NAME	The name (in SINTRAN III) of the RT-program.
SPOOL. DEV. No.	The number of the device on which the printing took place.
TERMINAL NUMBER	The terminal at which the background user was working.
TERMINAL TIME	This is a FORTRAN integer (see NORD FORTRAN ref. manual appendix B for definition of data types), giving the period of time the terminal was logged in. It is given in basic time units. (Usually 20 ms).
TIME USED	A FORTRAN integer giving the CPU time used in basic time units.
PROJECT NAME	An ASCII character string containing the project name. Unused character positions are filled with spaces (ASCII 40 Octal) and there is no apostrophe at the end of the name.
USER NAME	An ASCII character string containing the user name. Unused character positions are filled with spaces and there is no apostrophe after the name.

3.5.1 SINTRAN III Accounting Commands

The following are the accounting commands and are restricted to user system:

```
@START-ACCOUNTING <Background>[, <RT>, <clear logged information>,
                        <Logging interval>][, <ND-500>], <SPOOLING>
```

The answer to the first question is YES or NO. If and only if the SINTRAN system on your machine has RT-accounting the next questions must be answered.

<Clear logged information> must be answered YES or NO; it refers to the RT-accounting table (ACCTAB) in SINTRAN III in which CPU time used by RT-programs is stored and to that part of the I/O accounting table (IOACCTAB) used for accumulating filesystem IO for RT-programs. When these tables are reset the entries for all user RT-programs are set equal to zero.

<Dump-interval> is the number of seconds (decimal) between dumps of the RT-accounting-table on the file ACCOUNTS:DATA. The value of this parameter must not be so large that overflow occurs in the double words used to contain number of page transfers and CPU time used in basic time units; but as this is a number approx 1 000 000 000 at most once per day should be sufficient.

To start RT-accounting system, the RT-program ACCRT must have been loaded.

<ND-500> is asked, if and only if, there is an ND-500 in your system.

<SPOOLING> is asked whether or not you have spooling on your system; it will have no effect if you answer yes when you have no spooling.

```
@STOP-ACCOUNTING <Background>[, <RT>][, <ND-500>], <SPOOLING>
```

The answers are YES or NO.

```
@INIT-ACCOUNTING <desired number of accounts>,
                  <maximum number of accounts>,
                  <background>[, <RT>, <clearing logged information>,
                  <logging interval>][, <ND-500>] <SPOOLING>
```

This command initializes the file ACCOUNTS:DATA, creating it if it does not exist. The number of accounts before warning and the maximum number of accounts may be specified. Default values are 500 and 600 respectively. The command then continues in the same way as the START-ACCOUNTING command.

INIT-ACCOUNTING reset the ACCOUNTS:DATA file and should only be used the first time the ACCOUNTING is started. If other values for DESIRED... and MAXIMUM... are required later, the command ADJUST-ACCOUNTING-FILE in the ACCOUNTING-SERVICE-PROGRAM should be used and the ACCOUNTS:DATA file contents will not be lost.

When background accounting is running the command processor will ask for the PROJECT PASSWORD when a user tries to log in. The user answer is read with no-echo and checked against legal values. If the password is correct, the PROJECT NAME is printed on the terminal, if it is incorrect the question is repeated. After three unsuccessful attempts to give a valid PROJECT PASSWORD @LOGOUT is automatically executed.

If there are no entries in the PROJNAM:DATA file, log in will be as if background accounting were not running.

RT accounting is started by the command START-ACCOUNTING and the CPU time used by those programs specified as parameters to the command START-RT-ACCOUNT is accumulated.

@START-RT-ACCOUNTING <RT-program-name>.

The parameter <RT-program-name> is checked against names in the file RTPROJ:DATA and if a match is found the program is flagged in the RT-accounting-table. The RT-ACCOUNTING may be started for user RT-programs only.

RT-description address is used as index in the tables ACCTAB and IOACCTAB and if the RT-program is reloaded using another RT-description, use @STOP-RT-ACCOUNTING for this program (before reloading) and @START-RT-ACCOUNTING after reloading the program.

@STOP-RT-ACCOUNTING <RT-program-name>

RT-ACCOUNTING is stopped for the specified RT-program.

@LIST-RT-ACCOUNT

The names of all RT-programs being logged will be listed on the terminal with the PROJECT-NAME and the time used since last dump of the RT-accounting-table.

3.5.2 **ACCRT Program**

This program dumps the RT program accounting-tables on the file ACCOUNTS:DATA. It is delivered on diskette as ACCRT:BPUN and loaded onto segment 32 using the READ-BINARY command in the RT-LOADER, i.e.

```
@RT-LOADER
*READ-BINARY  ACCRT:BPUN  32
*YES
*END-LOAD
*EXIT
```

ACCRT is started by @START-ACCOUNTING or @INIT-ACCOUNTING and stopped by the command @STOP-ACCOUNTING.

3.5.3 **The ACCOUNTING-SERVICE-PROGRAM**

This program should be loaded according to the PD-sheets delivered with the diskettes.

3.5.3.1 **Essential Precaution**

The ACCOUNTING-SERVICE-PROGRAM makes use of ND ISAM to store accounting records. There is always a possibility that an error will leave the ISAM files (in this case AACCOUNTS:DATA and AACCOUNTS:ISAM) in an inconsistent state. It is essential to take adequate back up of these files before using the ACCOUNTING-SERVICE-PROGRAM if any of the following commands are to be used:

```
DUMP-AND-ACCUMULATE
DELETE-ACCUMULATED-USER
DELETE-ACCUMULATED-PROJECT
```

If the computer stops while one of these commands is being executed or if a fatal error occurs in the ACCOUNTING SERVICE PROGRAM (accompanied by an error message stating this fact) the files AACCOUNTS:DATA and AACCOUNTS:ISAM should be restored from backup and the operation should be attempted again.

3.5.3.2 Commands

The service program uses the same command processor as the BACKUP SYSTEM. The program is started by typing

```
@ACC-SER-PR
```

when in command mode in SINTRAN III. When the program is ready to receive a command the leading text ACC: is displayed. Commands can be abbreviated and parameters are prompted for interactively. The available commands are:

```
ADJUST-ACCOUNTING-FILE
CREATE-BACKGROUND-PROJECT
CREATE-RT-PROJECT
DELETE-ACCUMULATED-PROJECT
DELETE-ACCUMULATED-USER
DELETE-BACKGROUND-PROJECT
DELETE-RT-PROJECT
DESCRIBE-ALL-COMMANDS
DUMP-AND-ACCUMULATE
EXIT
HELP
LIST-BACKGROUND-PROJECTS
LIST-RT-PROJECTS
LOOK-ACCUMULATED
NUMBER-OF-ACCOUNTS
PRINT-ACCUMULATED-ACCOUNTS
RESET-ACCOUNTING-FILE
RESET-BACKGROUND-PROJECT-TABLE
RESET-RT-PROJECT-TABLE
SET-INFORMATION-FILE
```

```
ACC: DESCRIBE-ALL-COMMANDS <output file name>
```

This gives a description of all the commands available within the program together with the use of the HELP command and the built-in functions ? and escape.

```
ACC: EXIT
```

Stops the ACCOUNTING-SERVICE program and returns to SINTRAN III.

```
ACC: RESET-BACKGROUND-PROJECT-TABLE
```

The word giving the number of records written onto the file PROJNAM:DATA, is set to zero.

ACC: CREATE-BACKGROUND-PROJECT <project-password>,
<project-name>

Specifies PROJECT-PASSWORD and their corresponding PROJECT-NAMES. The entries are stored as record in the file PROJNAM:DATA which is read during the log in routine when ACCOUNTING is on. A PROJECT-PASSWORD not in this file will not be accepted during log in. The PROJECT-PASSWORD must be unique. If there are no entries on the file, users will be able to log in as if accounting is not running.

ACC: DELETE-BACKGROUND-PROJECT <project-name>

Deletes entries from the PROJNAM:DATA file. Background projects should not be deleted whilst background accounting is running.

ACC: LIST-BACKGROUND-PROJECTS <output file name>

Lists PROJECT-PASSWORDS and their corresponding PROJECT-NAMES from entries on the PROJNAM:DATA file.

ACC: RESET-RT-PROJECT-TABLE

The word giving the number of entries in the file RTPROJ:DATA is set to zero.

ACC: CERATE-RT-PROJECT <rt-program-name> , <rt-project-name>

Associates an RT-PROGRAM-NAME with a PROJECT-NAME. Specified entries are stored on the file RTPROJ:DATA and used when @START-RT-ACCOUNTING is given. An RT-program name can only occur once in the file. Only USER RT-programs (not SYSTEM RT-PROGRAMS) can be accounted; there is no check in the ACCOUNTING-SERVICE program but there is in SINTRAN.

ACC: DELETE-RT-PROJECT <rt-program-name>

Lists the entries in the file RTPROJ:DATA file. RT-projects should not be deleted whilst RT-accounting is running.

ACC: LIST-RT-PROJECT <output file name>

Lists the entries in the file RTPROJ:DATA; i.e. RT-program and their corresponding RT-PROJECT-NAMES.

ACC: DUMP-AND-ACCUMULATE.

This command processes all the records in ACCOUNTS:DATA, checking their validity and printing a log if required, and accumulates the data from each in the intermediate values in AACCOUNTS:DATA, (see tabel IV), for each project and user name. Accounts can be printed using this data if required. These totals are also added to ACCUMULATED totals in these records. Thus the intermediate values contain the resource usage between the last and preceding DUMP-AND-ACCUMULATE commands for each project and each user name. The accumulated values contain the total resource utilisation to the last DUMP-AND-ACCUMULATE command.

The command has the following parameters;

RESET ACCOUNTING FILE	: <yes/no>
NUMBER OF RECORDS BEFOR WARNING	: <number>
MAXIMUM NUMBER OF RECORDS	: <number>
DO YOU WANT A LOG	: <yes/no>
OUTPUT FILE FOR LOG	: <file name>
LINES PER PAGE	: <number>
DO YOU WANT ACCOUNTS	: <yes/no>
ACCOUNTS BY PROJECT NAME OR USER NAME OR BOTH	: <both/user/project>
DO YOU WANT SUBTOTALLING	: <yes/no>
OUTPUT FILE	: <file name>
LINES PER PAGE	: <number>

It is possible to produce a log and accounts separately on different files or to produce only one or neither. In any case the records in ACCOUNTS:DATA will be processed and written to the intermediate values in AACCOUNTS:DATA.

When the ACCOUNTS:DATA file is reset, the first three words are given the values zero and the number of records before warning and the maximum number of accounts respectively.

When the warning limit is reached the error-message "APPROACHING END OF ACCOUNTING FILE" is given on the terminal on each logout whilst accounting is running. When the maximum number of accounts is reached the message "END OF ACCOUNTING FILE ENCOUNTERED" is written on the terminal at each logout. (NOTE: This standard operation of the ACCOUNTING SERVICE PROGRAM can be modified by patching. Details can be found on the PD-sheets accompanying the diskettes on which the program is written.)

ACCOUNTING LOG

There is a separate log produced for BACKGROUND, RT, SPOOLING and ND-500 records (although this can be modified by patching: see PD-sheets).

This is a number of one line entries derived from the data in ACCOUNTS:DATA printed on the output file. The USER NAME (or RT-PROGRAM NAME), PROJECT NAME, an the resource usage are listed. The order is in increasing logout time and date, or dump time and date, or print time and date.

ACCOUNTS

These can be produced for user (RT program) name, project name or both. For each user name a table is produced showing the total usage by this user and sub-totals by project name. The accumulated data are for console time, CPU time (for both ND-100 and ND-500), number of pages printed and block IO transfers. The magnitude of the usage and its percentage of the whole are given. Similar tables are produced for the accounts by project name but with sorting on the project name and sub-totalling on the user name.

ACC: LOOK-ACCUMULATED <user-name> , <project-name>

To look at a specific entry in the AACOUNTS:DATA. Both the intermediate and accumulated useage are given for a specific user name and project name.

ACC: DELETE-ACCUMULATED-PROJECT <project-name> and
ACC: DELETE-ACCUMULATED-USER <user-name>

Removes a specific PROJECT or USER from the file AACOUNTS:DATA.

PRINT-ACCUMULATED-ACCOUNTS

This produces a listing of the accumulated values of system usage from when the file AACOUNTS:DATA was first created to the last time DUMP-AND-ACCUMULATE was executed. It can be sorted by the user name or project with or without sub-totalling as in the case of DUMP-AND-ACCUMULATE. The data is from the ACCUMULATED entries in the file AACOUNTS:DATA and gives system useage up to the last DUMP-AND-ACCUMULATE command.

The command has the following parameters:

DO YOU WANT ACCOUNTING BY USER NAME	: <yes/no>
DO YOU WANT ACCOUNTING BY PROJECT NAME	: <yes/no>
DO YOU WANT A SUBTOTALLING	: <yes/no>
OUTPUT FILE	: <file name>
LINES PER PAGE	: <No. of lines>

TABLE IV FORMAT OF RECORDS IN AACCOUNTS:DATA

Format of the ISAM records in the AACCOUNTS:DATA file.

WORD	TYPE	EXPLANATIONS
1-8	CHARACTER*16	User name or RT program name
9-16	CHARACTER*16	Project name
17-18	DOUBLE INTEGER	Accumulated CPU time (seconds)
19-20	DOUBLE INTEGER	Intermediate CPU time (basic time units)
21-22	DOUBLE INTEGER	Accumulated console time (minutes)
23-24	DOUBLE INTEGER	Intermediate console time (seconds)
25-26	DOUBLE INTEGER	Accumulated number of pages printed
27-28	DOUBLE INTEGER	Intermediate number of pages printed
29-30	DOUBLE INTEGER	Accumulated No. of block I/O transfers
31-32	DOUBLE INTEGER	Intermediate No. of block I/O transfers
33-34	DOUBLE INTEGER	Accumulated ND-500 CPU time (seconds)
35-36	DOUBLE INTEGER	Intermediate ND-500 CPU time (basic time units)
37-38	DOUBLE INTEGER	Accumulated ND-500 console time (minutes)
39-40	DOUBLE INTEGER	Intermediate ND-500 console time (seconds)

ACC: ADJUST-ACCOUNTING-FILE

This enables the values of the number of accounts before warning and maximum number of accounts to be modified while accounting is running and without resetting the file by @INIT-ACCOUNTING or by DUMP-AND-ACCUMULATE.

ACC: RESET-ACCOUNTING-FILE

This sets the first word in the file, i.e the number of records, to zero.

ACC: SET-INFORMATION-FILE

This opens a file to which all information from the commands DUMP-AND-ACCUMULATE, NUMBER-OF-ACCOUNTS, LOOK-ACCUMULATED, DELETE-ACCUMULATED-USER and DELETE-ACCUMULATED-PROJECT is written. Once defined the file remains open until the EXIT command is given or until a new information file is defined.

3.6 THE BATCH SYSTEM

The batch system is described in the manual SINTRAN III Timesharing/Batch Guide (ND-60.132). Two commands are restricted to user SYSTEM. They are the commands to activate and abort a batch process:

@BATCH and @ABORT-BATCH.

@BATCH

This command finds a passive batch processor and starts it. It then prints BATCH NUMBER = <batch number> where <batch number> is a decimal integer which may be used in future commands to identify the batch processor.

If there are no passive batch processors in the system, the message NO BATCH AVAILABLE is printed.

After the batch processor is started, it immediately enters waiting state as the batch queue will initially be empty. It will automatically be restarted when a batch-input-file/batch-output-file pair is entered into the batch by an @APPEND-BATCH command.

@ABORT-BATCH <batch number>

This command will abort a batch processor and release all resources reserved by the batch processor. Any job currently running will be aborted immediately, and the batch queue will be cleared.

3.7 PERIPHERAL DEVICES

Peripheral devices are supported by the file system. User SYSTEM is responsible for introducing them to the file system. This is done by the command:

```
@SET-PERIPHERAL-FILE <file name>, <device number>
```

This command defines the specified <file name> as a peripheral file. The <device number> is an octal value. A list of logical device numbers is found in Appendix L. The <file name> may be chosen by the operator. If the file does not exist it must be enclosed in quotation marks.

Example:

To introduce the line printer one types:

```
@SET-PERIPHERAL-FILE "LINE-PRINTER" 5
```

Legal access is specified by the command:

```
@SET-FILE-ACCESS L-P, WA, WA, WAD
```

The command

```
@SET-TERMINAL-FILE <file name>
```

will specify <file name> as the name of all terminals, i.e., a time-sharing user may refer to his terminal by the specified <file name>. If the file does not exist it must be enclosed in quotation marks.

Example:

After:

```
@SET-TERMINAL-FILE "TERMINAL"
```

TERMINAL may be used as an output or input file name, i.e.,

```
@SET-FILE-ACCESS TERM, RWA, RWA, RWAD
```

```
@COPY TERMINAL FILE-ONE
```

will copy FILE-ONE to the terminal.

3.8 REMOTE JOB ENTRY

3.8.1 General Remarks

RJE emulators are delivered for emulating IBM 2780, IBM 3780, IBM HASP WORK STATION, CDC 200 USER, UNIVAC DCT 2000 and Honeywell Bull GERTS 115. An emulator is delivered on a diskette in BRF format. The emulators are run as RT programs and must be loaded by the RT loader. The starting and stopping of an RJE emulator must be done by user SYSTEM on user RT.

The emulator (in BRF format) should be copied to a mass storage file. This is done by, for instance:

```
@COPY "RJEFILE: BRF" F-D-1
```

```
@COPY-FILE "RJEFILE:BRF" F-D-1.
```

Load procedure of an RJE emulator:

```
@RT-LOADER
```

```
RT-LOADER
```

```
*NEW-SEGMENT ,,,,
```

```
SEGMENT NO.: 37
```

```
*LOAD RJEFILE ,,
```

```
*END-LOAD
```

```
*EXIT-LOADER
```

To start the emulator one of the following commands must be given:

@RT IBM4	if IBM 2780 or 3780
@RT DCT4	if DCT 2000
@RT CDC4	if CDC 200 USER
@RT GRTS4	if GERTS 115
@RT HASP	if HASP WORK STATION
@RT IPR0	if NTR

A starting message is then written on the RJE communication terminal (normally terminal 2, logical device number 9). One may then continue on the RJE communication terminal according to the user's guide for that type of emulator.

To stop an RJE terminal, a command may be given on the communication terminal of the RJE emulator, or the SINTRAN command

@ABORT may be given from another terminal. In this case, all RT programs concerning RJE must be aborted.

If IBM 3780:

```
@ABORT IBM0,  
,  
@ABORT IBM1,  
@ABORT IBM2,  
@ABORT IBM3,  
@ABORT IBM4.
```

If DCT 2000:

```
@ABORT DCT0,  
@ABORT DCT4.
```

A similar procedure is used for other RJE emulators.

3.8.2 The Remote Batch Queue

In the same way as for the local batch, it is possible to queue files containing remote batch jobs on a *remote batch queue* held internally in SINTRAN III.

When a special command is given to the emulator, it will start reading input file names from the remote batch queue. Another command will reset the emulator to interactive mode, where input file names are given from the communication terminal.

3.8.3 Commands to Maintain the Remote Batch Queue

3.8.3.1 The APPEND-REMOTE Command

This command adds a *remote batch input file* to the specified remote batch queue.

The format is

```
@APPEND-REMOTE <host computer> ,<input file>
```

where

<host computer>

is one of the following names:

IBM
CDC
UNIVAC
HONEYWELL-BULL

or any other device name established by the command @SET-PERIPHERAL-FILE. Default file type is REM.

<input file>

is the name of the file from which batch-job-input is to be taken.

Note that the remote-batch input file must have read access for user RT.

3.8.3.2 The LIST-REMOTE-QUEUE Command

This command lists the contents of a remote batch queue.

The format is:

```
@LIST-REMOTE-QUEUE <host computer>
```

where

<host computer>

is one of the following names:

```
IBM
CDC
UNIVAC
HONEYWELL-BULL
```

Example of a @LIST-REMOTE-QUEUE list:

```
@LIST-REMOTE-QUEUE IBM
1 CARD-READER
2 (USER-NAME) IBMJOB
@
```

3.8.3.3 The DELETE-REMOTE-QUEUE-ENTRY Command

This command may be used to remove an entry from the remote batch queue.

The format is:

```
@DELETE-REMOTE-QUEUE-ENTRY <host computer>, <queue entry>
```

where

<host computer>

is one of the following names:

IBM
CDC
UNIVAC
HONEYWELL-BULL

<queue entry>

is the file name given in the @APPEND-REMOTE command.

An exact match is required between the second parameter of this command and the remote batch queue entry. The exact format of the remote batch queue entry to be removed may be checked by the @LIST-REMOTE-QUEUE command.

If the remote batch queue contains two equivalent entries, the first one will be removed.

This command must be issued by user SYSTEM or the user owning the job file in the queue in order for it to be deleted from the queue.

3.9 COMMANDS TO INITIATE AND TERMINATE NORDNET

@START-COMMUNICATION [<line number>]

Parameters:

<line number> may be omitted if there is only one possible remote connection.

Function:

Initiate communication on a communication line. A configuration table containing the correspondence between channel numbers and logical device numbers is sent to the remote computer. If the remote computer answers with its own configuration table within 12 seconds, the message COMMUNICATION ESTABLISHED is printed. If no answer is received, the message NO REPLY is printed and control is returned to the SINTRAN. However, the system continues to retransmit the configuration table until a @STOP-COMMUNICATION command is given. Thus, there may be an arbitrary time delay between the @START-COMMUNICATION commands on the two computers.

This command may only be executed by user SYSTEM and user RT.

@STOP-COMMUNICATION [<line number>]

Parameters:

<line number> may be omitted if there is only one possible remote connection.

Function:

Terminate communication on a communication line.

This command may only be executed by user SYSTEM and user RT.

Format:

@REMOTE-LOAD <load file> , <bootstrap address> , <line no.>

To load a stand-alone program into a remote computer.

Parameters:

<load file>

File name of program in BPUN format.

<bootstrap address>

Starting address of bootstrap in remote computer. It occupies approximately 400₈ words (DEF = 0).

<line no.>

line number to remote computer (DEF = 1 if only one remote computer).

Rules:

1. Permitted only for users RT and SYSTEM.
2. Valid only when communication is stopped on the line.
3. The bootstrap must reside on a system file (SYSTEM) REMOTE-BOOTSTRAP:BPUN, in the local computer. The file must be in the BPUN format. It is usually generated at system generation time.
4. Before doing a remote load from the local computer, the remote one must be initiated. This is done on the remote computer by pressing MASTER CLEAR and typing <octal no.> & on the console terminal. <octal no.> is the hardware device number of the communication line. If automatic load is used, only MASTER CLEAR and LOAD are required.

Example:

```
@REMOTE-LOAD  REMFI, 37400, 1
```

The file called REMFI on the local computer will be loaded to the remote computer on line 1. The bootstrap will occupy the memory area 37400 - 37777 in the remote computer.

```
@REMOTE-PASSWORD <line no.> , <password>
```

Set the password to be used upon remote open file from RT programs.

Parameters:

<line no.>

line number to remote computer (DEF=1, if only one remote computer).

<password>

(DEF = no password).

Rules:

1. Permitted only for user SYSTEM.
2. The password is used on the opening of a file through <line no.> by an RT program. The file is only opened if the password of user RT in the remote computer is equal to this password.

Example:

@REMOTE-PASSWORD 3, DELTA

Files are only opened in the remote computer on line number 3 if user RT has password DELTA.

For further information about NORDNET, see the following manuals:

SINTRAN III Communications Guide (ND—60.134) and
NORDNET System Documentation (ND—60.081)

3.10 THE MAIL SYSTEM

The Mail System makes it possible to all users to send a *message* to any other user. User SYSTEM may also send a *broadcast* to all users.

Messages and broadcasts are normally put into a *mailbox* and the receiver is notified when logging in and logging out. The receiver himself must, however, ask for the waiting mail by the command @MAIL.

Messages and broadcasts may also be sent directly and immediately to all terminals (having logged-in users or not) without any notification.

The Mail System is entered by the SINTRAN III command @MAIL. Afterwards, a set of mail subcommands are available. Some of these commands are restricted to user SYSTEM.

The format is:

@MAIL [<output file>]

Each time the Mail System is entered, all waiting mail for this user will be printed on the specified <output file>.

Subcommands to the Mail System:

*HELP

All available Mail subcommands will be listed.

*EXIT

Exit from the Mail System.

*INITIALIZE <maximum number of messages>
(Restricted)

The maximum length of a message is 256 words.

This command must be given by user SYSTEM before the Mail system can be used. It can also be used to re-initialize the system. The mailbox is the mass storage file (SYSTEM)MAILBOX:DATA.

***BROADCAST**
(Restricted)

The message is asked for by MESSAGE: (See Note.) and must be terminated by a (CTRL)L character. The message will be put into the mailbox. \$ is converted to CR, LF. An (apostrophe) is not permitted, but terminates the message on output.

Note. See example printout of SYSTEM MESSAGE(s).

***DIRECT-BROADCAST**
(Restricted)

The message will be asked for by MESSAGE: and must be terminated by a (CTRL)L character. The message will immediately be sent to all terminals. S and ' are handled as for *BROADCAST.

***SEND-MESSAGE <user name>**

the message is asked for by MESSAGE: (See note.) The text is terminated by (CTRL)L. The message will be put into the mailbox, addressed with <user name>. \$ and ' are handled as for *BROADCAST.

Note. See example print out of SYSTEM MESSAGE(s).

***SEND-DIRECT-MESSAGE <terminal number>**

The message is asked for by MESSAGE: (See Note.) The text is terminated by (CTRL)L. The message will be sent immediately to the specified terminal.

Note. See example printout of SYSTEM MESSAGE(s).

***LIST-MESSAGES <output file name>**
(Restricted)

All messages will be listed together with a message number.

***LIST-BROADCASTS <output file name>**
(Restricted)

All broadcasts will be listed together with a broadcast number.

***DELETE-MESSAGE <message number>**
(Restricted)

The message will be deleted. The message number can be found in the output from LIST-MESSAGES.

*DELETE-BROADCAST <broadcast number>
(Restricted)

The broadcast will be deleted. The number can be found in the output from LIST-BROADCASTS.

*STOP-MAIL-SYSTEM
(Restricted)

The Mail system will not be available. However, existing mail will not be lost.

*RUN-MAIL-SYSTEM
(Restricted)

The Mail system will be restarted, containing the same mail as before it was stopped by STOP-MAIL-SYSTEM.

3.11 Reentrant-Sybsystems Commands

The following command will establish a subsystem as a reentrant subsystem.

The subsystem will be read from a file of type BPUN. The command will call the RT loader and the subsystem is then loaded to a segment. The subsystem name is then inserted into a command table, which is searched by the command @RECOVER before it inspects the list of files for a PROG type file. The format is:

```
@DUMP-REENTRANT <subsystem name> , <start address> , <restart
address> , <binary file>
```

where

<subsystem name>

is the name of the subsystem.

<start address>

is the initial start address, found on a NORD Software Library Program Description (PD) sheet (See Appendix G).

<restart address>

is the address where the program should be reentered by the @CONTINUE command, found on a NORD Software Library Program Description sheet (See Appendix G).

<binary file>

is a file containing the subsystem in the format made by the)BPUN command of the MAC assembler. Default file type is BPUN.

Example:

```
@COPY-FILE "MAC:BPUN" F-D-1
@DUMP-REENTRANT MAC, 177777, 177775, MAC
```

The subsystem MAC will be loaded to a segment and may now be started by

```
@RECOVER MAC or just @MAC.
```

The following command will delete the subsystem name from the command table mentioned above. The format is:

@DELETE-REENTRANT <subsystem name>

where

<subsystem name>

is the name of the reentrant subsystem.

Example:

@DELETE-REENTRANT MAC

The subsystem MAC will no longer be available as a reentrant subsystem.

The commands @DUMP-REENTRANT and @DELETE-REENTRANT are only available to user SYSTEM. The command @LIST-REENTRANT is available to public users.

3.12 THE SPOOLING SYSTEM

The term spooling is derived from SPOOL, an acronym for Simultaneous Peripheral Output On Line. It allows several users to print files to one peripheral "simultaneously". A queue entry is put in a spooling queue containing information about which file is to be printed, who entered it, how many copies are to be printed and possibly a message to be printed on the error device prior to starting the output to the peripheral.

In order to have a spooling system on the computer, SINTRAN III has to be generated with the required spooling programs. These are system included real-time programs called SPRT1, SPRT2, etc.

Before we start a spooling process it is necessary to :

- make a peripheral file (with the same LDN as in the SINTRAN order).
 - create the necessary number of versions of the file.
- This is usually 10 files, known as spooling files.

Example :

```
@SET-PERIPHERAL-FILE "LINE-PRINTER",44B
@SET-FILE-ACCESS LINE-PRINTER,WA,RWA,RWAD
@CREATE-NEW-VERSION LINE-PRINTER:,10,0
```

There are now 10 versions of the file LINE-PRINTER. The first version is a peripheral file with device number 44B.

The remaining files are spooling files.

The spooling system has to be started (@START-SPOOLING) for each spooling device. The spooling program then reserves the peripheral file, thus output to the peripheral must be through the spooling program.

The spooling program can be defined as having an automatic stop before starting the printout (@DEFINE-SPOOLING-CONDITIONS). Thus allowing the system supervisor to receive messages about the job, eg., changing to a new paper type, etc.

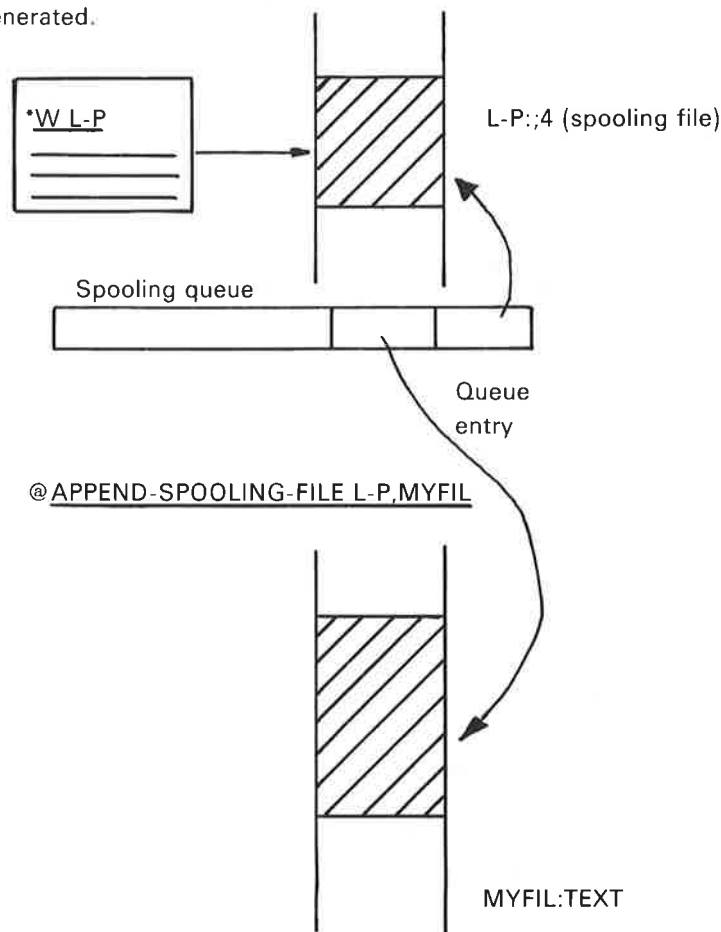
The spooling files are used for intermediate storage of the text to be printed. All the spooling files, even if they belong to different spooling programs, take their space from a "pool" of spooling pages under user SYSTEM. The default value of this "pool" is 500 pages but this can be changed (@GIVE-SPOOLING-PAGES,@TAKE-SPOOLING-PAGES) by user SYSTEM. Note that user SYSTEM must have as many free pages as the spooling system has spooling pages.

Commands to control the spooling program:

@DEFINE-SPOOLING-CONDITIONS
 @GIVE-SPOOLING-PAGES
 @START-SPOOLING
 @STOP-SPOOLING
 @TAKE-SPOOLING-PAGES

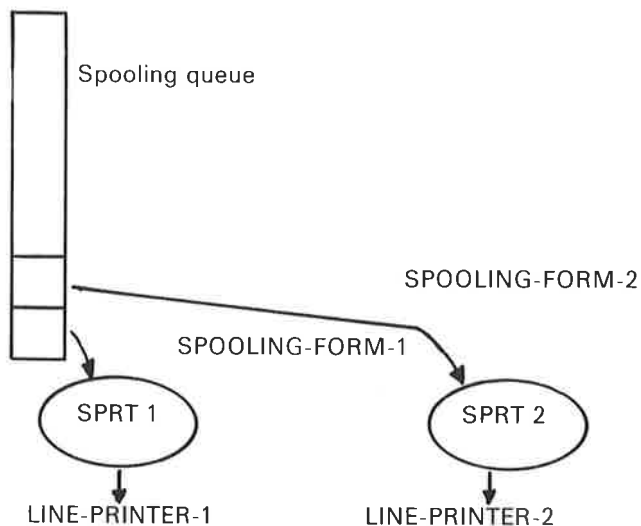
There are two ways to print to the peripheral. One uses the spooling files and the other uses the user's own files.

From an editor, we can specify the peripheral file as the output device or the file we want to write to (write-to-document). In a command, the peripheral file may be used as a parameter for the output file. The text we want to get printed is then copied to a free spooling file and a queue entry pointing to the spooling file is generated.

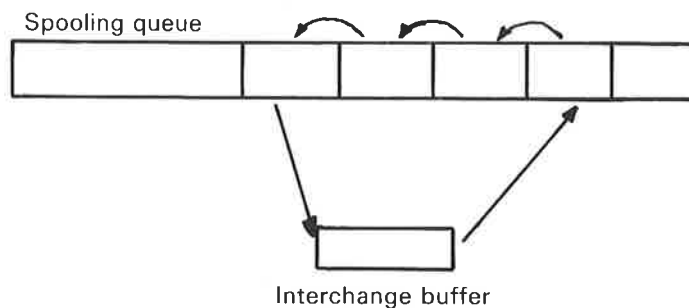


If the text we want to print has the desired format stored on a file, we can append a queue entry, pointing to the user's file, to the spooling queue.

The peripheral can be defined with an identification key (`@SET-SPOOLING-FORM`) which can be used to compare with the user text connected to the spooling queue entry. If a match is found the file is printed. This could be used to sort out the queue entries for printing, with user text that match, i.e., using the same paper format. If a spooling queue is shared by several peripherals, thus saving segment space, the spooling form can be used to print to the desired peripheral.



If you want to move a queue entry in order to reorganize the queue, use the command @MOVE-SPOOLING-QUEUE-ENTRY. An interchange buffer is then used to shift the queue entry backwards or forwards in the queue.



Commands used to control the spooling queue:

@ APPEND-SPOOLING-FILE
 @ DEFINE-SPOOLING-FILE-MESSAGE
 @ DELETE-SPOOLING-FILE
 @ MOVE-SPOOLING-QUEUE-ENTRY
 @ REMOVE-FROM-SPOOLING-QUEUE
 @ SET-NUMBER-OF-PRINT-COPIES
 @ SET-SPOOLING-FORM

When the spooling program fetches a queue entry and starts to print this file the queue entry is removed from the spooling queue and it is no longer possible to use the commands to control the queue elements. A number of commands are, however, available for the control of the file currently being printed.

The printing can be stopped and started, or we can jump forwards or backwards in the file. We can restart the printing, or just terminate the printing even when it is not finished.

The commands to control the file currently being printed on are:

@ABORT-PRINT
 @BACKSPACE-PRINT
 @FORWARD-SPACE-PRINT
 @RESTART-PRINT
 @START-PRINT
 @STOP-PRINT

Some commands provide the user with information about the spooling queue, the spooling form and the free spooling pages ("the pool").

Information commands are:

@LIST-SPOOLING-FORM
 @LIST-SPOOLING-QUEUE
 @SPOOLING-PAGES-LEFT

When the spooling program starts to print a file it first outputs a text string containing information from the queue entry along with system title and date. This spooling header can be removed, ie., the printing consist only of the text in the file (@REMOVE-SPOOLING-HEADER)

Commands available in the SINTRAN SERVICE PROGRAM are:

*INSERT-SPOOLING-HEADER
 *REMOVE-SPOOLING-HEADER
 *SET-SPOOLING-DEVICE-NUMBER

3.12.1 Spooling Commands For The User System

3.12.1.1 Start Spooling

@START-SPOOLING <peripheral file name>
(Restricted)

Starts the spooling program for the specified peripheral device. The peripheral will be reserved for the spooling program and the spooling program will print every file linked to the spooling queue for that device until the @STOP-SPOOLING command is used.

The number of pages given to spooling files will be compared to the number of unused pages belonging to user SYSTEM. If the latter number is smaller, the number of pages given to spooling will be reduced accordingly.

If more than one version of the file is a peripheral device, the spooling programs for all peripheral versions of the file is started. One specific peripheral device may be selected by including a version number in the file name.

An error message will appear if the specified file name is not the name of a peripheral or if no spooling program exists for a specified peripheral.

Before this command may be executed, the command @RTENTER must have been given.

3.12.1.2 Stop Spooling

@STOP-SPOOLING <peripheral file name>
(Restricted)

Stops the spooling program for the specified peripheral and releases the peripheral from the spooling program. Any file currently being printed by the spooling program will be completed before the spooling program is stopped. The spooling queue is unaffected by the command and files may still be appended to the queue. The spooling program will resume printing the files in the spooling queue when the @START-SPOOLING command is used.

3.12.1.3 Give Spooling Pages

@GIVE-SPOOLING-PAGES <number of pages>
(Restricted)

There is a limit to the number of pages of the disk that can be used by the spooling files. That limit may be increased with this command. Note that the command does not guarantee that the disk space is available. 500 pages are initially given to the spooling system.

3.12.1.4 Take Spooling Pages

@TAKE-SPOOLING-PAGES <number of pages>
(Restricted)

This command may be used to decrease the number of pages the spooling files may use. The pages to be taken must be unused.

3.12.1.5 Define Spooling Conditions

@DEFINE-SPOOLING-CONDITIONS <peripheral file name>, <printing name of spooling files?>, <stop and wait for START-PRINT before printing file?>, <number of lines per page>
(Restricted)

This command defines conditions under which spooling on the specified peripheral must operate. The second parameter may take the values YES or NO. If YES, the file names of all files printed on the peripheral will be written on the error device. The third parameter may also take the values YES or NO. (YES is only permitted if the previous parameter also had the value YES.) A positive third parameter will result in automatic stop-print condition before every file is emptied on the peripheral. The @START-PRINT command must then be used to obtain a print-out. The fourth parameter is number of lines per page as used by the commands @FORWARD-SPACE-PRINT and @BACKSPACE-PRINT, and will only have effect on these commands.

3.12.2 Spooling Commands for Public Users

3.12.2.1 List Spooling Queue

@LIST-SPOOLING-QUEUE <peripheral file name>,<output file>

This command gives information on the entries in the spooling queue for the specified peripheral. The information includes file name, number of bytes in file, name of user who appended the file, the number of copies to be printed and, if applied, a user message to be written to the error device when emptying the file. Similar information is supplied for the current print-out. In addition, the spooling system gives the approximate number of bytes left to print in the current print-out.

3.12.2.2 Stop Print

@STOP-PRINT <peripheral file name>

Stops the current print-out on the specified peripheral. The spooling system will await further Lcommands. Only user SYSTEM and the user who appended the file can stop the print-out.

3.12.2.3 Start Print

@START-PRINT <peripheral file name>

Resumes printing of the current print-out. The print-out may have been stopped with the @STOP-PRINT command, an automatic stop-print condition may have been specified with the @DEFINE-SPOOLING-CONDITIONS command or the user may have specified a stop-print to occur in the @APPEND-SPOOLING-FILE command or when closing the file. The @START-PRINT command is only available to user SYSTEM and the user who appended the file to the queue.

3.12.2.4 Forward Space Print

@FORWARD-SPACE-PRINT <peripheral file name>,<number of pages>,
<number of lines>

This command may only be used when the printing is in a stop-print state.

The command causes a forward space of the current print-out. The number of lines per page is device dependent, but may be changed by the @DEFINE-SPOOLING-CONDITIONS command. Only user SYSTEM and the user who appended the file may use this command.

3.12.2.5 Backspace Print

@BACKSPACE-PRINT <peripheral file name> , <number of pages> , <number of lines>

Similar to the command above, but causes a backspace of the current print-out.

3.12.2.6 Move Spooling Queue Entry

@MOVE-SPOOLING-QUEUE-ENTRY <peripheral file name>,<file name> ,
<insert or append?> , <before/after file name>

In the spooling queue for the specified peripheral the file specified as second parameter will be moved in front of or after the file specified as last parameter. If the third parameter is I, the file will be placed in front, if the parameter is A, the file will be placed after. All users may move the entries they have appended further back in the spooling queue, but only user SYSTEM may move entries forward in the queue.

3.12.2.7 Remove from Spooling Queue

@REMOVE-FROM-SPOOLING-QUEUE <peripheral file name> , <file name>

Removes the file specified as last parameter from the spooling queue for the peripheral. The contents of the file will be retained. Only user SYSTEM and the user who appended the file to the queue may use this command.

3.12.2.8 Delete Spooling File

@DELETE-SPOOLING-FILE <peripheral file name> , <file name>

The file specified in the second parameter is removed from the spooling queue for the specified peripheral. If the file is a spooling file, its pages are released and returned to the pool of free spooling pages. Only user SYSTEM and the user who appended the file to the queue can delete the file from the queue.

3.12.2.9 Abort Print

@ABORT-PRINT <peripheral file name>

Aborts the current print-out on the specified peripheral and lets the spooling program continue with the next file in the queue. The command has no effect if the spooling program for a specified peripheral is not started or if no file is being printed. Only user SYSTEM and the user who appended the file to the queue can abort the printing of the file.

3.12.2.10 Restart Print

@RESTART-PRINT <peripheral file name>

Restart the printing of the file currently being processed by the spooling program. The command has no effect if the spooling program for the specified peripheral is not started or if no file is being printed. Only user SYSTEM and the user who appended the file to the queue can restart the printing of the file. The command is useful when, for instance, a paper crash has occurred in the line printer.

3.12.2.11 Append Spooling File

@APPEND-SPOOLING-FILE <peripheral file name>, <file name>, <number of copies>, <text> [, <printing message independent of spooling conditions?>]

The file specified in the second parameter is appended to the spooling queue for the specified peripheral. The specified number of copies of the file will be printed on the peripheral. The fourth parameter defines a text (which must be terminated with a ') to be written out on the error device when emptying the file. The last parameter is only requested if <text> is specified and may take the values YES or NO. If YES, the text will be written and a stop-print condition will occur independent of conditions specified in the **@DEFINE-SPOOLING-CONDITIONS** command. If NO, the text will be suppressed if the command **@DEFINE-SPOOLING-CONDITIONS** <peri <peripheral file name>, NO, NO,, has been issued. Default value for this optional parameter is NO.

3.12.2.12 Set Number of Print Copies

@SET-NUMBER-OF-PRINT-COPIES <peripheral file name>, <file name>, <number of copies>

Specifies the number of print copies desired for a file in the spooling queue.

3.11.2.13 Define Spooling File Message

@DEFINE-SPOOLING-FILE-MESSAGE <user text>, <printing message independent of spooling conditions?>

This command is available to every user and defines a text to be written to the error device whenever one of the terminal user's spooling queue files is to be emptied on a peripheral. The text given by the parameter will be used until another text is defined. If no text is wanted, a single quote (') must be used as parameter. The text is suppressed if second and third parameters of **@DEFINE-SPOOLING-CONDITIONS** are NO and <printing message independent of spooling conditions?> is NO.

3.12.2.14 Spooling Pages Left

@SPOOLING-PAGES-LEFT

Lists the number of pages that can be used by the spooling files. Note that the number given is an upper limit and the actual available disk space may be less.

3.12.2.15 Monitor Calls

Two monitor calls are available for programmable control of the spooling system. The SPCLO monitor call (MON 40) will close a spooling file and define a text to be written to the error device when the file is to be emptied. The RSPQE monitor call (MON 55) will remove the first spooling queue entry and place it in a user area.

3.12.2.16 Spooling Form

@SET-SPOOLING-FORM <peripheral file name> ,
<spooling form identification>

This command is used to define an identification key which is compared with the user text connected to spooling queue entry. If match is found the file is printed. This could be used to sort out for printing all spooling entries with the same "user text", i.e., using the same paper format. The same command is used to reset the identification key. Only the user SYSTEM can use this command.

<spooling form identification> contains a text followed by an apostrophe (').

3.12.2.17 List Spooling Form

@LIST-SPOOLING-FORM <peripheral file name>

This command lists out the identification key defined by the "set-spooling-form" command.

3.13 THE SINTRAN III SERVICE PROGRAM

This program is activated by the command

@SINTRAN—SERVICE—PROGRAM.

It is available only to user SYSTEM and can only be used from one terminal at a time. It has several subcommands which can be used to change system variables, tables etc. These are given after the * prompt.

To return to SINTRAN III use the *EXIT subcommand.

The service program operates on resident memory, memory-image and the save area. Each subcommand asks which area is to be operated on and the answer is YES or NO in each case. Most subcommands can operate on all three areas simultaneously. Some can only operate on one area and will ask which area to access.

Numbers given as parameters to subcommands and numeric output from the program are octal by default.

If the subcommands are used in a MODE or BATCH-file they must be preceded by @.

The following are the subcommands available:

@SINTRAN-SERVICE-PROGRAM *ASCII-DUMP

See also *OCTAL-DUMP.

Function:

Dump an area as ASCII characters.

Format:

*ASCII-DUMP <area> [, <segment no.>], <low address> , <high address> ,
<output file>

Parameters:

See *OCTAL-DUMP.

Rules:

Each line of the dump consists of a maximum of 64 characters. Control characters (LF, CR etc.) are output as printable characters. I.e. CR on TERMINAL generates a carriage return on the device.

@ SINTRAN-SERVICE-PROGRAM

***CC**

Function:

Comment. The command has no effect. Normally used in MODE and batch jobs.

Format:

*CC <text>

Parameters:

<text>

any printable characters.

@ SINTRAN-SERVICE-PROGRAM

***CHANGE-BUFFER-SIZE**

Function:

Change the length of the ring buffer of a logical device. Total buffer area is limited depending on system configuration; if a substantial increase in size is desired, calculations should be made.

Format:

*CHANGE-BUFFER-SIZE <logical device no.>,<input or output>,<buffer size>,<image?>,<save-area?>

Parameters:

<logical device no.>

(OCT).

<input or output>

<buffer size>

length of ring buffer in words or bytes (OCT).

<image?>

<save-area?>

YES = modify area.

NO = do not modify (DEF = NO).

@ SINTRAN-SERVICE-PROGRAM

* CHANGE-DATAFIELD

Function:

Change value of displacements in datafields.

Format:

*CHANGE-DATAFIELD <logical unit no.> , <input/output> , <memory?> ,
<image?> , <save-area?>

Subcommands (see below)

Parameters:

<logical unit no.>
(OCT).

<input or output>

input	=	input part.
output	=	output part.

<memory?>

<image?>

<save-area?>

YES	=	modify the area.
NO	=	do not modify area (DEF = NO).

Rules:

1. The command must not be used in batch jobs.
2. Subcommands for patching must follow rules 3, 4 and 6 of @LOOK-AT. The address specified must be a relative octal address within the datafield or the symbolic name of an item within the datafield.
3. The symbolic names available are:

AERRB	FLAGB	SERRB
ARG	FYLLE	SETDV
		SSREF
BHOLD	HDEV	STDEV
BLSZ	HENTE	STDRIV
BRKTAB	HSTAT	STRSEG
BSTATE		
BUFST	IBLOAD	TACNS
BWLINK	ICORAD	TACOUNT
	IFUNC	TERM
CARG	IMAXBHOLD	TMR
CFREE	IMAXW	TMSUB
CHARI	IOLOG	TRG
CNTREG	IOTRANS	TRLREG
COMFL	IRETW	TSPEED
CONVTAB	ISTATE	TSTATE
CTRG		TTMR
CTTYP	LAST	TYPRING
CXRG		
	MAX	WERRB
DBADR	MAXBHOLD	WFLAG
DBPROG	MFUNC	
DERROR	MINBHOLD	XRG
DFLAG	MLINK	
DFOPP	MTRANS	
DRG		
DRIVER	RESLINK	
DRT	RTRES	
ECHOTAB		
ERCNT		

Example:

@SINTRAN-SERVICE-PROGRAM

*CHANGE-DATAFIELD 36, I, Y, Y, Y

```
TSPEED/177777 177777 177777 210
          0      0      0
```

*EX

@

The baud-rate (speed) for terminal 36 on a normal interface is changed to 9600 baud.

@SINTRAN-SERVICE-PROGRAM

*CHANGE-VARIABLE

Function:

Examine and change system variables, which may be single variables or arrays. For some variables, the memory image and/or save area may be affected. For some variables resident memory may be affected; this is indicated by an M in the rules below.

Format:

*CHANGE-VARIABLE <variable name> [, <index>], <value> [, <memory?>]
<image?> , <save-area?>

Parameters:

<variable name>

see rule 1.

<index>

only if <variable name> is an array (OCT). See rule 1.

<value>

new value (OCT, DEF = old value).

<memory?>

YES = modify area, NO = do not modify. Specified only if resident memory is to be changed.

<image?>

<save-area?>

YES = modify area.

NO = do not modify (DEF = NO).

Rules:

The following are legal values of <variable name>. The index range is specified for arrays.

BGLPAGE

Last logical page number legal for background programs.

BGFPAGE

First logical page number legal for background programs.

CACHLIM

Change the CACHE-INHIBIT-LIMIT register of NORD-10. The most significant byte is the upper limit and the least significant byte the lower limit.

CCFPAGE

First legal logical page for RTCOMMON.

CCLPAGE

Last legal logical page for RTCOMMON.

CNVRT (M, $0 \leq \text{index} \leq 13$)

Address of logical unit tables.

ENDCOR

Upper address of resident memory.

EXTDS (M, $0 \leq \text{index} \leq 3$)

Address of the extended ident code tables.

FIXMAX (M)

Maximum number of pages which can be fixed in memory simultaneously.

IDNTS (M, $0 \leq \text{index} \leq 3$)

Address of the ident code tables.

IMASK

Value is a mask to be used for enabling internal interrupts (TRR IIE).

LCACHLIM

Change the lower limit of the CACHE-INHIBIT-LIMIT of ND-100.

LOADI (M)

= 0: RT loader shall initialize RTFIL.

\neq 0: RT loader will not initialize RTFIL.

MAXP (M)

Maximum number of pages in memory for a demand segment.

RTFPAGE

First legal logical page number for RT programs on page table 1.

RTLPAGE

Last legal logical page number for RT programs on page table 1.

TABLES (M, $0 \leq \text{index} \leq 3$)

Address of timer, background, batch and RTCOMMON table (CCTAB).

TMCTAB (M, $0 \leq \text{index} \leq 107$)

Monitor call types (see *DEFINE-USER-MONITOR-CALL). The TMCTAB array is a byte array (e_0, e_1, \dots, e_{217} , octal index). The parameter $\langle \text{index} \rangle$ is a word index. Thus two bytes are changed by one command. Eg. to change the type of byte element e_3 to 1 when e_2 is 16, use

*CHANGE-VARIABLE TMCTAB, 1, 416, ...

UCACHLIM

Change the upper limit of the CACHE-INHIBIT-LIMIT of NORD-100.

UNAFLAG (M)

Flag set \neq 0 if system is unavailable (@SET-UNAVAILABLE).

USEGADR

Address of first free entry in segment table.

UZEROFLAG (M)

= 0: the user's working area (background segment) will not be changed on each @LOGOUT.

\neq 0: the area is set to all zeros on each @LOGOUT. All pages released from a file by @DELETE-FILE are cleared.

@ SINTRAN-SERVICE-PROGRAM

*CLEAR-ENTER-COUNT

See also *SET-MAX-ENTER-COUNT.

Function:

Clear the enter count for a terminal and allow attempts to log in on that terminal again.

Format:

*CLEAR-ENTER-COUNT <logical unit no.>,<memory?>

Parameters:

<logical unit no.>

(DEC.)

<memory?>

YES = modify area.

NO = do not modify (DEF = NO).

@ SINTRAN-SERVICE-PROGRAM

*DEFINE-BASIC-TIME-UNIT

See also related *DEFINE-TIME-SLICE.

Function:

Set the length of the basic time unit in milliseconds.

Format:

*DEFINE-BASIC-TIME-UNIT <milliseconds>,<image?>,<save-area?>

Parameters:

<milliseconds>

(OCT).

<image?>

<save-area?>

YES = modify area.

NO = do not modify (DEF = NO).

Rules:

The standard basic time unit is 20 ms.

@ SINTRAN-SERVICE-PROGRAM *DEFINE-BATCH-SUPERVISOR

Function:

Define an RT program to be started each time a batch job is terminated.

Format:

```
*DEFINE-BATCH-SUPERVISOR  <program name> , <memory?> , <image?> ,
<save-area?>
```

Parameters:

<program name>

RT description address or RT program name.

<memory?>

<image?>

<save-area?>

YES = modify area.

NO = do not modify (DEF = NO).

Rules:

None.

@ SINTRAN-SERVICE-PROGRAM *DEFINE-PROMPT-STRING

Function:

Define a string to be printed instead of the default prompt in SINTRAN remote mode. String may also be declared to replace default prompt in SINTRAN local mode.

Format:

```
*DEFINE-PROMPT-STRING  <string> , <local mode?>
```

Parameters:

<string>

the string to replace the old one, terminated with `^`.

<local mode?>

YES = also to replace string in local mode.

NO = not to replace string in local mode.

@ **SINTRAN-SERVICE-PROGRAM**

***DEFINE-RTCOMMON-SIZE**

Function:

Define the size of the RTCOMMON area in pages.

Format:

*DEFINE-RTCOMMON-SIZE <no. of pages> , <first physical page> ,
<image?> , <save-area?>

Parameters:

<no. of pages>

new size (OCT).

<first physical page>

physical page where RT common should start. In addition to the pages generated for the system, only 8 pages can be added. (DEF = upper end of physical memory.)

<image?>

<save-area>

YES = modify area.

NO = do not modify (DEF = NO).

Rules:

Size can be increased by up to 10K in addition to the RT common size defined at system generation.

@ SINTRAN-SERVICE-PROGRAM

* DEFINE-SEGMENT-FILE

Function:

Associate a segment file number with a segment file name for the RT-loader.

Format:

DEFINE-SEGMENT-FILE <memory?> , <save-area?> , <segment file no.> ,
<segment file name> [, <redefine segment file?>]

Parameters:

<memory?>

<save-area?>

YES = modify area.

NO = do not modify (DEF = NO).

<segment file no.>

(OCT: 0 - 3).

<segment file name>

any existing contiguous file.

<redefine segment file?>

only if <segment file no.> is already defined. Specify YES or NO

(DEF = NO).

Rules:

1. Users SYSTEM and RT must have read and write access to <segment file name>.
2. The page address of all the pages in the segment file must be $\leq 77777_8$.
3. The command must not be used in batch jobs.
4. Redefine segment file only if <segment file no.> is already defined.

@SINTRAN-SERVICE-PROGRAM

*DEFINE-TIME-SLICE

See also related *DEFINE-BASIC-TIME-UNIT.

Function:

Define the time slice of the background programs for terminal control and batch processors. The unit used in parameters is 10 basic time units.

Format:

```
*DEFINE-TIME-SLICE  <HLTIME>,<MLTIME>,<LTIML>,<LTIMU> ,
<image?> , <save-area?>
```

Parameters:

<HLTIME>

no. of basic units on high priority (OCT).

<MLTIME>

no. of basic units on medium priority (OCT).

<LTIML>

lower limit of basic units on low priority (OCT).

<LTIMU>

upper limit of basic units on low priority (OCT).

<image?>

<save-area?>

YES = modify area.

NO = do not modify (DEF = NO).

Rules:

The system is generated with standard values. They are:

<HLTIME>	12
<MLTIME>	24
<LTIML>	24
<LTIMU>	100

@SINTRAN-SERVICE-PROGRAM

*DEFINE-TITLE

Function:

Define string to be output in addition to system version string at log in on a terminal or as part of the spooling header.

Format:

```
*DEFINE-TITLE  <text>,<memory?>,<save-area?>
```

Parameters:

<text>

any printable characters terminated by an apostrophe ('). \$ is translated to CR, LF on output. CR on input is ignored. (' specifies no text.)

<memory?>

<save-area?>

YES = change area.

NO = do not change (DEF = NO).

Rules:

1. The maximum is 120 characters including apostrophe.
2. The text is printed by @LIST-TITLE and when "rub-out" (or DEL) is typed during remote operation.
3. The command must not be used in batch jobs.

Example:

```
*DEFINE-TITLE $NORD 10.54 $ 810817 $'
*
```

The text will be output as:

```
NORD 10.54
810817
```

@SINTRAN-SERVICE-PROGRAM

***DEFINE-USER-MONITOR-CALL**

Function:

Define number, entry point address and type of user monitor call. The code should be assembled using FMAC or DMAC.

Format:

```
*DEFINE-USER-MONITOR-CALL  <monitor call no.>,<start address> ,
<type>,<memory?>,<image?>,<save-area?>
```

Parameters:

<monitor call no.>

(OCT).

<start address>

entry point of routine (OCT).

<type>

1 = callable only from RT programs.

16 = callable from RT and background programs
(OCT, DEF = 1).

<memory?>

<image?>

<save-area?>

YES = modify area.

NO = do not modify (DEF = NO).

@ SINTRAN-SERVICE-PROGRAM

***DEFINE-USER-RESTART-PROGRAM**

See also *DEFINE-USER-RESTART-SUBROUTINE.

Function:

Define the user restart RT program to be started by SINTRAN after each "power fail - restart".

Format:

```
*DEFINE-USER-RESTART-PROGRAM  <program>,<memory?>,<image?>,<save-area?>
```

Parameters:

<program>

RT description address (OCT), or RT program name.

<memory?>

<image?>

<save-area?>

YES = modify area.

NO = do not modify (DEF = NO).

Rules:

None.

@ SINTRAN-SERVICE-PROGRAM

***DEFINE-USER-RESTART-SUBROUTINE**

See also *DEFINE-USER-RESTART-PROGRAM.

Function:

Define the start address of a user restart subroutine to be called by SINTRAN after "power fail - restart".

Format:

```
*DEFINE-USER-RESTART-SUBROUTINE  <restart
address>,<memory?>,<image?>,<save-area?>
```

Parameters:

```
<restart address>
    entry point of the subroutine (OCT).
<memory?>
<image?>
<save-area?>
    YES    =    modify area.
    NO     =    do not modify (DEF = NO).
```

Rules:

The subroutine must reside in resident memory.

@ SINTRAN-SERVICE-PROGRAM

*** DEFINE-USER-START-SUBROUTINE**

Function:

Define the address of a user start subroutine executed when the system is started.

Format:

*DEFINE-USER-START-SUBROUTINE <start address>, <image?>,
<save-area?>

Parameters:

<start address>

entry point of subroutine (OCT).

<image?>

<save-area?>

YES = modify area.

NO = do not modify (DEF = NO).

Rules:

The subroutine must reside in resident memory or on the operator communication segment (segment 3).

@ SINTRAN-SERVICE-PROGRAM

***DELETE-SEGMENT-FILE**

Function:

Set a segment file unavailable for the RT loader. The file is not deleted from the directory. (See @DELETE-FILE.)

Format:

*DELETE-SEGMENT-FILE <memory?>, <image?>, <save-area?>, <segment file no.>

Parameters:

<memory?>

<image?>

<save-area?>

YES = modify area.

NO = do not modify (DEF = NO).

<segment file no.>

(OCT: 0-3).

Rules:

A defined segment file must not be deleted (@DELETE-FILE) without being undefined with *DELETE-SEGMENT-FILE.

@SINTRAN-SERVICE-PROGRAM *DUMP-RT-DESCRIPTION

See also @LIST-RT-DESCRIPTION.

Function:

Dump the symbolic names and contents of locations in an RT description.

Format:

*DUMP-RT-DESCRIPTION <program>,<area>,<output file>

Parameters:

<program>

RT description address (OCT) or RT program name.

<area>

memory, image or save-area.

<output file>

destination of the dump (DEF = TERMINAL).

Rules:

None.

@SINTRAN-SERVICE-PROGRAM

***DUMP-SEGMENT-TABLE-ENTRY**

See also @LIST-SEGMENT.

Function:

Dump the symbolic name and contents of locations in a segment table entry.

Format:

*DUMP-SEGMENT-TABLE-ENTRY <segment no.> , <area> , <output file>

Parameters:

<segment no.>

the segment to be dumped (OCT).

<area>

choose memory, image or save-area.

<output file>

destination of the dump (DEF = TERMINAL).

Rules:

None.

Example:

```
*DUMP-SEGMENT-TABLE-ENTRY 30, M,
SEGLINK:                    0
BPAGELINK:                  0
LOGADR:                     1074
MADR:                       325
FLAG:                       162003
```

@ SINTRAN-SERVICE-PROGRAM

***EXIT**

Function:

Leave the service program and return to the SINTRAN command processor.

Format:

*EXIT.

Parameters:

None.

Rules:

None.

@ SINTRAN-SERVICE-PROGRAM

***HELP**

***LIST-SERVICE-COMMANDS**

Function:

List all subcommands available in @ SINTRAN-SERVICE-PROGRAM.

Format:

*HELP <output file>

*LIST-SERVICE-COMMANDS <output file>

Parameters:

<output file>

destination of the list (DEF = TERMINAL).

Rules:

The two commands are identical.

@ SINTRAN-SERVICE-PROGRAM

***INITIALIZE-SYSTEM-SEGMENT**

Function:

Fetch a new copy of the system segment for a terminal. The segment is transferred from the save area to the segment file.

Format:

*INITIALIZE-SYSTEM-SEGMENT <logical device no.>

Parameters:

<logical device no.>

the terminal's logical device number (OCT).

Rules:

This command will only be executed if the terminal's background processor is passive; otherwise the message "background program active" is given.

@ SINTRAN-SERVICE-PROGRAM

***INSERT-IN-BACKGROUND-TABLE**

***REMOVE-FROM-BACKGROUND-TABLE**

Function:

Insert (remove) a device into (from) the background table.

Format:

*INSERT-IN-BACKGROUND-TABLE <logical device no.> , <input/output> ,
<memory?> , <image?> , <save-area?>

*REMOVE-FROM-BACKGROUND-TABLE <logical device no.> ,
<input/output> , <memory?> , <image?> , <save-area?>

Parameters:

<logical device no.>

(OCT).

<input/output>

choose input or output.

<memory?>

<image?>

<save-area?>

YES = modify area.

NO = do not modify (DEF = NO).

Rules:

For insert, there must be a free entry in the table.

@ SINTRAN-SERVICE-PROGRAM
***INSERT-IN-EXTENDED-IDENT-TABLE**
***REMOVE-FROM-EXTENDED-IDENT-TABLE**

Function:

Insert (remove) an entry in (from) the extended ident code table of a hardware interrupt level.

Format:

*INSERT-IN-EXTENDED-IDENT-TABLE <level>,<logical device no.>,
<input/output>,<ident code>,<memory?>,<image?>,<save-area?>

*REMOVE-FROM-EXTENDED-IDENT-TABLE <level>,<logical device no.>,
<input/output>,<ident code>,<memory?>,<image?>,<save-area>

Parameters:

See *INSERT-IN-IDENT-TABLE.

Rules:

None.

@ SINTRAN-SERVICE-PROGRAM
***INSERT-IN-IDENT-TABLE**
***REMOVE-FROM-IDENT-TABLE**

Function:

Insert (remove) an entry in (from) the ident code table of a hardware interrupt level.

Format:

*INSERT-IN-IDENT-TABLE <level> , <logical device no.> , <input/output> ,
 <ident code> , <memory?> , <image?> , <save-area?>

*REMOVE-FROM-IDENT-TABLE <level> , <logical device no.> ,
 <input/output> , <memory?> , <image?> , <save-area?>

Parameters:

<level>

Interrupt level (OCT).

<logical device no.>

(OCT: 1-77, 200—).

<input/output>

<ident>

new ident code (OCT).

<memory?>

<image?>

<save-area?>

YES = modify area.

NO = do not modify (DEF = NO).

Rules:

None.

Example:

*INSERT-IN-IDENT-TABLE 12, 5, OUTPUT, 3

*REMOVE-FROM-IDENT-TABLE 12, 5, OUTPUT

@ SINTRAN-SERVICE-PROGRAM
***INSERT-IN-IOX-TABLE**
***REMOVE-FROM-IOX-TABLE**

See also related @EXECUTE-IOX and EXIOX (MON 31).

Function:

Make a hardware device number available (unavailable) for @EXECUTE-IOX and EXIOX.

Format:

*INSERT-IN-IOX-TABLE <hardware device no.> , <memory?> , <image?> ,
 <save-area?>

*REMOVE-FROM-IOX-TABLE <hardware device no.> , <memory?> ,
 <image?> , <save-area?>

Parameters:

<hardware device no.>

(OCT).

<memory?>

<image?>

<save-area?>

YES = modify area.

NO = do not modify (DEF = NO).

Rules:

None.

Ⓐ SINTRAN-SERVICE-PROGRAM
***INSERT-IN-LOGICAL-UNIT-TABLE**
***REMOVE-FROM-LOGICAL-UNIT-TABLE**

Function:

Insert (remove) a logical unit in (from) the logical unit table.

Format:

*INSERT-IN-LOGICAL-UNIT-TABLE <logical device no.> , <input/output> ,
 <datafield>

*REMOVE-FROM-LOGICAL-UNIT-TABLE <logical device no.> ,
 <input/output> , <datafield>

Parameters:

<logical device no.>

(OCT: 1-77, 200—).

<input/output>

<datafield>

address of the datafield of device (OCT).

<memory?>

<save-area?>

YES = modify area.

NO = do not modify (DEF = NO).

Rules:

For insert there must be a free entry in the table for <logical unit no.>.

Example:

*INSERT-IN-LOGICAL-UNIT-TABLE 5, INPUT, 14341

*REMOVE-FROM-LOGICAL-UNIT-TABLE 6, OUTPUT

@ SINTRAN-SERVICE-PROGRAM
***INSERT-IN-TIME-SLICE**
***REMOVE-FROM-TIME-SLICE**

See @PRIOR.

Function:

Insert causes the background program priority period to be changed; remove causes the background program to be run at a fixed priority.

Format:

*INSERT-IN-TIME-SLICE <logical device no.> , <memory?> , <image?> ,
 <save-area?>

REMOVE-FROM-TIME-SLICE <logical device no.> , <memory?> , <image?> ,
 <save-area?>

Parameters:

<logical device no.>

a terminal or batch processor (OCT).

<memory?>

<image?>

<save-area?>

YES = modify area.

NO = do not modify (DEF = NO).

Rules:

A background program not in the time slice system will run on a fixed priority; this is defined by @PRIOR.

Ⓐ SINTRAN-SERVICE-PROGRAM
***INSERT-IN-TIMER-TABLE**
***REMOVE-FROM-TIMER-TABLE**

Function:

Insert (remove) a logical device number in (from) the timer table.

Format:

*INSERT-IN-TIMER-TABLE <logical device no.>,<input/output>

*REMOVE-FROM-TIMER-TABLE <logical device no.>,<input/output>

Parameters:

<logical device no.>

(OCT: 1-77, 200—).

<input/output>

<memory?>

<save-area?>

YES = modify area.

NO = do not modify (DEF = NO).

Rules:

For insert there must be a free entry in the table.

Example:

*INSERT-IN-TIMER-TABLE 5, OUTPUT

*REMOVE-FROM-TIMER-TABLE 6, INPUT

@ SINTRAN-SERVICE-PROGRAM
*** INSERT-SPOOLING-HEADER**
*** REMOVE-SPOOLING-HEADER**

Function:

Cause the spooling program to insert (remove) the spooling header and trailer between each file output by the spooling system.

Format:

*INSERT-SPOOLING-HEADER < spooling index> , < memory?> , < image?> ,
< save-area?>

*REMOVE-SPOOLING-HEADER < spooling index> , < memory?> , < image?> ,
< save-area?>

Parameters:

< spooling index>

index of the spooling device in the system.

Rules:

None.

@ SINTRAN-SERVICE-PROGRAM

***LIST-ADDRESSES**

Function:

List addresses of some global variables and entry points within the fixed part of SINTRAN.

Format:

*LIST-ADDRESSES <output file>

Parameters:

<output file>

destination of the list (DEF = TERMINAL).

Rules:

None.

Example:

```
*LIST-ADDRESSES,
RET:          1333
GET0:         1231
GET1:         1223
GET2:         1215
GET3:         1207
GET4:         1201
GET5:         1173
CCTAB:        45062
```

*

@ SINTRAN-SERVICE-PROGRAM

***LIST-SERVICE-COMMANDS**

See *HELP.

@SINTRAN-SERVICE-PROGRAM

*OCTAL-DUMP

See also *ASCII-DUMP.

Function:

Dump an area as octal numbers.

Format:

*OCTAL-DUMP <area> [, <segment no.>], <low address> , <high address> ,
<output file>

Parameters:

<area>

choose memory, image, save-area or segment.

<segment no.>

only if <area> = segment (OCT).

<low address>

<high address>

address range to be dumped including limits (OCT, DEF = 0).

<output file>

destination of the dump (DEF = TERMINAL).

Rules:

Each output line dumps 10₈ words. The address of the first word on each line is given in a separate column.

Example:

*OCTAL-DUMP MEMORY, , 1000, 1777, ,

Dump memory area 1000 to 1777 as octal numbers.

@ SINTRAN-SERVICE-PROGRAM

***READ-BINARY**

Function:

Read binary information from a file to a system area.

Format:

*READ-BINARY <area> , <file name>

Parameters:

<area>

choose memory, image or save-area.

<file name>

(DEF type = :BPUN).

Rules:

None.

@ SINTRAN-SERVICE-PROGRAM

***REMOVE-FROM-BACKGROUND-TABLE**

See *INSERT-IN-BACKGROUND-TABLE.

@ SINTRAN-SERVICE-PROGRAM

***REMOVE-FROM-EXTENDED-IDENT-TABLE**

See *INSERT-IN-EXTENDED-IDENT-TABLE.

@ SINTRAN-SERVICE-PROGRAM

***REMOVE-FROM-IDENT-TABLE**

See *INSERT-IN-IDENT-TABLE.

@ SINTRAN-SERVICE-PROGRAM
***REMOVE-FROM-IOX-TABLE**

See *INSERT-IN-IOX-TABLE.

@ SINTRAN-SERVICE-PROGRAM
***REMOVE-FROM-LOGICAL-UNIT-TABLE**

See *INSERT-IN-LOGICAL-UNIT-TABLE.

@ SINTRAN-SERVICE-PROGRAM
***REMOVE-FROM-TIMER-TABLE**

See *INSERT-IN-TIMER-TABLE.

@ SINTRAN-SERVICE-PROGRAM
***REMOVE-SINTRAN-COMMAND**

Function:

Remove a SINTRAN command (not file system, RT-loader or other subsystems).

Format:

*REMOVE-SINTRAN-COMMAND <command>, <memory?>, <save area?>

Parameters:

<command>

<memory?>

<save-area?>

*EX

)HENT is necessary to recover the command if it is removed in memory. If it is removed on save also the system must be reloaded to recover it.

@ SINTRAN-SERVICE-PROGRAM
*** REMOVE-SPOOLING-HEADER**

See *INSERT-SPOOLING-HEADER.

@ SINTRAN-SERVICE-PROGRAM
*** SET-CHANNEL-PRIORITY**

Function:

Set priority of a communication channel.

Format:

*SET-CHANNEL-PRIORITY <channel name>,<priority>,<memory?>,
 <image?>,<save-area?>

Parameters:

<channel name>

peripheral file name of a channel.

<priority>

new priority (OCT: 0-377).

<memory?>

<image?>

<save-area?>

YES = modify area.

NO = do not modify (DEF = NO).

Rules:

None.

@ SINTRAN-SERVICE-PROGRAM *SEGMENT-WRITE-PERMIT

See also *SEGMENT-WRITE-PROTECT

Function:

Give write permission for segment.

Format:

*SEGMENT-WRITE-PERMIT <segment no.>

Parameters:

<segment no.>
(OCT.)

Rules:

1. Must be a loaded segment.

@ SINTRAN-SERVICE-PROGRAM *SEGMENT-WRITE-PROTECT

See also *SEGMENT-WRITE-PERMIT

Function:

Protect the segment against writing.

Format:

*SEGMENT-WRITE-PROTECT <segment no.>

Parameters:

<segment no.>
(OCT.)

Rules:

1. Must be a loaded segment.

@SINTRAN-SERVICE-PROGRAM

*SET-MAX-ENTER-COUNT

See also *CLEAR-ENTER-COUNT.

Function:

Set the maximum number of consecutive unsuccessful attempts a user can make to log in on a terminal.

Format:

*SET-MAX-ENTER-COUNT <logical unit no.>,<enter count wanted?>
[,<max enter count>],<memory?>,<save-area?>

Parameters:

<logical unit no.>

(DEC.)

<enter count wanted?>

YES = entercount enabled.

NO = entercount disabled.

<max enter count>

max number of consecutive unsuccessful attempts to enter that can be made on the terminal specified.

<memory?>

<save-area?>

YES = modify area.

NO = do not modify (DEF = NO).

@SINTRAN-SERVICE-PROGRAM

*SET-COMMAND-PROTECTION

Function:

Change the group of users who are allowed to use a SINTRAN III command.

Format:

*SET-COMMAND-PROTECTION <command>,<protection>,<memory?>,<save-area?>

Parameters:

<command>

any command except file system commands (can be abbreviated).

<protection>

PUBLIC = permitted for all users.

RT = permitted for users RT and SYSTEM.

SYSTEM = permitted only for user SYSTEM.

<memory?>

<save-area?>

YES = modify area.

NO = do not modify (DEF = NO).

Rules:

The command parameter can be abbreviated.

@ SINTRAN-SERVICE-PROGRAM

*SET-SPOOLING-DEVICE-NUMBER

Function:

Associate a spooling index with a logical device number.

Format:

*SET-SPOOLING-DEVICE-NUMBER <spooling index>,<logical device no.>,<memory?>,<image?>,<save-area?>

Parameters:

<spooling index>

index of the spooling device in the system. The range is determined at system generation time (OCT).

<logical device no.>

logical device to be used for spooling (OCT).

<memory?>

<image?>

<save-area?>

YES = modify area.

NO = do not modify (DEF = NO).

Rules:

None.

@ **SINTRAN-SERVICE-PROGRAM**

* **SET-CLOSED-SCRATCH-FILE-SIZE**

Function:

Set the maximum number of pages to remain in a scratch file when it is closed.

Format:

*SET-CLOSED-SCRATCH-FILE-SIZE <logical device no.>,<no. of pages>,
<memory?>,<save-area?>

Parameters:

<logical device no.>

the terminal associated with the scratch file (OCT).

<no. of pages>

maximum number of pages (multiple of 10_a) (OCT).

<memory?>

<save-area?>

YES = modify area.

NO = do not modify (DEF = NO).

Rules:

1. <size> for all scratch files is changed when the save-area is modified.
2. <size> must not be set to zero.
3. <size> must be set to a multiple of 10_a.

@ SINTRAN-SERVICE-PROGRAM
START-XMSG*Function:**

Fix (with FIXC) the XMSG paging off and buffer area segments in physical memory and start routine XROUT. See SINTRAN Communication Guide, ND-60.134.01.

Format:

*START-XMSG

Parameters:

None.

Rules:

The command should be performed before starting NORDNET and SPOOLING, preferably in the LOAD-MODE file.

@ SINTRAN-SERVICE-PROGRAM
STOP-XMSG*Function:**

Disables the XMSG monitor call and releases the physical memory space.

Format:

*STOP-XMSG

Rules:

XMSG can be restarted again provided NORDNET or SPOOLING have not been started since XMSG was stopped.

@ SINTRAN-SERVICE-PROGRAM
***SWAP-DIRECTORY-ENTRIES**

Function:

Exchange two directories in the directory table.

Format:

*SWAP-DIRECTORY-ENTRIES <directory index 1>,<directory index 2>,
<save-area?>

Parameters:

<directory index 1>

<directory index 2>

index refers to the relative location in the directory table
(OCT: ≥ 0).

<save-area?>

YES	=	modify area.
NO	=	do not modify.

4

ERROR SUPERVISING

This chapter contains general information about system failures. The chapter describes how system failures are detected, and how these failures are corrected.

Error procedures are given for situations where the computer stops (the STOP light is ON), hangs (the STOP light is not ON, but the computer does not respond), or is completely dead (no lights are ON). These procedures are given as diagrams of questions and actions, depending on the answers to these questions (see Section 4.2). A procedure is also given for restarting SINTRAN III after a system failure. Since error situations are usually detected through error messages from SINTRAN III, these messages are listed, together with suggested operator actions for the different messages.

System failures are considered to include all types of errors and irregularities that cause the system to go down or run with lowered performance. Whenever a system failure occurs, it is the System Supervisor's responsibility to take control of the installation. The System Supervisor should identify the type of system failure, get all the necessary information to describe the state of the computer, and try to get the installation working again.

System failures may be of two types:

- nonfatal
- fatal

NONFATAL ERRORS are detected by SINTRAN III. Error message will appear on the user's terminal or on the system error device (usually the console terminal). See Section 4.1.

Only error messages from the SINTRAN III monitor will be covered in this chapter. These will be the most useful, from the System Supervisor's point of view. Some of them may indicate errors in the hardware or in the SINTRAN III operating system.

The different error messages, and some additional information about each of them, are in Section 4.1.

FATAL ERRORS will almost all be detected by SINTRAN III, but no error message will be given. The system will go into a "stop" condition or will "hang up". In such cases, the flow diagram in Section 4.2 should be referred to.

4.1 NONFATAL ERROR

4.1.1 Error Messages From SINTRAN III Monitor

At run-time, errors may be detected by the system and written on the main terminal or the error device terminal (See Section 3.3.5). Most of the errors will cause the current RT program to be aborted and the error message:

```
aa.bb.cc, ERROR nn IN rr AT ll ; tttt
xx yy
```

will be printed.

If the error occurs in a background program, the error message will be written on the corresponding terminal. For RT programs, the error message will come to the error device terminal (usually Terminal 1).

The parameters have the following meaning:

aa.bb.cc	Time when the error message was printed.
aa	hours
bb	minutes
cc	seconds
nn	Error number. For further explanation, refer to the list on the following page.
rr	The RT program name or an octal address corresponding to an RT program name.
ll	Octal address where the error occurred.
tttt	Explanatory text.
xx, yy	Numbers carrying additional information about the error. One or both numbers may be omitted.

Example:

```
@01.43.32 ERROR 14 in BAK03 AT 114721;
OUTSIDE SEGMENT BOUNDS
```

Errors in system RT programs and in user RT programs (See Appendix A.3) give the same type of error messages.

All system included RT programs are given names automatically by the RT loader the first time this is called, after a cold start (See Chapter 6). All error messages will then print the name of the RT program.

User RT programs will usually not affect the SINTRAN III system and these error messages should only be reported to the owner of the RT program concerned.

4.1.2 Run-time Error Codes

<i>Error Code</i>	<i>Meaning</i>	<i>xx</i>	<i>yy</i>	<i>Program Aborted</i>
00	Illegal monitor call			yes
01	Bad RT program address			yes
02	Wrong priority in PRIOR			yes
03	Bad memory page	page no.		
04	Internal interrupt on direct task level		bit	no
06	Batch input error	error no.		yes
07	Batch output error	error no.		yes
08	Batch system error	error no.	L register	yes
09	Illegal parameter in CLOCK			yes
10	Illegal parameter in ABSET			yes
11	Illegal parameter in UPDAT			yes
12	Illegal time parameters			yes
13	Page fault for non-demand			yes
14	Outside segment bounds			yes
15	Illegal segment number	segment no.		yes
16	Segment not loaded	segment no.		yes
17	Fixing demand	segment no.		yes
18	Too many fixed pages	segment no.		yes
19	Too big segment	segment no.		yes
20	Disk/drum transfer error	Hardware device no.	unit	no (aborted if segment transfer)
21	Disk/drum transfer error	disk address	hardware status	See explanation

<i>Error Code</i>	<i>Meaning</i>	<i>xx</i>	<i>yy</i>	<i>Program Aborted</i>
22	False interrupt	level		no
23	Device error	hardware device no.	hardware status	no
25	Already fixed	segment no.		yes
26	Mass storage time-out			no
27	Illegal parameter in CONCT			yea
28	Space not available	segment no.		yes
29	MON 64 and MON 65	error no.	(see "NORD File System")	yes
30	Divide by zero			yes
31	Permit violation			yes
32	Ring violation			yes
33	HDLC, drivers fatal error			yes
34	Illegal instruction			yes
35	RT FORTRAN stack error			yes
36	Privileged instruction			yes
37	IOX error	Address	Level	no
38	Memory Parity	PEA register	PES register	yes
39	Memory out of range	PEA register	PES register	yes
40	Power fail			no
41	Illegal error in ERMON			yes
42	Overlapping segments	segments		yes
44	Corrected memory error	PEA reg.	PES reg.	no
45	Not demand segments			yes
46	XMSG/Program fatal error			yes

<i>Error Code</i>	<i>Meaning</i>	<i>xx</i>	<i>yy</i>	<i>Program Aborted</i>
47	XMSG/Driver fatal error			yes
50-69	User defined error (MON 142)	error no.	suberror no.	no
90	FORTTRAN run-time error	error no.		no
91	FORTTRAN I/O error	error no.		no
100	FTN library error			

4.1.3 The Run-time Errors Explained in Detail

00 ILL. MONITOR CALL

Explanation: A monitor call (MON instruction) is used in a wrong way or an incorrect argument is used in a MON instruction. Probable user error.

System action: The specified RT program is aborted.

Operator's response: If system RT program, list RT description of RT program and call Norsk Data for software service. If user RT program, report the error to the user.

01 ILL. RT-PROG

Explanation: An incorrect address of the RT description. Probable software error.

System action: See error code 00.

Operator's response: See error code 00.

02 ILL. PRIORITY

Explanation: An incorrect priority used in the monitor call PRIOR. The priority should be a number between 0 and 255. Probable software error.

System action: See error code 00.

Operator's response: See error code 00.

04 INTERNAL INTERRUPT ON DIRECT TASK LEVEL LEVEL NO BIT NO

Explanation: An interval internal interrupt from direct task level. Probably user error.

System action: Priority is given up.

06 BATCH INPUT ERROR

FILE ERROR NO.:

"File system error description"

Explanation: The batch supervisor has not found the input file for the current batch job. The user probably has forgotten to include USER-NAME as a part of the batch input file name.

Operator's response: Report the error to the owner of the batch job.

07 BATCH OUTPUT ERROR

FILE ERROR NO.:

Explanation: An output error has occurred in a batch job running in batch mode. The file system error description explains the error. As for 06 but for the output file.

Operator's response: Report the error to the owner of the batch job.

08 BATCH SYSTEM ERROR

FILE ERROR NO.:

ADDRESS

Explanation: An error has occurred in the batch system. Probable software system error.

Operator's response: Check if the batch system is properly initialized and that you have a scratch file available for this batch-processor. If it is, report the error to Norsk Data for software service.

09 ILL. PARAM. IN CLOCK

Explanation: Incorrect array address used as argument in the monitor call CLOCK. User error.

System action: See error code 00.

Operator's response: See error code 00.

10 ILL. PARAM. IN ABSET

Explanation: Incorrect parameter(s) used in the monitor call ABSET. User error.

System action: See error code 00.

Operator's response: See error code 00.

11 ILL. PARAM. IN UPDAT

Explanation: Incorrect parameter(s) used in the monitor call UPDAT. User error.

System action: See error code 00.

Operator's response: See error code 00.

12 ILL. TIME PARAM.

Explanation: Incorrect parameter(s) used in the monitor call TIME. Probable user error.

System action: See error code 00.

Operator's response: See error code 00.

13 PAGE FAULT FOR NON-DEMAND

Explanation: An RT program on a non-demand type segment tried to use an address outside the segment bounds. Probable user error.

System action: See error code 00.

Operator's response: See error code 00.

Example:

09.53.10 ERROR 13 IN PROG A AT 6157; PAGE FAULT FOR NON-DEMAND

14 OUTSIDE SEGMENT BOUNDS

Explanation: An RT program on a demand type segment tried to use an address outside the segment bounds. Probable user error.

System action: See error code 00.

Operator's response: See error code 00.

15 ILL. SEGMENT NUMBER

SEGMENT NO.

Explanation: Overlap of the address area or incorrect segment number(s) used as parameters in the monitor call MCALL or MEXIT. Probable user error.

System action: See error code 00.

Operator's response: See error code 00.

16 SEGMENT NOT LOADED

SEGMENT NO.

Explanation: The segment in FIX/UNFIX is a demand segment or the segment is not loaded by the RT loader. Probable user error.

System action: See error code 00.

Operator's response: See error code 00.

17 FIXING/DEMAND

SEGMENT NO.

Explanation: Trying to fix a demand segment.

System action: See error code 00.

Operator's response: See error code 00.

18 TOO MANY FIXED PAGES

SEGMENT NO.

Explanation: Trying to fix more pages than allowed. Only a limited amount of physical memory may be used for fixed segment at a time.

System action: See error code 00.

Operator's response: See error code 00.

19 TOO BIG SEGMENT

Explanation: A non-demand type segment is bigger than the SINTRAN swapping area. Probable user error.

System action: See error code 00.

Operator's response: See error code 00.

20 DISK/DRUM TRANSFER ERROR

HARDWARE DEVICE NO.

UNIT

(See error 21)

21 DISK/DRUM TRANSFER ERROR

DISK-ADDRESS

STATUS

Explanation: These two error messages will always appear together and indicate a mass storage transfer error. Hardware error.

Some device numbers:

430	Line Printer 1
500	Disk System 1
510	Disk System 2
540	Drum 1
630	Terminal 33
1540	Big disk system 1
1570	Floppy Disk 2

The status word gives the type of error(s).

System action: If segment transport, the specified RT routine is aborted. No system action if error return from a monitor call (RFILE/WFILE).

Operator's response: Eventually call Norsk Data for hardware service. If address mismatch (status is xxx4xx) or parity error (status is xx1xxx) occurred, first use DIMS, BIMS or DISC-TEMA to test for parity errors. If no error, just continue and if error, use the program DIMS, BIMS or DISC-TEMA and the function REFRESH (tracks will be reformatted and information restored if possible). Run PARITY-CHECK again. If errors still occur contact Norsk Data for hardware service.

22 FALSE INTERRUPT

LEVEL (DEC)

Explanation: Level 10, 11, 12 or 13 is activated but the IDENT instruction does not find a correct ident code. Possible noise or hardware error.

Level:

- 10 output interrupt
- 11 mass storage interrupt
- 12 input interrupt
- 13 real-time clock

Operator's response: Run Configuration Investigator to check the state of the different device interfaces. If no errors are given, it is possible due to noise. Call hardware service if errors occur.

23 DEVICE ERROR

HARDWARE DEVICE NO.

STATUS

Explanation: A device failure has occurred, probably hardware error.

The following device numbers are used:

- 100- 157 Synchronous modem buffer card
- 200- 277 Asynchronous modem buffer card, terminal buffer card
- 1200-1277 Asynchronous modem buffer card, terminal buffer card
- 300- 377 Teletype buffer card, terminal buffer card
- 1300-1377 Teletype buffer card, terminal buffer card
- 400- 477 Paper tape devices, line printers, etc.
- 500- 577 Mass storage devices
- 1500-1577 Mass storage devices

The status word gives a more precise description of the error. See the status word description for the specified device.

Operator's response: If this error message occurs after a warm or cold start, and the printed status is equal to ZERO, then it is not necessarily an error. It may be due to:

- the device is connected to an R3-232 interface but not switched on.
- the device interface has been modified.

Report the error to Norsk Data and call for hardware service only if error occurs under SINTRAN III.

25 ALREADY FIXED

SEGMENT NO.

Explanation: Trying to refix a segment.

System action: See error code 00.

Operator's response: See error code 00.

26 MASS STORAGE TIME-OUT

Explanation: If the disk does not respond within a certain time interval (4 seconds) this message is printed.

Operator's response: Call for hardware service only if the error recurs several times.

27 ILL. PARAM. IN CONCT

Explanation: Incorrect parameters used in the monitor call CONNECT. Probable user error.

System action: See error code 00.

Operator's response: See error code 00.

28 SPACE NOT AVAILABLE

SEGMENT NO.

Explanation: Trying to load more information on a segment than possible.

System action: See error code 00.

Operator's response: See error code 00.

29 FILE SYSTEM ERROR

FILE ERROR NO.

"File system error description"

Explanation: The monitor call ERMSG (64) or QERMS (65) is used to write a file system error message. A parameter will hold the error code. These commands are normally used to write error messages in case of error exits from file system commands.

System action: ERMSG will give no system action, QERMS will abort the specified RT routine.

Operator's response: See error code 00.

30 DIVIDE BY ZERO

Explanation: Division of a floating point number by zero is attempted.

System action: See error code 00.

Operator's response: See error code 00.

31 PERMIT VIOLATION

Explanation: The RT program attempted to access a page with an illegal reference type. Probable user error.

Each individual segment may be protected against:

- read access
- write access
- instructions fetch access

System action: See error code 00.

Operator's response: See error code 00.

32 RING VIOLATION

Explanation: The RT program attempted to execute an instruction or access data on another page with higher ring status. Probable user error.

System action: See error code 00.

Operator's response: See error code 00.

34 ILL. INSTR.

Explanation: The program attempted to execute an instruction not implemented. Probable user error.

System action: See error code 00.

Operator's response: See error code 00.

35 RT-FTN STACK ERROR

Explanation: FORTRAN program attempted to use the stack outside the stack bounds.

Operator's response: Report the error to the user of the FORTRAN job. He/she will probably have to increase the stack size of his/her program.

36 PRIV. INSTR.

Explanation: An RT program attempted to execute a privileged instruction.

System action: See error code 00.

Operator's response: See error code 00.

37 IOX ERROR

ADDRESS

LEVEL (DEC.)

Explanation: This could mean either no answer from external device or an IDENT instruction is executed without an interrupt waiting. Probable hardware error or user error (e.g., a user is trying to access a non-existent device).

System action: Run Configuration Investigator to check the state of the different device's interfaces. Call for hardware service only if the error recurs several times.

38 MEMORY PARITY

PEA
PES

Explanation: A memory parity error has occurred. Probable hardware error. PEA gives the memory error address and PES gives the memory error status and bank number.

Operator's response: Report the error to Norsk Data and call for hardware service.

39 MEMORY OUT OF RANGE

PEA
PES

Explanation: An attempt to address a non-existent memory location has occurred. Probable hardware or system software error. PEA and PES as for error code 38.

Operator's response: Report the error to Norsk Data and call for hardware service.

40 POWER FAIL

Explanation: This message will be given when SINTRAN automatically restarts after a power failure or STOP-SYSTEM command.

Example:

14.21.32 ERROR 40 IN 23327 AT 110330: POWER FAIL

41 ILL. ERROR IN ERMON

Explanation: Trying to use an error number outside the specified interval ERMON.

System action: See error code 00.

Operator's response: See error code 00.

42 OVERLAPPING SEGMENTS

SEGMENTS

Explanation: The two segments used by an RT program are overlapping in the virtual address space.

System action: See error code 00.

Operator's response: See error code 00.

44 CORRECTED MEMORY ERROR

PEA

PES

Explanation: An error has occurred in memory and is corrected.

System action: The error is corrected.

90 FORTRAN RUN-TIME ERROR

ERROR NO.

Explanation: A run-time error has occurred in a background FORTRAN job.

Operator's response: Report the error to the owner of the FORTRAN job.

91 FORTRAN I/O ERROR

ERROR NO.

Explanation: An input error has occurred in a background FORTRAN job. The file system error description explains the error. User software error.

Operator's response: Report the error to the owner of the FORTRAN job.

SPECIAL ERROR MESSAGE

TRANSF!!

This message is printed out when a transfer error occurs during a page swapping operation on the disk. Because the error message routine is on a segment, and the error has occurred when transferring a page to/from a segment, the simple message TRANSF is stored in memory and written out by a special routine which is resident in memory.

System action: RT program is aborted. Background program returns to command mode.

Operator's response: Error is probably due to either a disk error, disk controller error (hardware) or a memory error. Run DIMS, BIMS or DISC-TEMA to check for parity errors. Run MULTI to test the memory.

4.2 ERROR PROCEDURES FOR FATAL ERRORS

4.2.1 Computer "Hanging" Procedure

Procedure for dumping registers and memory when computer is in STOP or all/most terminals are hanging.

NO	Is the computer "dead" (i.e., no lamps ON) ?		YES
NO	Is the computer in STOP mode?		YES
Note the active levels and press STOP	Note the active levels.		Follow instructions for DEAD computer
NO	Is there any response from MOPC on the console?		
	Type 0 < 17 RD and IRD		
	Type 10/ % address of current RT program % e.g. 10/30561		
	Note: Value 11 bit 10 ₈ to 13 ₈ will give current program level Value 14 bit 3 ₈ to 6 ₈ will give previous program level		
Press MASTER CLEAR			
Insert the MEMTOF floppy in floppy unit 0 and type 1560&			
Remove MEMTOF floppy and insert a new formatted diskette when asked for by this program, then type any character.			
When "finished dump" is typed on the console, remove the floppy and label it.			
Go to RESTART procedure.			
You should now send the floppy, hard copy of the register dumps, etc. and write down what was going on when the system stopped and started to behave abnormal or investigate the dump yourself using S3-PM-INV program.			

4.2.2 Computer "Dead" Procedure

The following flow diagram describes action to be taken if the computer appears completely "dead", i.e. the A/C line current is absent.

No	Are A/C line fuses OK?	Yes
Fix them	Find out why there is no power, fix the problem or await return of A/C current if power fail	
No	Has power been away less than 20 min.?	Yes
	The computer should restart automatically if the key in operator panel is in locked position otherwise press MASTER CLEAR then 20!	
	No	Does the computer start up?
		Yes
Run the microprogram memory test (See section 5.3.1) Run the EXTENDED-ONE test program for checking the instructions. (Repertoire on all levels.)		Finish
Run the FOUR-CHECK test program for checking interrupt system Run the CONFIGURATION-INVEST program (See Section 5.3.7) Run the FLOATING-POINT test program that verifies some specific instructions		
Contact ND for hardware support		

4.2.3 Start/Restart Procedure

The following flow diagram describes the action to taken to restart a computer running SINTRAN III.

RESTART Procedure:

Check that the disks are turned on and READY	
Press MASTER CLEAR or type MACL	
Is the ALD set to load from correct disk? (ALD=Automatic Load Descriptor. Type 112/ on the console to inspect its value)	
No	Yes
Type <disk ALD code>\$	Press LOAD
Does the computer start up? (Give it time, from 1 to 5 min.)	
No	Yes
Turn off and on the disk power. Press LOAD or type <disk ALD code >\$ and wait up to 5 minutes. % if power fail has occurred it might happen that the disk driver could not manage a device clear. Does the computer start up?	
No	Yes
Insert the first S-III floppy in floppy unit 0 Type 1560& and LOAD MACM	
Is MACH typed on the console ?	
No	Yes
Type 22!	
Does the computer start up?	
No	Yes
Insert the first S-III floppy in floppy unit 0 Type 1560& and LOAD MACM	
Is MACM typed on the console?	
No	Yes
Type)HENT	
Does the computer give line feed on the console terminal	
No	Yes
Type 22!	
Does the computer start up?	
No	Yes
Copy system from a backup disk or read in SINTRAN from floppy. See System Supervisor's Guide, Sec.6.3.2.8.	Follow cold start procedure. (See Section 6.2)

4.3

SINTRAN III UTILITY PROGRAMS.

Post Mortem Dump

In case of a fatal error (machine goes in STOP mode or a no responding mode), you are of course interested in knowing what has gone wrong. Take a dump of physical memory to a floppy and send it to ND Software Service. Also try to investigate the dump yourself by means of an investigator named S3-PM-INV-2328, which is supplied on request. To do this you should have some knowledge of SINTRAN III internal structure.

Before a fatal error occurs, you would need a program that does the actual dump for you (MEMTOF= memory to floppy). The following must be done when SINTRAN III is running:

- copy the two program files
 MEMTOF-2326 : BPUN and
 DUMPFL-2327 : BPUN
 (which all users of NORD computers will receive on a floppy) to the main directory, user SYSTEM.
- dump DUMPFL onto a PROG file, i.e.
 @PLACE DUMPFL
 @DUMP "DUMPFL-2327", 13665, 13665
- put a formatted diskette in floppy disk 1, unit 0 and start the program DUMPFL (i.e., @DUMPFL). This program requires no input, but will print some information on the terminal
- take out the diskette and write MEMTOF on the label
- produce a few more diskettes with MEMTOF

4.4 **WHAT TO DO IF THE FAULT LAMP LIGHTS UP; OR IF, THE READY LAMP ON THE DISK PANEL DOES NOT LIGHT UP**

To remove a disk error when the FAULT lamp lights up, simply press the FAULT button. If the lamp remains ON, call hardware service.

If the ready lamp on the disk does not light up, the following may have occurred:

- For 10 Mb disk only:
the disk pack (removable) is not loaded properly. Check that the two small latches are holding the disk pack firmly in position
- the wrong disk unit is selected
- one of the two switches at the back of the disk unit may be OFF (note that these switches also act as fuses, so if there is an overload they will be switched OFF)

5

**PREVENTATIVE MAINTENANCE AND
HARDWARE TESTING**

This chapter contains information about what kind of maintenance the system supervisor should do, and a summary of some of the test programs available. The most commonly used test programs from the system supervisor point of view are explained here.

5.1

MAINTENANCE TO BE DONE BY THE OWNER*Level 0 (Daily).*

- 1 Site should be kept clean and dustfree.

Note: Never turn the computer power off during nights, weekends etc.
Do not perform any kind of operation inside the computer without permission from the ND Service Department.

Level 3 (Monthly).

- 1 Clean air filters.

Level 6 (Annually).

- 1 Perform lower level maintenance.
- 2 Clean the computer. If necessary clean the boards, gold-contacts and memory-modules with "Isopropanol" and vacuum-cleaner.
- 3 Check power-supply output.

5.2 TEST AND UTILITY PROGRAMS

There exists a range of test and verification programs for testing memory, CPU, mass storage and I/O devices. Most of these programs are described in the two manuals:

- NORD-10 Verification Programs
- Test Program Descriptions

An information sheet describing the purpose of the tests, their names and the loading/operating procedures follows each program.

These programs are stand alone programs and are loaded and started by the following method:

- Press STOP and MASTER CLEAR
- Put diskette with test program in floppy disk unit 0
- Type 1560 & on the console
- When the floppy monitor is read from the diskette and has been started up it types an asterisk (*)
- Then the following two commands are available:

- LIST-FILE <LOG. DEV>

This command will list all files of the type BPUN belonging to the user with user index 0. The files will be listed on logical device 1 (terminal) or 5 (lineprinter).

- LOAD-FILE <FILE NAME>

This command will search for the file <FILE NAME> of the type of BPUN belonging to the user with user index 0.

The file must have "BPUN" format. The file will be read into memory and the program will be started at the start address specified in the bootstrap. A check sum test will be made during the reading.

Only digits, letters and "-" will be accepted as input characters. Neither user name nor file type can therefore be given in <FILE NAME>. The command name and the file name can be abbreviated in the usual manner.

5.2.1 Test Program Summary

In this chapter we have listed the most used programs, divided into different types.

- 1 CPU
- 2 MEMORY
- 3 INPUT/OUTPUT
- 4 MASS STORAGE
- 5 UTILITY PROGRAMS FOR DISK/MAGTAPE

CPU TEST PROGRAMS

<i>Program Name</i>	<i>Test Program Diskette</i>	<i>Purpose</i>
ONE-CHECK-1192	ND—10325	Instruction check
TWO-CHECK-1190	ND—10325	Instruction check
THREE-CH-1528	ND—10325	Instruction check
FOUR-CH-1418	ND—10325	Instruction check
EXTEN-ONE-1519	ND—10324	Instruction check, all levels
RGCHK-1543	ND—10325	Register
CACHE-2063	ND—10325	Cache
PAGING-A	ND—10325	Paging
TREAL-1399	ND—10326	Real-Time clock
FLOATING-1529	ND—10325	48 bit floating
T-32B-FLOA-1860	ND—10325	32 bit floating
PFAIL-1355	ND—10324	Power fail restart

MEMORY TEST PROGRAMS

MULTI-1820	ND—10324	Memory
T8KMOS-1821	ND—10325	8K MOS modules
T32KMOS-2178	ND—10324	32K MOS modules
ERRCOR-2112	ND—10325	Error correction (memory)—NORD-10
MPM-MAINT-2177	ND—10324	Big multiport memory log
MOVER-1863	ND—10324	Memory test
MEM-TEST-2304	ND—10326	Memory test using S1172 (Universal DMA)

TEST PROGRAMS FOR INPUT/OUTPUT DEVICES

TREPU-1269	ND—10325	Tape reader and tape punch
TTEST-1206	ND—10324	Terminals
TNCT-2039	ND—10326	Nord colour terminal
ES-PICT-2216	ND—10326	Picture system test
S1172-HAR-2235	ND—10326	Test DMA interface
DS1172-2282	ND—10325	Test DMA interface
INTER-T-2233	ND—10326	Test of external interrupts 1127
PROCES-PAN-1865	ND—10325	Process panel check
FLOPPY-FU-1986	ND—10324	Floppy disk
TESTMONO-1534	ND—10326	NORDCOM
TLINE-1541	ND—10325	Synchronous modem
CARDR-1642	ND—10325	Card reader
TERMBUF-1751	ND—10325	Terminal interface ND 253
FLOPPY-RAN-1988	ND—10324	Floppy Disk
CHATA-1832	ND—10325	Asynchronous inter computer link
CONFI-INV-1672	ND—10324	Configuration Investigation
LP-TEST-1878	ND—10324	Line Printers
PARAL-BYTE-1942	ND—10325	Parallel Byte interface
VERSATEC-TEST-2297	ND—10326	Versatec printer/plotter
HDLC-2-2307	ND—10324	HDLC test program

TEST PROGRAMS FOR MASS STORAGE

SUPER-RAND-2222	ND—10324	To test the controller and 38/75/288Mb disks. Writes on disks.
ECCTEST-2224	ND—10325	Error correction facility test for 38/75/288Mb controller. Doesn't write on disks.
BIGFUNC-1824	ND—10324	Function test for 33/66 and 38/75/288Mb disks. Writes on disks.
BIG-RAND-1876	ND—10324	Random data and address test for 33/66Mb disks. Writes on disks.
DSERV-1395	ND—10325	Adjustment program for cartridge disks.
TECOD-1451	ND—10325	Test of cartidge disks and controller.
TANB-MAG-1559	ND—10324	Test program for Pertec/Tandberg Magnetic tape stations.
HPMAG-1523	ND—10326	Hewlett Packard magnetic tape.
TCODR-1299	ND—10326	Test of core and drum.

UTILITY PROGRAMS FOR MASS STORAGE

PASCAN-2226	ND—10326	Pack verification program for 75/288Mb disks.
DISC-TEMA	ND—10324	Utility program for 37/75/288Mb disks.
TSTAD-1870	ND—10326	To check big disk addresses.
BIMS-1871	ND—10324	Utility program for 33/66Mb disks.
DIMS-1453	ND—10324	Utility program for cartridge disks.
DRUMS-1297	ND—10326	Drum maintenance system.
FILSYS-INV-2135	PRO-10022	To check and investigate the contents of a directory on disks (all disks).
FL-LOOPS-1996	ND—10326	Debugging loops for floppy disk.

5.3 **TEST PROGRAMS RUN BY THE SYSTEM SUPERVISOR WHEN SINTRAN III IS DOWN**

5.3.1 **Memory Test by Using the Microprogram**

For each NORD computer there is a memory test program located in the ROM (read only memory) to quickly test the memory. This is a very useful feature as it may quickly be decided whether a given error is to be blamed on the CPU or the memory. To use the test program do the following:

- Press STOP and MASTER CLEAR
- Give lower memory address, B/
- Give upper memory address, X/ (32K = 077777, 64K = 177777)
- start the test program by typing #

If the test is successful, # is typed when finished. If the test is unsuccessful a question mark will be printed on the console and the test stops.

The following registers in level 0 give information about the error:

P register:	Failing address
L register:	Test pattern
D register:	Error pattern
T register:	Failing bits
B register:	Start address
X register:	Stop address

5.3.2 Test Program Monitor

The Test Program Monitor consists of a series of standard commands used by a user to communicate with a test program. A description of all the commands with Test Program Monitor can be found in the manual Test Program Descriptions for ND-100/10 Series, Vol. 1 (ND-30.005) and in Test Program Description (ND-62.009).

5.3.3 Mover

This memory test program tests the memory by moving around in the memory (only 64k word areas at a time) after each test.

To use the test program press MASTER CLEAR and type 1560& or dump the program onto a file and call it up by @MOVER.

The five parameters the program will ask for are:

FLYTT:	number of words the program moves in memory after each test, e.g., 1
ADDRN:	lower address of memory area to be tested, e.g. 0
ADDRX:	upper address of memory area, e.g., 177777
PROGN:	first location of the program, e.g., 0
device number:	defines error output (TTY = 0304, L-P = 0430)

Note: This program can run with or without SINTRAN (testing the swapping area). It is advisable to let MOVER run as often as possible (e.g., each night) even though no memory errors are expected. It is advisable that MOVER runs for at least 6 hours.

5.3.4 Multi

This is a very good program for checking memory (i.e., 256K word area). The computer must have paging. The program is self-documenting. Multi should run for about 1 hour or at least until THE TEST IS NOW REPEATED ERRORS ONLY GIVE PRINTOUT is typed on the console.

5.3.5 **Big Disk Maintenance System (BIMS)**

This program operates on 33 Mb and 66 Mb disks.

This program has many functions and is often used by the System Supervisor. Some of its functions are:

FORMAT:	used to format disk packs (see Section 7.5)
COPY:	used to take back-up
REFRESH:	used to refresh tracks
TRANSLATE:	used to translate a logical address to a big disk address or vice versa
PARITY-CHECK:	used for parity checking, often used in connection with FORMAT
VERIFY:	used to compare the contents of two disk areas (memory compare)
COMPARE:	used to compare the contents of two disk areas (disk compare)

The last two functions are *often* used in connection with back-up. The two disk areas are compared word for word.

5.3.6 **DISC-TEMA**

This program operates on a 38 MB, 75 MB, 288 MB disk or 30/60/90 MB disk. DISC-TEMA replaces GREMS (see also Section 8.1.1.3).

5.3.7 **Disk Maintenance System (DIMS)**

This program operates on 10 Mb disks.

This program performs the same functions as BIMS.

5.3.8 Configuration Investigator (CONFI-INV)

Besides individual control of each device in a computer installation it is necessary to know the connection between each device interface and the CPU. This can be done by using the program configuration investigator (CONFI-INV).

When SINTRAN III accesses a device this is done by using the physical device number. Each device has a unique device number. When a device is ready for service its interface issues an interrupt to the SINTRAN III system. The IDENT code is used to identify the device that caused the interrupt. All I/O devices are connected to an interrupt level in NORD-10 and ND-100. Levels 10, 11, 12 and 13 are used for this. The device numbers and ident codes are automatically selected when terminal group is chosen (See Appendix K).

The output gives information about the machine's memory size, ALD setting, device numbers both physical and logical, ident codes and ident code priority sequence of levels 10, 11, 12 and 13 and if cache memory. An example of this output is shown in the next section.

EXAMPLE OF CONFIGURATION INVESTIGATOR

#15608

*LOAD CON-INV)

NORD CONFIGURATION INVESTIGATOR

PROGRAM NUMBER: HUT-1672N

DATE ISSUED : 1 SEP 1982

THE ADDED DEVICES ARE ONLY CHECKED AGAINST DEVICE NUMBERS

THE COMMAND HELP GIVES YOU A LIST OF THE COMMANDS

>RUN)

RUN-CONFIGURATION

THIS IS A NORD-100

48-BITS FLOATING ARITHMETIC

THIS MACHINE HAS HARDWARE PAGING

MEMORY MAP OF BANK 0

000000 177777 MEMORY (64K)

MEMORY MAP OF BANK 1

000000 177777 MEMORY (64K)

MEMORY MAP OF BANK 2

000000 177777 MEMORY (64K)

MEMORY MAP OF BANK 3

000000 177777 MEMORY (64K)

MEMORY MAP OF BANK 4

000000 177777 MEMORY (64K)

MEMORY MAP OF BANK 5

000000 177777 MEMORY (64K)

MEMORY MAP OF BANK 6

000000 177777 MEMORY (64K)

MEMORY MAP OF BANK 7

000000 177777 MEMORY (64K)

ALD-SETTING: 021540

THIS N-100 HAS CACHE MEMORY

DEVICE 0300-0307 IS ON THE CPU CARD.

THE IDENT CODE IS NOT CHECKED FOR THIS DEVICE !!

FROM	TO	DEVICE NAME	LOG.NO	LVL13	LVL12	LVL11	LVL10
000010	000013	REAL TIME CLOCK 1		000001			
000200	000207	TERMINAL 17	7		000060		000060
000210	000217	TERMINAL 18	017		000061		000061
000220	000227	TERMINAL 19	052		000062		000062
000230	000237	TERMINAL 20	053		000063		000063
000240	000247	TERMINAL 21	054		000064		000064
000250	000257	TERMINAL 22	055		000065		000065
000260	000267	TERMINAL 23	056		000066		000066
000270	000277	TERMINAL 24	057		000067		000067
000300	000307	TERMINAL 1	1 IDENTCODE NOT CHECKED ***				
000340	000347	TERMINAL 5	044		000044		000044
000350	000357	TERMINAL 6	045		000045		000045
000360	000367	TERMINAL 7	046		000046		000046
000370	000377	TERMINAL 8	047		000047		000047
000640	000647	TERMINAL 33	01040		000124		000124
000650	000657	TERMINAL 34	01041		000125		000125
000660	000667	TERMINAL 35	01042		000126		000126
000670	000677	TERMINAL 36	01043		000127		000127
001100	001107	TERMINAL 37	01044		000130		000130
001110	001117	TERMINAL 38	01045		000131		000131
001120	001127	TERMINAL 39	01046		000132		000132
001130	001137	TERMINAL 40	01047		000133		000133

001140 001147	TERMINAL 41	01050	000134	000134
001150 001157	TERMINAL 42	01051	000135	000135
001160 001167	TERMINAL 43	01052	000136	000136
001170 001177	TERMINAL 44	01053	000137	000137
001200 001207	TERMINAL 25	070	000070	000070
001210 001217	TERMINAL 26	071	000071	000071
001220 001227	TERMINAL 27	072	000072	000072
001230 001237	TERMINAL 28	073	000073	000073
001240 001247	TERMINAL 29	074	000074	000074
001250 001257	TERMINAL 30	075	000075	000075
001260 001267	TERMINAL 31	076	000076	000076
001270 001277	TERMINAL 32	077	000077	000077
001300 001307	TERMINAL 9	060	000050	000050
001310 001317	TERMINAL 10	061	000051	000051
001320 001327	TERMINAL 11	062	000052	000052
001330 001337	TERMINAL 12	063	000053	000053
001340 001347	TERMINAL 13	064	000054	000054
001350 001357	TERMINAL 14	065	000055	000055
001360 001367	TERMINAL 15	066	000056	000056
001370 001377	TERMINAL 16	067	000057	000057
001400 001407	TERMINAL 45	01054	000140	000140
001410 001417	TERMINAL 46	01055	000141	000141
001420 001427	TERMINAL 47	01056	000142	000142

```

001430 001437 TERMINAL 48          01057          000143          000143

001540 001547 BIG DISK SYSTEM 1          000017

001560 001567 FLOPPY DISC 1 01000-01002          000021

001604 001607 HDLC REMOTE LOAD 1          IDENTCODE NOT CHECKED ***

001640 001657 HDLC NORD-NET 1          000150
          DMA VERSION          000150

100115 000000 ERROR CORR. CONTROL REG. IDENTCODE NOT CHECKED ***

```

IDENTCODE PRIORITY SEQUENCE, LEVEL 13:

```

000001 REAL TIME CLOCK 1
000150 HDLC NORD-NET 1

```

IDENTCODE PRIORITY SEQUENCE, LEVEL 12:

```

000150 HDLC NORD-NET 1
000044 TERMINAL 5          044
000045 TERMINAL 6          045
000046 TERMINAL 7          046
000047 TERMINAL 8          047
000050 TERMINAL 9          060
000051 TERMINAL 10         061
000052 TERMINAL 11         062
000053 TERMINAL 12         063
000054 TERMINAL 13         064
000055 TERMINAL 14         065
000056 TERMINAL 15         066
000057 TERMINAL 16         067
000060 TERMINAL 17         7
000061 TERMINAL 18         017
000062 TERMINAL 19         052
000063 TERMINAL 20         053
000064 TERMINAL 21         054
000065 TERMINAL 22         055
000066 TERMINAL 23         056
000067 TERMINAL 24         057
000070 TERMINAL 25         070
000071 TERMINAL 26         071
000072 TERMINAL 27         072
000073 TERMINAL 28         073
000074 TERMINAL 29         074
000075 TERMINAL 30         075
000076 TERMINAL 31         076
000077 TERMINAL 32         077
000124 TERMINAL 33         01040
000125 TERMINAL 34         01041
000126 TERMINAL 35         01042
000127 TERMINAL 36         01043
000130 TERMINAL 37         01044
000131 TERMINAL 38         01045
000132 TERMINAL 39         01046
000133 TERMINAL 40         01047
000134 TERMINAL 41         01050
000135 TERMINAL 42         01051
000136 TERMINAL 43         01052
000137 TERMINAL 44         01053
000140 TERMINAL 45         01054
000141 TERMINAL 46         01055
000142 TERMINAL 47         01056
000143 TERMINAL 48         01057

```

IDENTCODE PRIORITY SEQUENCE, LEVEL 11:

000017 BIG DISK SYSTEM 1
 000021 FLOPPY DISC 1 01000-01002

IDENTCODE PRIORITY SEQUENCE, LEVEL 10:

000044	TERMINAL 5	044
000045	TERMINAL 6	045
000046	TERMINAL 7	046
000047	TERMINAL 8	047
000050	TERMINAL 9	060
000051	TERMINAL 10	061
000052	TERMINAL 11	062
000053	TERMINAL 12	063
000054	TERMINAL 13	064
000055	TERMINAL 14	065
000056	TERMINAL 15	066
000057	TERMINAL 16	067
000060	TERMINAL 17	7
000061	TERMINAL 18	017
000062	TERMINAL 19	052
000063	TERMINAL 20	053
000064	TERMINAL 21	054
000065	TERMINAL 22	055
000066	TERMINAL 23	056
000067	TERMINAL 24	057
000070	TERMINAL 25	070
000071	TERMINAL 26	071
000072	TERMINAL 27	072
000073	TERMINAL 28	073
000074	TERMINAL 29	074
000075	TERMINAL 30	075
000076	TERMINAL 31	076
000077	TERMINAL 32	077
000124	TERMINAL 33	01040
000125	TERMINAL 34	01041
000126	TERMINAL 35	01042
000127	TERMINAL 36	01043
000130	TERMINAL 37	01044
000131	TERMINAL 38	01045
000132	TERMINAL 39	01046
000133	TERMINAL 40	01047
000134	TERMINAL 41	01050
000135	TERMINAL 42	01051
000136	TERMINAL 43	01052
000137	TERMINAL 44	01053
000140	TERMINAL 45	01054
000141	TERMINAL 46	01055
000142	TERMINAL 47	01056
000143	TERMINAL 48	01057

END OF INVESTIGATOR

6

DIFFERENT LEVELS OF STARTING UP SINTRAN

There are seven different levels of starting up a SINTRAN III system:

- | | | |
|---|-----------------------------------|--|
| 1 | Normal Start | (i.e., switching on the computer, the console, starting the disk(s) and pressing MASTER-CLEAR and LOAD buttons, see Section 2.1) |
| 2 | Warm Start | (i.e., pressing the MASTER-CLEAR and then the LOAD buttons, see Section 6.1 or using the command @RESTART-SYSTEM, see Section 3.4.3) |
| 3 | Restart | (i.e., @STOP-SYSTEM followed by pressing MASTER-CLEAR and typing 20!, see Section 3.4.2) |
| 4 | Cold start | (i.e., using the first SINTRAN III floppy diskette to load MACM and then give the HENT command to fetch a new SINTRAN from the SAVE area of SINTRAN III resident. Start up SINTRAN by typing 22!, see Section 6.2) |
| 5 | Loading a new SINTRAN III version | (i.e., new diskettes with SINTRAN III are received due to changes in the software because of new terminals, a new line printer, etc. have been ordered, see Section 6.3.2.8) |
| 6 | Loading a new SINTRAN III release | (i.e., new diskettes with SINTRAN III are received because a new release of SINTRAN III has been ordered, see Section 6.3.2.9) |
| 7 | Initial loading | (i.e., loading SINTRAN III from scratch, see Section 6.3) |

6.1

INFORMATION CONCERNING A WARM START

When MASTER-CLEAR and LOAD has been pressed the IMAGE area on SEGFIL0 is copied to memory. Also the POF area on MACM-AREA:DATA is copied to memory. Also see Appendix B and Chapter 7.

All commands in the initial command buffer are automatically executed. One of these commands should be to append a batch job (the system file LOAD-MODE) to the batch queue.

The LOAD-MODE file (see example in Section 6.2.4) normally performs the following tasks:

- Enters any directories not entered by the initial commands.
- Sets these directories default.
- Starts up any spooling processes.
- Starts up NORDNET communication.
- Starts up any other batch processes.
- Starts up accounting.
- Sets the system available.

The commands in the text buffer have previously (in the system file HENT-MODE, see section 6.2.2) been initialized.

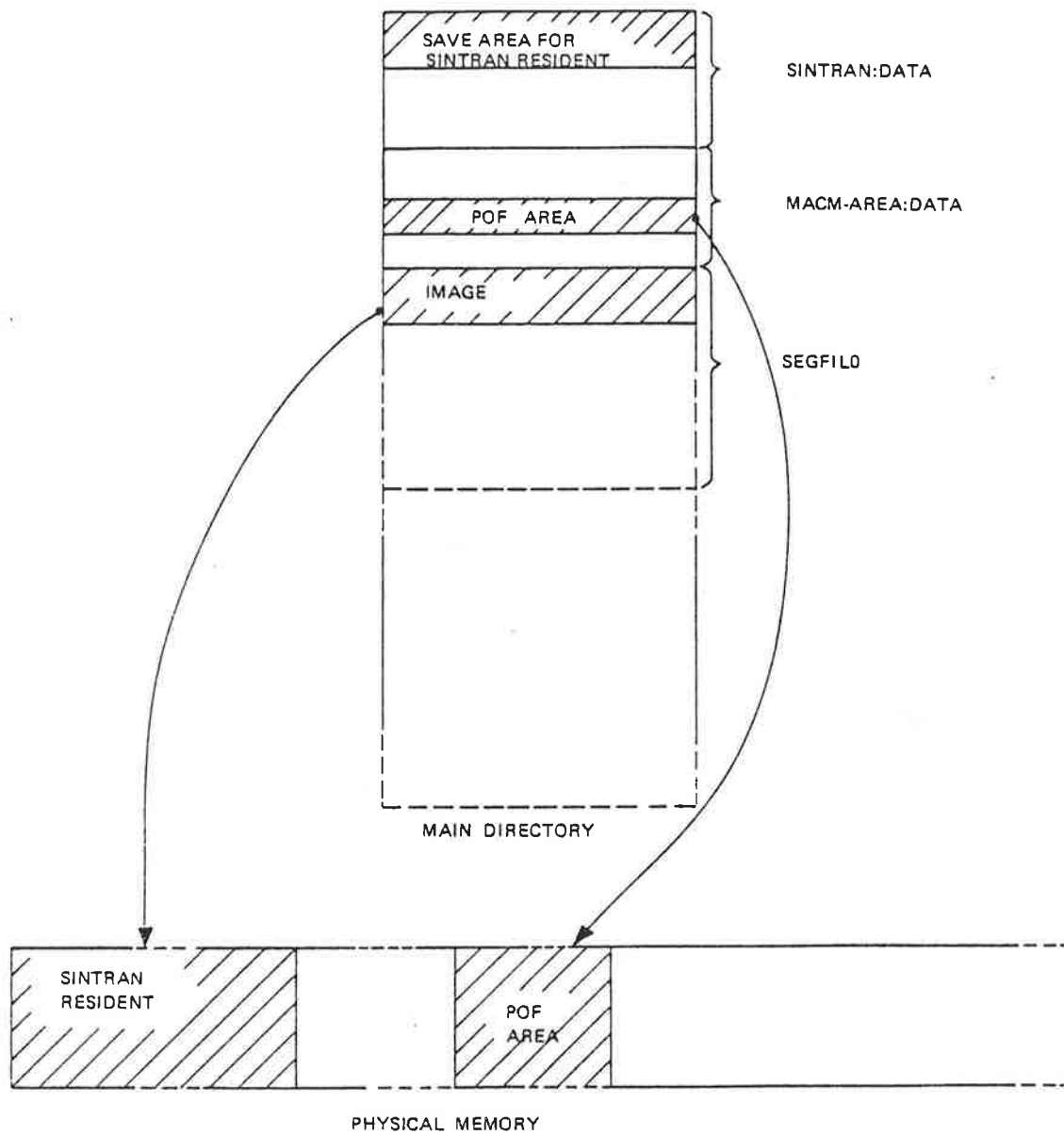


Figure 6.2: A WARM START OVERVIEW

The IMAGE and the POF area are copied into memory.

6.2 A COLD START

A COLD Start will often be done after a patch on SINTRAN:DATA or MACM-AREA:DATA (also see Appendix B and Chapter 7), and in the cases it is impossible to load from the image area.

The COLD Start procedure is as follows:

- Press the MASTER-CLEAR button on the panel.
- Place the first SINTRAN III diskette in floppy unit 0 and type 1560 & and LOAD MACM on the console. MACM is loaded from the diskette.
- Type)HENT and give carriage return. Line feed is given by the system.
- Type 22!
- When SINTRAN III has started, press ESC and give carriage return when user name and password are asked for.
- Update SINTRAN's software clock if necessary.
- Enter the main directory.
- Log out.
- Log in as user SYSTEM.
- Run the "HENT-MODE" file. This file has a number of tasks many of which are installation dependent (see example in Section 6.2.2).

6.2.1 Example of a COLD Start

#1560&

```
=====
== M A C M - 1 7 1 8 - K ==
=====
```

INITIALIZED FOR:

DISC-2-75MB (150MB)

WE REMIND YOU OF THE FOLLOWING MACM COMMANDS:

```
)REDEF    => REDEFINE DISC TYPE
)HENT     => GET SINTRAN FROM SAVE-AREA
22!       => START SINTRAN
10,0$     => LOAD SINTRAN FROM DISKETTE
```

YOU MAY NOW TYPE ANY MACM COMMAND.

>HENT)

22!

```
OCTAL NO. OF PAGES THE SYSTEM WILL USE ON THE SEGMENT FILE(S): 13673
FIRST SYSTEM SEGMENT STARTS ON PAGE (OCT.): 751
NUMBER OF BACKGROUND PROCESSES (DEC.) : 42
EACH BACKGROUND PROCESS NEEDS (OCT. PAGES): 205
```

```
16.23.56      7 DECEMBER 1982
SINTRAN III - VSE H
```

< 100.685 >

```
REVISION:      0
CPU (SYSTEM NUMBER): 685
GENERATED: 09.32.00 1 OCTOBER 1982
SINTRAN III RUNNING -
```

PAGES FOR SWAPPING(OCT.): 633

```
16.24.41      7 DECEMBER 1982
SINTRAN III - VSE H
```

< 100.685 >

```
ENTER)
PASSWORD:)
```

NO MAIN DIRECTORY

OK

@ENT-DIRECTORY

DIRECTORY NAME: PACK-ONE)

DEVICE NAME: D-2-7-1)

DEVICE SUB-UNIT: Q)

@LOG)

```
16.26.14      7 DECEMBER 1982
--EXIT--
```


16.26.28 7 DECEMBER 1982
SINTRAN III - VSE H

< 100.685 >

ENTER SYS }
PASSWORD: }

OK
@MODE }
INPUT FILE: HENT-MODE }
OUTPUT FILE: SYS-OUT-1 }

@LOG }
16.39.52 7 DECEMBER 1982
--EXIT--

The command)HENT is a MACM command that will:

- copy the save area of the SINTRAN resident part to the IMAGE area.
- renew all system segments, i.e. segments on SINTRAN:DATA and MACM-AREA:DATA will be copied to SEGFIL0:DATA.
- note that any programs residing on segments are lost (i.e., user RT programs, reentrant-subsystems, SIBAS, remote job entry systems, etc.) System background segments must be initialized.

Also the buffer area containing the command strings from the initial command and the next initial commands is cleared, and all patches done only on the IMAGE area are lost.

Note. Patches in the so-called POF (paging OFF) area will not disappear after a HENT.

When 22! is typed, the "new" image area and the POF area will be copied to memory.

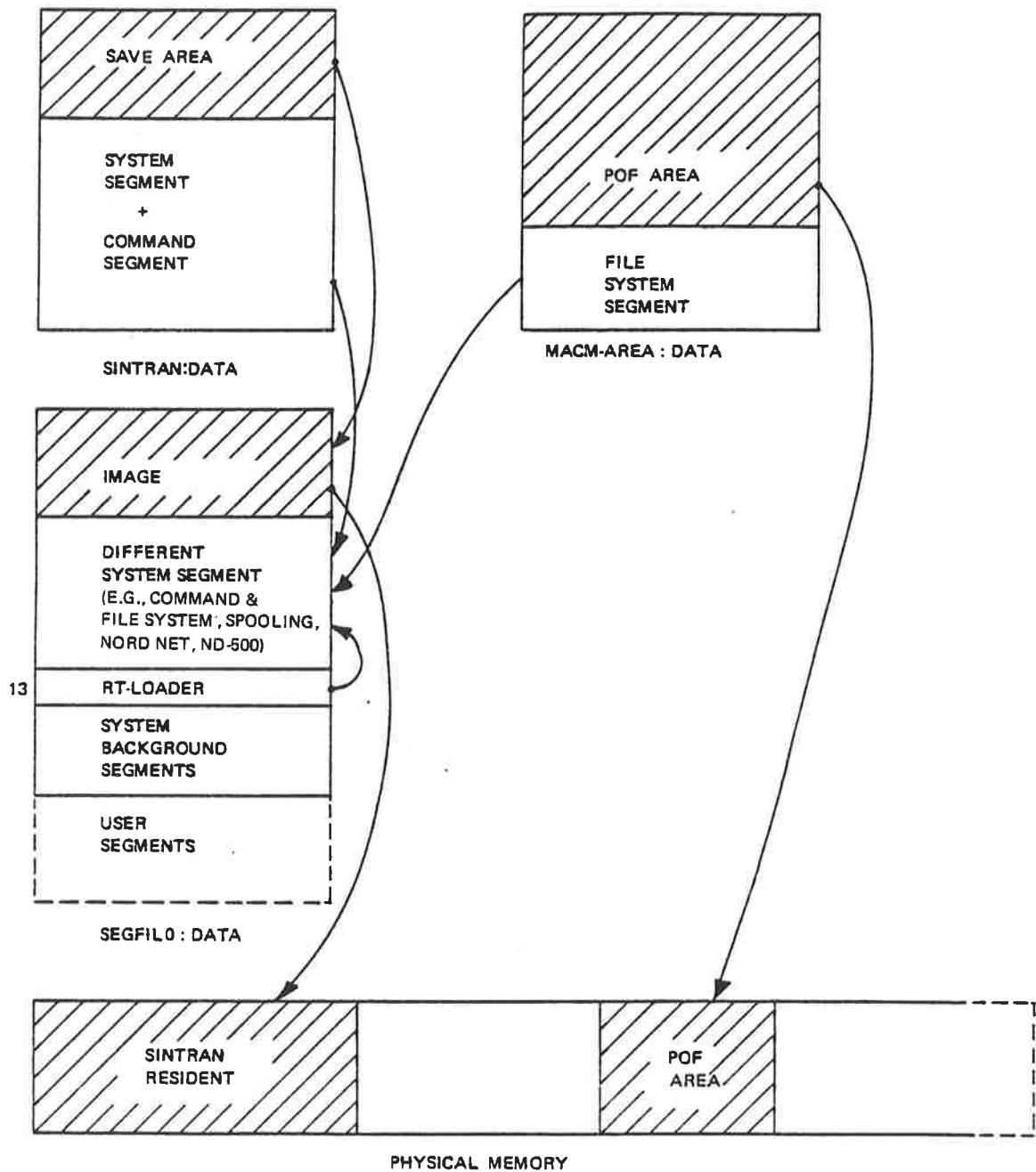


Figure 6.2.1: A COLD START OVERVIEW

The SAVE area of SINTRAN resident is copied to the IMAGE area. The segments on SINTRAN:DATA and MACM-AREA:DATA are copied to SEGFILO. The SAVE areas of the RT-LOADER, Spooling RT/program, NORD-NET program, SINTRAN-SERVICE program, and the MAIL SYSTEM (not drawn on the figure) are copied to other segments on SEGFILO. Then the IMAGE area and the POF area is copied into memory.

6.2.2 The HENT-MODE File

A lot of information is lost in a cold start. This must be restored and so is done in the system HENT-MODE file which will contain all necessary commands. Some of these commands are system dependent, while others are always present.

Example of the commands in HENT-MODE:

- (i) To set up the necessary initial commands to:
 1. Enter the main directory
 2. Enter the directory on which user RT has space, if this is not the main directory, and set this directory default.
 3. Empty the temporary file used to contain output from the LOAD-MODE job at each restart.
 4. Start up a batch processor
 5. Enter a file called "LOAD-MODE" into the batch queue. This file is described in Section 6.1.
- (ii) To execute RTENTER
- (iii) To dump all reentrant subsystems, a new file or batch file job may be used here (see example in Section 6.2.5).
- (iv) To make the RT loader define the name of all "SYSTEM INCLUDED" RT programs.
- (v) To initialize the background programs
- (vi) To start up the mail system.
- (vii) To initialize a batch processor.
- (viii) To initialize all the spooling files.
- (ix) To load DMAC.
- (x) To enter the LOAD-MODE file to the batch queue.
- (xi) To load any RJE systems required.
- (xii) To enter into the batch queue a job to load SIBAS.
- (xiii) To enter into the batch queue a job to load all user RT-programs.

6.2.3 Example of the HENT-MODE File

```

@CC *****
@CC *
@CC * (SYSTEM)HENT-MODE:SYMB
@CC *
@CC *
@CC *          THIS FILE MUST BE TAILORED
@CC *          TO EACH INDIVIDUAL SYSTEM
@CC *
@CC *****
@CC *
@CC * THIS FILE IS TO BE RUN AFTER A COLD START.
@CC * IT WILL ENTER THE MAIN DIRECTORY, LOAD THE REENTRANT SUBSYSTEMS ETC.
@CC * 5 OTHER FILES MUST BE CREATED :
@CC *   LOAD-MODE:SYMB      - THIS CONTAINS A BATCH JOB WHICH INITIALISES
@CC *                       SINTRAN AFTER A MASTER-CLEAR/LOAD START.
@CC *   SYSTEM-OUTPUT-1:SYMB - THIS IS A TEMPORARY FILE USED TO CONTAIN THE
@CC *                       OUTPUT FROM THE SYS-START BATCH JOB.
@CC *   SIBAS-SYS:BATC      - THIS CONTAINS A BATCH JOB TO INITIALISE SIBAS.
@CC *   SYSTEM-OUTPUT-2:SYMB - A TEMPORARY FILE TO RECEIVE OUTPUT FROM THE
@CC *                       BATCH JOB USED TO INITIALISE SIBAS.
@CC *   DUMP-REENTRANT:SYMB - A MODE JOB USED TO DUMP REENTRANT SUBSYSTEMS.
@CC *
@CC *   IN ADDITION, MODE FILES TO READ IN FLOCON AND THE RJE PACKS MUST
@CC *   BE CREATED, IF THEY ARE REQUIRED.
@CC *
@CC * NOTE : IF THE SYSTEM PASSWORD IS CHANGED, REMEMBER THAT IT MUST
@CC *        BE UPDATED ON ALL BATCH FILES, E.G. LOAD-MODE, SIBAS-SYS.
@CC *
@CC *****

@CC *****
@CC *
@CC * INITIAL COMMAND TO ENTER THE MAIN DIRECTORY
@CC * REMEMBER      *** CORRECT DISC SIZE ***
@CC *
@CC *****

@INITIAL-COMMAND ENTER-DIRECTORY,,DISC-75MB-1,0

@CC *****
@CC *
@CC * INITIAL COMMANDS TO EMPTY TEMP. FILE USED FOR BATCH OUTPUT BEFORE USE
@CC * ( ALWAYS PRESENT )
@CC *
@CC *****

@NEXT-INITIAL-COMMAND CONNECT SYS-OUT-1 105 R
@NEXT-INITIAL-COMMAND CLOSE 105

@CC *****
@CC *
@CC * INITIAL COMMANDS TO :
@CC * INITIALISE BATCH PROCESSOR AND ENTER BATCH JOB TO ENTER OTHER
@CC * DIRECTORIES, START SPOOLING ETC.
@CC * FILE "LOAD-MODE" WILL CONTAIN THE SYSTEM PASSWORD. ENSURE THAT SYSTEM
@CC * IS THE ONLY USER TO HAVE READ ACCESS TO IT !
@CC * ( ALWAYS PRESENT )
@CC *
@CC *****

@NEXT-INITIAL-COMMAND BATCH
@NEXT-INITIAL-COMMAND APPEND-BATCH 1 LOAD-MODE SYS-OUT-1

@CC *****
@CC *
@CC * SINCE HENT HAS BEEN USED, RTENTER MUST BE EXECUTED
@CC * ( ALWAYS PRESENT )

```

```

@CC *
@CC *****

@RTENTER

@CC *****
@CC *
@CC * GIVE SYSTEM INCLUDED RT-PROGRAMS NAMES
@CC * AND LOAD DMAC TO SEGMENT 7
@CC * ( ALWAYS PRESENT )
@CC *
@CC *****

@RT-LOADER
YES
READ-BINARY DMAC 7
YES
EXIT

@CC *****
@CC *
@CC * INITIALIZE BACKGROUND PROGRAMS (ALWAYS PRESENT), AND
@CC *
@CC * IF BACKGROUND SEGMENTS OF OTHER SIZES THAN 64K ARE TO BE USED,
@CC * THE CHANGE-BACKGROUND-SEGMENT-SIZE COMMANDS SHOULD BE DONE HERE.
@CC * TERMINAL 1, (CONSOLE), WILL ALWAYS HAVE A 64K SEGMENT.
@CC *
@CC *****

@INIT-BACKGROUND-PROGRAMS

@CC * CHANGE-BACKGROUND-SEGMENT-SIZE <LOGICAL NO.> <NO. OF PAGES>
@CC *
@CHANGE-BACKGROUN-SEG-SIZE 670 128
@CHANGE-BACKGROUN-SEG-SIZE 36 128
@CHANGE-BACKGROUN-SEG-SIZE 39 128

@CC *****
@CC *
@CC * START MAIL SYSTEM
@CC * ( ALWAYS PRESENT )
@CC *
@CC *****

@MAIL
@RUN-MAIL
@EXIT

@CC *****
@CC *
@CC * INITIALISE THE FIRST BATCH PROCESSOR
@CC * ( ALWAYS PRESENT )
@CC *
@CC *****

@BATCH

@CC *****
@CC *
@CC * INITIALISE SPOOLING FILES. I.E. ENSURE THAT THEY ARE EMPTY
@CC * THIS SET OF COMMANDS SHOULD BE DONE FOR EACH LINE-PRINTER OR TERMINAL
@CC * WITH SPOOLING, AND FOR EACH VERSION FROM 2 UPWARDS OF THOSE FILES.
@CC *
@CC *****

@OPEN L-P;2 R
@OPEN L-P;3 R

```

```

@OPEN L-P;4 R
@OPEN L-P;5 R
@OPEN L-P;6 R
@OPEN L-P;7 R
@OPEN L-P;8 R
@OPEN L-P;9 R
@OPEN L-P;10 R
@CLOSE -1

```

```

@CC *****
@CC *
@CC * DUMP THE REENTRANT SUBSYSTEMS
@CC * ( ALWAYS PRESENT )
@CC *
@CC *****

```

```

@MODE DUMP-REENT,,

```

```

@CC *****
@CC *
@CC * LOAD SIBAS AFTER EMPTYING ITS BATCH OUTPUT FILE
@CC * THIS SET OF COMMANDS SHOULD ONLY BE INCLUDED IF SIBAS IS TO BE RUN.
@CC *
@CC *****

```

```

@CONNECT SYSTEM-OUTPUT-2 105 R
@CLOSE 105
@APP-BA 1 SIB2-LOAD:BATC,SYS-OUT-2

```

```

@CC *****
@CC *
@CC * LOAD FLOCON
@CC * ONLY TO BE PRESENT IF FLOCON IS TO BE RUN WITH ONE OR MORE RJE PACKS
@CC *
@CC *****

```

```

@MODE LOAD-FLOCON,,

```

```

@CC *****
@CC *
@CC * LOAD RJE PACKS
@CC * ONLY TO BE PRESENT IF ONE OR MORE RJE PACKS ARE TO BE LOADED
@CC *
@CC *****

```

```

@MODE LOAD-NTR,,
@MODE LOAD-HASP,,

```

```

@CC *****
@CC *
@CC * RUN LOAD-MODE TO TERMINATE INITIALISING
@CC *
@CC *****

```

```

@APPEND-BATCH 1 LOAD-MODE SYS-OUT-1

```

```

@CC *****
@CC *
@CC * END OF HENT-MODE
@CC *
@CC *****

```

6.2.4 Example of the LOAD-MODE File

```

@ENTER SYSTEM,,,,
@CC *****
@CC *
@CC * (SYSTEM)LOAD-MODE:SYMB
@CC *
@CC *      BATCH JOB WHICH WILL BE RUN AFTER A WARM START
@CC *      IS EXECUTED.  THE JOB IS STARTED BY A NEXT-INITIAL-COMMAND
@CC *
@CC *      THIS FILE MUST BE TAILORED
@CC *      TO SUIT EACH INDIVIDUAL SYSTEM
@CC *
@CC *      REMEMBER TO SET-FILE-ACCESS FOR
@CC *      FRIEND AND PUBLIC TO NONE, SINCE
@CC *      THE FILE CONTAINS THE SYSTEM PASSWORD
@CC *
@CC *      REMEMBER TO CHANGE THE PASSWORD
@CC *      WHEN THE SYSTEM PASSWORD IS CHANGED
@CC *
@CC *****

@CC *****
@CC *
@CC * REMEMBER TO UPDATE THE CLOCK, IF NOT AUTOMATIC UPDATE !
@CC *
@CC *****

@OPERATOR PLEASE UPDATE THE CLOCK

@CC *****
@CC *
@CC * ENTER ALL DIRECTORIES AND SET THEM DEFAULT IF REQUIRED
@CC * THE NUMBER AND FORM OF THESE COMMANDS IS SYSTEM DEPENDANT.
@CC *
@CC *****

@ENTER-DIRECTORY,,DISC-75MB-1,1
@SET-DEFAULT-DIRECTORY PACK-TWO

@CC *****
@CC *
@CC * START UP SINTRAN COMMUNICATION LINES
@CC * ( SYSTEM DEPENDANT )
@CC *
@CC * AND
@CC *
@CC * SPOOLING PROCESSES
@CC * ( SYSTEM DEPENDANT )
@CC *
@CC *****

@START-SPOOLING L-P
@START-COMMUNICATION 1
@START-COMMUNICATION 2

@CC *****
@CC *
@CC * START UP OTHER BATCH PROCESSES
@CC * ( SYSTEM DEPENDANT )
@CC *
@CC *****

@BATCH

@CC *****
@CC *
@CC * START UP FLOCON IF USED TO RUN RJE EMULATOR(S)
@CC * ( SYSTEM DEPENDANT )

```



```

@CC *
@CC *****
@RT MAIN
@CC *****
@CC *
@CC * START UP RJE EMULATORS
@CC * ( SYSTEM DEPENDANT )
@CC *
@CC *****
@RT HASP
@CC *****
@CC *
@CC * SET SYSTEM AVAILABLE FOR USERS
@CC *
@CC *****
@SET-AVAILABLE
@OPERATOR *** SYSTEM IS AVAILABLE ***

```

6.2.5 Example of the DUMP-REENTRANT File

```

@CC - DUMP-REENTRANT
@CC - MODE FILE TO DUMP REENTRANT SUBSYSTEMS
@CC - THE FILES TO BE INCLUDED DEPEND ON THE SOFTWARE DELIVERED.
@CC - OTHER PROGRAMS SHOULD BE DUMPED AS :PROG FILES, I.E. ACCOUNTS,
@CC - FMAC, BRF-EDITOR ETC.
@CC
@DUMP-REENTRANT FTN           0           1   FTN
@DUMP-REENTRANT NRL           0           1   NRL
@DUMP-REENTRANT BASIC         0           1   BASIC
@DUMP-REENTRANT PED           0           1   PED-0000E
@DUMP-REENTRANT COBOL         0           1   COBOL
@DUMP-REENTRANT PERFORM       0           0   PERFORM
@DUMP-REENTRANT MAC           177777  177775  MAC-1415
@DUMP-REENTRANT EDITOR       0           1   EDITOR

```

6.3 INITIAL LOADING

In most cases it is people from Norsk Data that load the system the very first time. They will copy SINTRAN III from diskettes to a disk, create different system files, users and do the relevant patches.

But the whole procedure will be explained in detail and with examples in this chapter.

Prerequisites for loading SINTRAN III from scratch:

- an ND computer with console, floppy and a disk
- three floppies containing SINTRAN III, MACM, a file called PATCHFILE and files called SYMBOL-1-LIST, SYMBOL-2-LIST, FILESYS-LIST and RTL-LIST
- diskettes with different subsystems
- necessary documentation
 - SOFTWARE SYSTEM REPORT sheets (containing patches, see appendix F)
 - SOFTWARE LIBRARY OBJECT DESCRIPTION (containing information about subsystems, see appendix G)
 - The SYSTEM SUPERVISOR manual

6.3.1 Formatting a Disk Pack

A new disk pack must be formatted (i.e., hardware addresses filled in) before it can be used. This is done by using a stand-alone program:

BIMS for a 33/66 Mb disk
 DISC-TEMA for 38/75/288/30/60/90 Mb disks
 DIMS for a cartridge disk (10 Mb)

These programs are explained in detail in the Test Program Descriptions manual. Note that all data (if any) on the disk is gone when the disk is formatted.

Example of formatting a 33 Mb disk pack: (a whole disk pack on unit 0)

Place the diskette with the program BIMS into floppy unit 0.

1560&

*LOAD BIMS

BIG DISK MAINTENANCE SYSTEM (BIMS)

HUT-1872C AUG. 4, 1976

IF YOU DON'T KNOW THE ANSWER TO QUESTIONS THAT BIMS MAY ASK,
TYPE X!

IS THIS A 33 MBYTE DISK OR A 66 MBYTE DISK (3 or 6)? 3

FUNCTION: FORMAT

BEFORE FORMATTING, THE INTERFACE FORMAT SWITCH MUST BE ON.
IF ON, TYPE ANY CHARACTER ON THE TELETYPE!

Q

DISK ADDRESS:(cr)

NO. OF TRACKS:(cr)

END FORMATTING

REMEMBER THE FORMAT SWITCH!

FUNCTION:

To stop BIMS press STOP and MASTER CLEAR, but before doing this use the
function PARITY-CHECK to check if the formatting is OK.

ND-100 does not have a format switch, while in NORD-10, the interface format
switch in question is located as follows:

<i>Disk:</i>	<i>Interface Card:</i>	<i>Position:</i>
CARTRIDGE DISK	1107 (new) 1038 (old)	30B the format key is located on the back of the disk unit
BIG CARTRIDGE DISK (30/60/90 Mb)		31B
BIG DISK (33/66 Mb)	1077	31B
38/76 or 288 Mb DISK	1077	27B

6.3.2 Preparation of a Disk to Receive SINTRAN III

6.3.2.1 How Much Disk Space Does User SYSTEM Need?

When loading a new SINTRAN-III system, the question of how to allocate disk space for the system will arise. This may be a problem, especially when loading on a small disk. Therefore, the examples in the following sections will deal with loading to a small disk. However, the methods for solving these problems are valid for all mass storage media. A SINTRAN III operating system requires the following system files of which those marked with (*), must be placed on the MAIN directory. These files must be taken into consideration when calculating how much to give user SYSTEM:

- * — SINTRAN:DATA (continuous/allocated file — 63 pages)
- * — MACM-AREA:DATA (continuous/allocated file — 64 pages)
- * — SEGFIL0:DATA (continuous/allocated file)
- (SEGFIL1:DATA) (continuous/allocated file)
- (SEGFIL2:DATA) (continuous/allocated file)
- (SEGFIL3:DATA) (continuous/allocated file)
- * — RTFIL:DATA (indexed file)
- * — MAILBOX:DATA (indexed file)

- * — Peripheral files (e.g., LINE-PRINTER)
- * — (Spooling files) (e.g., LINE-PRINTER SPOOLING FILES)
- * — Subsystems in :PROG format (e.g., ACCOUNTS)
- Subsystems in :BPUN format (e.g., FORTRAN)
- * — Subsystem libraries in :BRF format (e.g., FTNLIBR)
- * — Accounting file
- * — LOAD-MODE:SYMB (See Section 6.2.4)
- * — HENT-MODE:SYMB (See Section 6.2.3)
- * — DUMP-REENTRANT:SYMB (See Section 6.2.5)
- * — PATCHFILE:SYMB (See Section 7.6)

Segment files (SEGFIL(S)):

The space required for the segment files is dependent upon :

- The number of background programs (68 pages each)
- The number and size of the reentrant subsystems
- The number and size of remote job entry packs to be used.
- If SIBAS and/or TPS is to be run.
- The space required for user Real-Time programs.

Spooling files:

The space required is dependent upon:

- The use of the spooling system (default 500 pages)

In addition, space is required for other personal files.

6.3.2.2 Disk Space Needed by User Scratch

User scratch is the owner of the scratch files. Each background process, i.e., terminals, batch processors and ND-NET channels with background need a scratch file. The scratch files are indexed files. Some subsystems and the RT loader will use the scratch files.

You can refer to your scratch file by the log number 100 ^a. For example when you compile a FORTRAN program, the object code (BRF code) can be copied to your scratch file (`*COMPILE MYFILE, 1, 100`).

The number of background processes is printed out when SINTRAN III is started. It is a good idea to create more scratch files than are currently required, since later installation of new terminals, batch processors or ND-NET channels with background will be simplified.

The space required for the scratch files depends on:

- The number of background processes (minimum 32K each)
- The use made of the scratch files

Comment:

Choosing a size of 50 pages multiplied by the number of background processes, will, in most cases, give sufficient space for user scratch.

6.3.2.3 The Segment Files

The segment files are contiguous area on mass storage where all segments in the SINTRAN III systems reside. The swapping of pages will be performed between the area of a segment in a segment file and physical memory at run-time immediately before the code on the segments is to be executed.

Four segment files are possible and they should be named SEGFILE0:DATA, SEGFILE1:DATA, SEGFILE2:DATA and SEGFILE3:DATA. These files must be defined after they have been created using SINTRAN-SERVICE-PROGRAM command *DEFINE-SEGMENT-FILE.

SEGFILE0 must always reside on the main memory. The other segment files may be placed on any directories.

The space required by SINTRAN itself, including all background segments, is printed out after a Cold Start or initial start and must reside on the SEGFILE0:DATA. It may happen (on a small disk) that the size of SEGFILE0 can not be made big enough to support the needed space (due to the bit file). In this case a SEGFILE1 must be created where the background segments (except for terminal 1) may be placed. In addition reentrant subsystems, RJE programs, user RT-programs and SIBAS also need space on the segment files (See Appendix B).

Only SEGFILE0:DATA has to be allocated (from page 200B). SEGFILE1-3 may be created, but the last page of any of the segment files may not be greater than disk address (page address 177777B. The total space on the segment files is maximum 8192 pages.

6.3.2.4. Loading SINTRAN From Diskettes

The task is to copy SINTRAN III from two diskettes to mass storage, so that when SINTRAN III is to be loaded next time, the warm start procedure can be used.

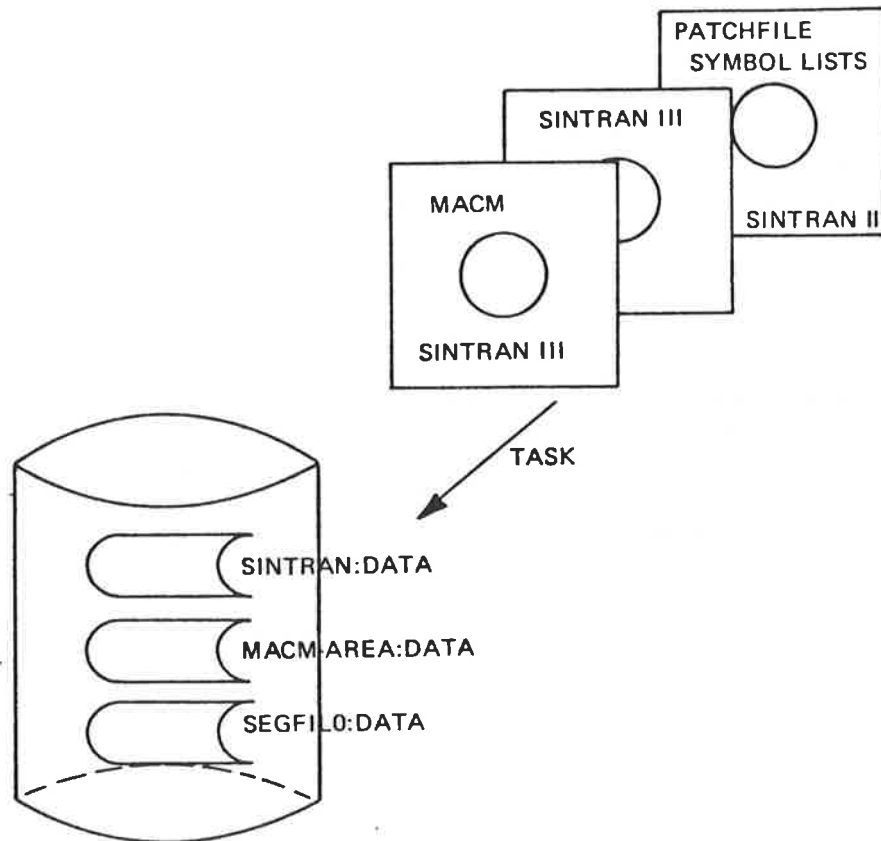


Figure 6.3: INITIAL LOADING

START
Switch on the computer i.e., press POWER & MASTER CLEAR
Start the disk with the formatted disk pack, disk unit 0
Turn on the console
Insert the diskette with the MACM and SINTRAN III in floppy unit 0
Type 1560& on the console MACM is loaded into memory and started
Type *LOAD MACM MACM will be loaded to memory and MACM is typed on the console. We will now use MACM to copy SINTRAN III from diskettes to mass storage.. Some additional information about MACM is printed out.
Type 10,0 \$, meaning input is to be taken from floppy and errors are to be typed on console
The following text will be printed:
#1560&

```
=====
== M A C M - 1 7 1 8 - K ==
=====
```

INITIALIZED FOR:

DISC-2-75MB (150MB)

WE REMIND YOU OF THE FOLLOWING MACM COMMANDS:

```
)REDEF  => REDEFINE DISC TYPE
)HENT   => GET SINTRAN FROM SAVE-AREA
22!     => START SINTRAN
10,0$   => LOAD SINTRAN FROM DISKETTE
```

YOU MAY NOW TYPE ANY MACM COMMAND.

```
=====
```

10,0\$

%% SINTRAN-III VERSION H LOAD: SINTRAN-DISKETTE-I
%% =====

10,0\$

%%

%% DUMPING OF FILE-SYSTEM PART-1 DONE.

10,0\$

%%

%% DUMPING OF FILE-SYSTEM PART-2 AND SPOOLING DONE.

10,0\$

%% INSERT SINTRAN-DISKETTE-II IN FLOPPY-DISK UNIT 0

%% AND TYPE: 10,0\$ TO CONTINUE LOADING

)9SBLO 4

**** 000000 DIAGNOSTICS ****

10,0\$

%% SINTRAN-III VERSION H LOAD: SINTRAN-DISKETTE-II
%% =====

10,0\$

%%

%% DUMPING OF RT-LOADER DONE.

10,0\$

%% DUMPING OF SINTRAN-SERVICE-PROGRAM, MAIL AND NORD-NET DONE.

10,0\$

%%

%% DUMPING OF "PAGING-OFF" AREA DONE.

10,0\$

%%

%% DUMPING OF SINTRAN DONE.

%%

%%)GJEM AND)9BYTT IS EXECUTED.

10,0\$

%% THE SINTRAN III SYSTEM MAY NOW BE STARTED BY TYPING 22!

%% LATER COLD STARTS MAY BE DONE BY

%% LOADING MACM FROM SINTRAN DISKETTE-I,

%% TYPE)HENT (CR) AND WAIT FOR LINE FEED.

%%

%% TO START SINTRAN, TYPE 22!.

%%

%% SINTRAN DISKETTE-III CONTAINS THE SYMBOL-LISTS

%% FOR YOUR SYSTEM AND A PROGRAM CALLED NEW-SYSTEM.

%% THIS PROGRAM SHOULD BE STARTED AS SOON AS

%% THE MAIN DIRECTORY HAS BEEN ENTERED.

%% THE PROGRAM WILL GUIDE YOU THROUGH SOME OF THE PROCEDURES

%% THAT HAS TO BE DONE AFTER LOADING A NEW SYSTEM.

%%

)LINE

**** 000000 DIAGNOSTICS ****

22!

OCTAL NO. OF PAGES THE SYSTEM WILL USE ON THE SEGMENT FILE(S): 11457

FIRST SYSTEM SEGMENT STARTS ON PAGE (OCT.): 605

NUMBER OF BACKGROUND PROCESSES (DEC.): 34

EACH BACKGROUND PROCESS NEEDS (OCT. PAGES): 205

00.07.36 9 DECEMBER 1982

SINTRAN III - VSE H REVISION: 0

CPU (SYSTEM NUMBER): 685

GENERATED: 13.54.00 7 DECEMBER 1982

SINTRAN III RUNNING -

PAGES FOR SWAPPING(OCT.): 670

ND-30.003.05

This information means:

- 11457 segment file area required for the system.
- 605 start of first system segment (i.e., system segment for terminal 1).
- 670 pages for swapping including system segments.
- 34 total number of background processes present in system.

This information must be used when planning the segment files. Space must be added for reentrant subsystems, SIBAS, user RT-programs and RJE systems. Note that a segment cannot be divided, and that the segment area required for background processes is constructed from 133 page modules.

Now the work starts, different files and users must be created and many special commands must be given. But first a directory (catalogue) must be created.

Press "ESC" and answer with CR (carriage return) to ENTER and PASSWORD when logging in.

NO MAIN DIRECTORY will be typed on the console.

Update the clock if necessary and create a directory on unit 0 of the device specified when loading.

This will take some time, the larger disk the more time it will require (up to an hour on a 288 Mbyte disk).

Enter the directory and create user SYSTEM.

LOG out and enter as user SYSTEM.

NO SUCH USER NAME will be typed out, since a scratch file is attempted to be opened.

Give user SYSTEM sufficient user space. (See Section 6.3.2.1)

Allocate the file SINTRAN:DATA

start-address: 1

number of pages: 77B

Allocate the file MACM-AREA:DATA

start-address: 100B

number of pages: 100B

Allocate the file SEGFIL0:DATA

start-address: 200B

number of pages:*

*(See Section 6.3.2.3)

If necessary, create the other segment files (max. 4, including SEGFIL0). Their sizes and locations are dependent upon the devices used.

If more than one directory must be used for the segment files, the other directories must be created and entered, and space must be given to user system on these directories. Segment files can then be created by specifying the directory and user names before the file name.

Create user "SCRATCH".

Give user "SCRATCH" user space.

Each background process requires a scratch file. Decide how large a scratch file is necessary for each such file and give the total number of pages to user SCRATCH. (See Section 6.3.2.2)

LOG out

LOG in as user SCRATCH

The message "NO SUCH FILE NAME" will be typed on the console, since the scratch files have not yet been created.

Set the default file access for user SCRATCH using the command:

@SET-DEFAULT-FILE-ACCESS RWA RWA RWAD

The scratch files will now get the necessary file accesses automatically at the time of their creation.

- Create the scratch files (SCRATCH01, SCRATCH02, etc.)

Each background process requires one scratch file.

N.B. Remember that all QED line editing characters may be used on SINTRAN commands!

Background processes are:

- Terminals with background.
- Asyncon-modems with background.
- ND-NET channels with background.
- Batch processors.
- N.B. The number of background processes is printed out when SINTRAN starts. However, a scratch file uses no space before it is actually used. Hence, it is a good idea to create more scratch files than are currently required, since later installation of new terminals, batch processors, channels etc. will then be simplified.
- LOG out.
- LOG in again as user SYSTEM

The message "OK" will now be printed, as the scratch file now exists. At this stage SINTRAN is running with only the console active. The background segment for this terminal only has been laid out on SEGFIL0. All other background programs are "dead". These must be initialized, but prior to this the segment file(s) must be defined.

Type: SINTRAN-SERVICE-PROGRAM

The service program will respond with a *

Define all the segment-files, including SEGFIL0.

*DEFINE-SEGMENT-FILE

MEMORY? YES

SAVE-AREA? YES

SEGMENT FILE NO: <number>

SEGMENT FILE NAME: <file name>

*

* * *

* * *

*EXIT

The background programs may now be initialized by the command:

INITIALIZE-BACKGROUND-PROGRAMS

If the segment file area can support the background-segments, all the background programs will now be running and the corresponding segments have been laid out on the segment-files.

If the segment file area is too small, the error message:

NOT ENOUGH SPACE ON THE SEGMENT FILE(S)

Will be printed on the console. Another segment file must be created or the length of the existing one increased. A new segment-file must be defined in the service-program before the INITIALIZE-BACKGROUND-PROGRAMS command is tried again.

Create user RT.

Create the file RTFIL:DATA as an indexed file using the command:

@CREATE-FILE,RTFIL,0

File access for this file should be:

public:	read
friend:	read, write, append
own:	read, write, append, common, directory.

Create user RT as friend of user SYSTEM (default access r,w,a)

Set terminal file: `TERMINAL`

File access for this file should be:

public:	read, write
friend:	read, write
own:	read, write, directory

Set peripheral-files for all the peripheral devices. The correct logical numbers for all the devices may be found in Appendix L and Section 6.3.2.5 for file access.

If the spooling system is to be used, the actual peripheral must be created with spooling files.

`@SET-PERIPHERAL-FILE <peripheral file>, <device number>`

`@CREATE-NEW-VERSION L-P;;10,0`

and file access specified (Also see Section 6.3.2.5).

Create the file `MAILBOX:DATA` as an indexed file.

File access for this file should be:

public:	none
friend:	none
own:	read, write, append, directory

Type command: `MAIL`

The MAIL system will respond with:

NOT INITIALIZED

*

— Give command: `INITIALIZE <mailbox size>`

Mailbox size: the maximum number of messages which the system will be able to handle. each message requires 250 words on the file.

— EXIT

Give user SYSTEM a secret password

Create user FLOPPY-USER (diskettes with subsystems and test programs from Norsk Data belong to this user).

Copy all subsystems from diskette(s) or tapes to mass storage files of type :BPUN or of type :BRF if libraries. Remember to enter and release the directory(s). The easiest way is to use @COPY-USERS-FILES, but then remember to rename the user of the diskette(s) to SYSTEM.

Load QED to write the files HENT-MODE, LOAD-MODE and DUMP-REENTRANT (See Sections 6.2.3, 6.2.4, and 6.2.5) and set file access to these, so that only SYSTEM can read the files.

Create the temporary file SYS-OUT-1 which will be used for output from the file LOAD-MODE and the temporary file SYS-OUT-2 used for output from the file SIBAS-LOAD:BATC (if SIBAS is used).

Create new users and give them appropriate space.

Run the mode file PATCHFILE (from diskette). (See Chapter 7).

log out.

Do a Cold Start (see Section 6.2).

Run the mode file HENT-MODE.

log out.

Well that's it.

6.3.2.5 File Accesses For Peripheral Files

Input devices (T-R, C-R, etc.)

File access should be:

public:	read
friend:	read
own:	read,directory

Output devices (F-P,L-Petc.)

File access should be:

public:	write, append
friend:	write, append
own:	write, append, directory

Input/Output devices (M-T, ND-NET channels etc.)

File access should be:

public:	read, write, append
friend	read, write, append
own:	read, write, append, directory

Peripherals with spooling

File access should be:

public:	write, append
friend:	read, write, append
own:	read, write, append, directory

6.3.2.6 Loading of Subsystems

Subsystems are now delivered on diskettes in :BPUN format (binary punch) except the libraries which are in :BRF format (binary relocatable format). Software library object description sheets follow these diskettes (See appendix G).

All subsystems should be copied directly to mass storage files using the BACK-UP-SYSTEM's command, COPY-USERS-FILES for back up. (The libraries to main directory, the other to optional directories.)

The subsystems may be dumped onto files (standard subsystem) using the @PLACE-BINARY and @DUMP commands, or onto segments (reentrant subsystem) using the @DUMP-REENTRANT command (See Section 3.10).

Examples:

```
@PLACE FTN-2090B
@DUMP "FTN-2090B" 0 1
OR
@DUMP-REENTRANT FTN-2090B 0 1 FTN-2090B
```

In timesharing the situation often occurs that many users want to apply the same subsystem simultaneously. If this happens frequently the subsystem should be generated as a reentrant subsystem thus allowing many users to share it.

The file DUMP-REENTRANT (See Section 6.2.5) contains all the reentrant subsystem. The commands on this file are executed after a cold start.

6.3.2.7 Example of Initial Loading

The following output is an example of initial loading of SINTRAN III.

```
#1560&
*LO DISC
DISC TEST AND MAINTENANCE SYSTEM (DISC-TEMA)

203134.D

ISSUED : 1. DECEMBER 1982

DISC NAME: DISC-75MB-1

DATA WAY TO DISC SYSTEM 1 TESTED

MEMORY ADDRESS REGISTER ON DISC SYSTEM 1 TESTED

MEMORY BUFFERS INITIALIZED
THE COMMAND HELP GIVES YOU A LIST OF THE COMMANDS

>FOR
FORMAT
DISC-75MB-1
DO YOU WANT RELOCATING OF BAD TRACKS (YES/NO): Y
UNIT (0-3 OCT.): 0
U/000010
NO. OF RE-ALLOCATED TRACKS (DEC.) 0
NO TRACK IN THE SPARE TRACK POOL ARE USED.
THEREFOR THE WHOLE POOL WILL BE FORMATED WITH STANDARD FORMAT.

>#
#
#
#1560&
```

```
=====
== M A C M - 1 7 1 8 - K ==
=====
```

INITIALIZED FOR:

DISC-75MB AND DISC-38MB

WE REMIND YOU OF THE FOLLOWING MACM COMMANDS:

```
)REDEF    => REDEFINE DISC TYPE
)HENT     => GET SINTRAN FROM SAVE-AREA
22!       => START SINTRAN
10,0$     => LOAD SINTRAN FROM DISKETTE
```

YOU MAY NOW TYPE ANY MACM COMMAND.

```
=====
```

10,0\$

```

%% SINTRAN-III VERSION H LOAD: SINTRAN-DISKETTE-I
%% =====

```

```

10,0$
%%
%% DUMPING OF FILE-SYSTEM PART-1 DONE.
10,0$
%%
%% DUMPING OF FILE-SYSTEM PART-2 AND SPOOLING DONE.
10,0$

```

```

%% INSERT SINTRAN-DISKETTE-II IN FLOPPY-DISK UNIT 0
%% AND TYPE: 10,0$ TO CONTINUE LOADING
)9SBLO 4

```

```

**** 000000 DIAGNOSTICS ****

```

```

10,0$
%% SINTRAN-III VERSION H LOAD: SINTRAN-DISKETTE-II
%% =====

```

```

10,0$
%%
%% DUMPING OF RT-LOADER DONE.

```

```

10,0$
%% DUMPING OF SINTRAN-SERVICE-PROGRAM, MAIL AND NORD-NET DONE.
10,0$
%%
%% DUMPING OF "PAGING-OFF" AREA DONE.
10,0$
%%
%% DUMPING OF SINTRAN DONE.
%%
%% )GJEM AND )9BYTT IS EXECUTED.
10,0$

```

```

%% THE SINTRAN III SYSTEM MAY NOW BE STARTED BY TYPING 22!

```

```

%% LATER COLD STARTS MAY BE DONE BY
%% LOADING MACM FROM SINTRAN DISKETTE-I,
%% TYPE )HENT (CR) AND WAIT FOR LINE FEED.
%%

```

```

%% TO START SINTRAN, TYPE 22!.
%%

```

```

%% SINTRAN DISKETTE-III CONTAINS THE SYMBOL-LISTS
%% FOR YOUR SYSTEM AND A PROGRAM CALLED NEW-SYSTEM.
%% THIS PROGRAM SHOULD BE STARTED AS SOON AS
%% THE MAIN DIRECTORY HAS BEEN ENTERED.
%% THE PROGRAM WILL GUIDE YOU THROUGH SOME OF THE PROCEDURES
%% THAT HAS TO BE DONE AFTER LOADING A NEW SYSTEM.
%%

```

```

)LINE

```

```

**** 000000 DIAGNOSTICS ****

```

```

22!
OCTAL NO. OF PAGES THE SYSTEM WILL USE ON THE SEGMENT FILE(S): 11425
FIRST SYSTEM SEGMENT STARTS ON PAGE (OCT.): 553
NUMBER OF BACKGROUND PROCESSES (DEC.) : 34
EACH BACKGROUND PROCESS NEEDS (OCT. PAGES): 205

```

12.55.31 6 DECEMBER 1982
 SINTRAN III - VSE H REVISION: 0
 CPU (SYSTEM NUMBER): 1299
 GENERATED: 15.00.00 1 DECEMBER 1982
 SINTRAN III RUNNING -

PAGES FOR SWAPPING(OCT.): 302

12.56.11 6 DECEMBER 1982
 SINTRAN III - VSE H
 ENTER
 PASSWORD:

NO MAIN DIRECTORY

OK

@CRE-DI PACK-ONE D 0,,
 @CRE-US SYS

ILLEGAL PARAMETER
 @E-D,,D 0
 @CRE-US SYSTEM
 @LOG

12.57.04 6 DECEMBER 1982
 --EXIT--

```

12.57.04      6 DECEMBER  1982
SINTRAN III - VSE H
ENTER
12.57.07      6 DECEMBER  1982
SINTRAN III - VSE H
ENTER SYS
PASSWORD:

NO SUCH USER NAME IN MAIN DIRECTORY

OK
@GI-US 15
@GI-US SYS 15000
@ALL-FI SINTRAN Y
@ALL-FI SINTRAN 1 77B
@ALL-FI MACM-AREA 100B 100B
@ALL-FI SEGFILO 200B 15000B
@LI-US,,,
USER 0 : PACK-ONE:SYSTEM
@CRE-US RT
@CRE-FRI RT
@CRE-US SCRATCH
@GIV-US SCRATCH
NUMBER OF PAGES: 1000
@CRE-US FLOPPY-USER
@LI-US,,,
USER 0 : PACK-ONE:SYSTEM
USER 1 : PACK-ONE:RT
USER 2 : PACK-ONE:SCRATCH
USER 3 : PACK-ONE:FLOPPY-USER
@CRE-US BPUN-FILES
@GIV-US BP 1000
@LI-FI,,,
FILE 0 : (PACK-ONE:SYSTEM)SINTRAN:DATA:1
FILE 1 : (PACK-ONE:SYSTEM)MACM-AREA:DATA:1
FILE 2 : (PACK-ONE:SYSTEM)SEGFILO:DATA:1
@CRE-FI RTFIL 0
@CRE-FI MAILBOX 0
@CRE-FI ACCOUNTS 0
@S-FI-ACC MAIL:D N N
OWN ACCESS (R,W,A,C,D IN COMBINATIONS OR N):
@MAIL
NOT INITIALIZED
*INI
MAX. NO. OF MESSAGES ( 512 WORDS EACH ): 10

*EX

@LOG
13.00.50      6 DECEMBER  1982
--EXIT--

```

13.00.51 6 DECEMBER 1982
 SINTRAN III - VSE H
 ENTER SCR
 PASSWORD:

NO SUCH FILE NAME

OK

@S-D-F-ACC RWA RWA RWACD

@CRE-FI SCRATCH01 0

@CRE-FI SCRATCH02 0

@CRE-FI SCRATCH03 0

@CRE-FI SCRATCH04 0

@CRE-FI SCRATCH05 0

@CRE-FI SCRATCH06 0

@CRE-FI SCRATCH07 0

@CRE-FI SCRATCH08 0

@CRE-FI SCRATCH09 0

@CRE-FI SCRATCH10 0

@CRE-FI SCRATCH11%-

CRE-FI SCRATCH11 0

@CRE-FI SCRATCH12 0

@CRE-FI SCRATCH13 0

@CRE-FI SCRATCH14 0

@CRE-FI SCRATCH15 0

@CRE-FI SCRATCH16 0

@CRE-FI SCRATCH17 0

@CRE-FI SCRATCH18 0

@CRE-FI SCRATCH19 0

@CRE-FI SCRATCH20 0

@CRE-FI SCRATCH21 0

@CRE-FI SCRATCH22 0

@CRE-FI SCRATCH23 0

@CRE-FI SCRATCH24 0

@CRE-FI SCRATCH25 0

@CRE-FI SCRATCH26 0

@CRE-FI SCRATCH27 0

@CRE-FI SCRATCH28 0

@CRE-FI SCRATCH29 0

@CRE-FI SCRATCH30 0

@CRE-FI SCRATCH31 0

@CRE-FI SCRATCH32 0

@CRE-FI SCRATCH33 0

@CRE-FI SCRATCH34 0

@CRE-FI SCRATCH35 0

@CRE-FI SCRATCH36 0

@CRE-FI SCRATCH37 0

@CRE-FI SCRATCH38 0

@CRE-FI SCRATCH39 0

@CRE-FI SCRATCH40 0

@LOG

13.02.56 6 DECEMBER 1982
 --EXIT--

13.02.57 6 DECEMBER 1982
 SINTRAN III - VSE H
 ENTER SYS
 PASSWORD:

OK
 @SIN

*DEF-SEG Y Y 0 SEGFILO

*EX

@RT-L

REAL-TIME LOADER, SINTRAN III - H

DEFINING NAME OF ALL "SYSTEM-INCLUDED" RT-PROGRAMS? Y
 *EX

@E-D,,F 0
 @LI-DI,,,

DIR INDEX 0 : DISC-75MB-1 UNIT 0 : PACK-ONE
 DIR INDEX 2 : FLOPPY-DISC-1 UNIT 0 : N-100-1299-III
 @(N:)NRW
 "(N:)NRW"
 NO SUCH FILE NAME
 @(N:)NEW

* SINTRAN INITIATOR V. 1.0 *

====>> TIME ACCORDING TO SINTRAN:

====>> 13.03.54 6 DECEMBER 1982

##>> DO YOU WANT TO UPDATE THE CLOCK (DEF. 'NO') : ?
 THIS IS A ND-100 WITH 48 BIT FLOATING
 AND COMERSIAL EXTENDED INSTRUCTION SET

COPY FILES FROM SINTRAN-FLOPPY-III TO SYSTEM

SYMBOL-1-LIST:SYMB
 SYMBOL-2-LIST:SYMB
 FILSYS-SYMBOLS:SYMB
 LIBRARY-MARKS:SYMB
 F48-FMAC:PROG
 DMAC-1915E:BPUN

@RELEASE-DIRECTORY N---III

====>> TAKE AWAY THE FLOPPY IN THE FLOPPY-DISK-1 UNIT 0 SLOT AND
 ====>> REPLACE IT BY THE 4'TH SYSTEM FLOPPY (THE PATCH FLOPPY).

####>> OK: ?Y

@ENTER-DIRECTORY PATCH-SINTRAN FLOPPY-DISC-1 0 ,,,
 @CREATE-FILE (PATCH-SINTRAN:SYSTEM)PATCH-FILE:OUT,0

FILE ALREADY EXISTS

@MODE (PATCH-SINTRAN:SYS)PATCH-FILE:MODE,(PATCH-SINTRAN:SYS)PATCH-FILE:OU

THIS COULD TAKE SOME TIME,
MESSAGES WILL APPEAR ON THE ERROR DEVICE.....

***13.07.02 TERMINAL 1:
***SYMBOL LISTS CHECKED. OK!

***13.07.31 TERMINAL 1:
***START PATCHING OF SINTRAN

***13.08.46 TERMINAL 1:
***PATCHING SUCCESSFULLY COMPLETED

***13.08.46 TERMINAL 1:
***DO A COLD START TO RESTART YOUR SYSTEM

@GET-ALT-SYS
"SINTRAN" FILE: SIN
"MACM-AREA" FILE: MACM
IS "ALTERNATIVE RT-LOADER" IN SEGMENT-FILE NO. 0? Y

THE NEXT QUESTIONS MUST ALWAYS BE ANSWERED
IS ALT. "SPOOLING/NORD-NET/SERVICE/MAIL-PROGRAM" IN SEGMENT-FILE NO. 0? Y

OCTAL NO. OF PAGES THE SYSTEM WILL USE ON THE SEGMENT FILE(S): 11425
FIRST SYSTEM SEGMENT STARTS ON PAGE (OCT.): 553
NUMBER OF BACKGROUND PROCESSES (DEC.) : 34
EACH BACKGROUND PROCESS NEEDS (OCT. PAGES): 205

13.09.20 6 DECEMBER 1982
SINTRAN III - VSE H REVISION: 5
CPU (SYSTEM NUMBER): 1299
GENERATED: 15.00.00 1 DECEMBER 1982

SINTRAN III RUNNING -

PAGES FOR SWAPPING(OCT.): 302

13.09.26 6 DECEMBER 1982
SINTRAN III - VSE H
ENTER E-D,,D 0
PASSWORD:

NO MAIN DIRECTORY

OK
@E-D,,D 0
@LOG
13.09.38 6 DECEMBER 1982
--EXIT--

13.09.39 6 DECEMBER 1982
 SINTRAN III - VSE H
 ENTER SYS
 PASSWORD:

OK
 @RTE

@IN-BA

@RT-L

REAL-TIME LOADER, SINTRAN III - H

DEFINING NAME OF ALL "SYSTEM-INCLUDED" RT-PROGRAMS? Y
 *EX

@SET-AV

@

***13.48.15 TERMINAL 38:
 IF REQUIRED, PLEASE UPDATE THE CLOCK !!!!!

***13.48.15 TERMINAL 38:
 ***** S Y S T E M I S A V A I A B L E *****

***13.49.34 TERMINAL 38:
 ***** THE REENTRANT SUBSYSTEMS ARE DUMPED *****

***13.50.41 TERMINAL 670:
 ***** THE REENTRANT SUBSYSTEMS ARE DUMPED *****

***13.50.45 TERMINAL 670:
 IF REQUIRED, PLEASE UPDATE THE CLOCK !!!!!

***13.50.45 TERMINAL 670:
 ***** S Y S T E M I S A V A I A B L E *****

#

BATCH NUMBER = 1
 15.31.48 6 DECEMBER 1982

The examples of the system files in sections 6.2.3, 6.2.4, and 6.2.5 are not an output of the files belonging to this installation.

6.3.2.8 Loading a New SINTRAN III Version

If one for example wants to buy some additional terminals, a new line printer with spooling or/and a new disk unit, a new SINTRAN III has to be ordered (new version of SINTRAN III). The System Supervisor would then have to load the new version of SINTRAN III on an existing directory.

The problem that the existing segment file area is too small may occur. This is no great problem, as long as continuous space is available on some mass-storage unit. It does not necessarily have to be on the same unit as SINTRAN. This problem may be left until SINTRAN has been started up.

If new devices are included, the necessary peripheral files must be created. If new background programs are added, corresponding scratch files must be created, etc..

It may also happen that LOAD-MODE and HENT-MODE must be adjusted. Certain commands must also be executed.

The following procedure must be followed:

Do the same procedure as explained in Section 6.3.2.4 up to 22! to load the new SINTRAN III.

The following will be printed on the console:

```
OCTAL NO. OF PAGES THE SYSTEM WILL USE ON THE SEGMENT FILE(S): (xx)
FIRST SYSTEM SEGMENT STARTS ON PAGE (OCT): (yy)
NUMBER OF BACKGROUND PROCESSES (DEC.) : (bp)
EACH BACKGROUND PROCESS NEEDS (OCT. PAGES): 104
```

SINTRAN III RUNNING

```
PAGES FOR SWAPPING (OCT.): (zz)
```

```
xx:  segment file area required for the system.
yy:  start of first system segment.
zz:  pages for swapping including system segments.
bp:  total number of background processes present in system.
```

This information will indicate whether or not the existing segment file area is large enough. Space must be added for reentrant subsystems, SIBAS, RT programs and RJE systems. Note also that a background segment cannot be divided, and that the segment-area required for the system is constructed from 68 page modules.

If the segment file area is too small, it must be increased after SINTRAN has started.

Press ESCAPE

After "ENTER" give (cr.), after "PASSWORD" give (cr.)

The message "NO USER ENTERED" will be typed.

Update the clock, if not automatic

Enter the main directory

LOG out

Enter as user "SYSTEM"

*If any new peripheral devices have been added to the system, these must be created as peripheral files (see Section 6.3.2.5). If any new background programs have been added, LOG in as user SCRATCH and create corresponding scratch files.

SINTRAN is now running with only the console active. The background segment of this terminal only has been laid out on SEGFIL0, in addition to the system. All other background programs are "dead". These must be initialized, but before this,

ALL segment files must be defined.

type: SINTRAN-SERVICE-PROGRAM

The service program will respond with a *

Define all the segment-files including SEGFIL0.

*DEFINE-SEGMENT-FILE

MEMORY? YES

SAVE-AREA? YES

SEGMENT FILE NO: <number>

SEGMENT FILE NAME: <file name>

*

..

..

..

*EXIT

The background programs may now be initialized with the command
INITIALIZE-BACKGROUND-PROGRAMS.

If the segment file area can support the background-segments, all the background programs will be initialized and the corresponding segments laid out on the segment files. If the segment file area is too small, the error message :NOT ENOUGH SPACE ON THE SEGMENT FILE(S) will be printed on the console. Another segment file must be created or the length of the existing one increased.

A new segment-file must be defined in the service-program before the INITIALIZE-BACKGROUND-PROGRAMS command is tried again.

load QED and correct/adjust the files HENT-MODE, LOAD-MODE and DUMP-REENTRANT if necessary.

run PATCHFILE (found on the second diskette with SINTRAN III)
and log out.

Do a Cold Start (See Section 6.2).

Run HENT-MODE & log out.

6.3.2.9 Loading a New Release of SINTRAN III/VS

Say you have ordered the SINTRAN III, VERSION F after having worked with the E Version, then two new diskettes with SINTRAN III arrives. The problems may arise that the existing segment file area is too small. A new SEGFIL must be created or an old expanded. This problem must be left until SINTRAN III has been started up.

The same procedure as explained in Section 6.3.2.8 is to be followed, except the box marked with a *.

6.3.2.10 Example of Loading a New Release of SINTRAN III/VS

#1560&

```
=====
== M A C M - 1 7 1 8 - K ==
=====
```

INITIALIZED FOR:

DISC-2-75MB (150MB)

WE REMIND YOU OF THE FOLLOWING MACM COMMANDS:

```
)REDEF  => REDEFINE DISC TYPE
)HENT   => GET SINTRAN FROM SAVE-AREA
22!     => START SINTRAN
10,0$   => LOAD SINTRAN FROM DISKETTE
```

YOU MAY NOW TYPE ANY MACM COMMAND.

10,0\$

```
%% SINTRAN-III VERSION H LOAD: SINTRAN-DISKETTE-I
%% =====
```

```
10,0$
%%
%% DUMPING OF FILE-SYSTEM PART-1 DONE.
10,0$
%%
%% DUMPING OF FILE-SYSTEM PART-2 AND SPOOLING DONE.
10,0$
```

```
%% INSERT SINTRAN-DISKETTE-II IN FLOPPY-DISK UNIT 0
%% AND TYPE: 10,0$ TO CONTINUE LOADING
)9SBLO 4
**** 000000 DIAGNOSTICS ****
```

```
10,0$
%% SINTRAN-III VERSION H LOAD: SINTRAN-DISKETTE-II
%% =====
```

```
10,0$
%%
%% DUMPING OF RT-LOADER DONE.
```

```
10,0$
%% DUMPING OF SINTRAN-SERVICE-PROGRAM, MAIL AND NORD-NET DONE.
10,0$
%%
%% DUMPING OF "PAGING-OFF" AREA DONE.
10,0$
%%
%% DUMPING OF SINTRAN DONE.
%%
%% )GJEM AND )9BYTT IS EXECUTED.
10,0$
```

```

%% THE SINTRAN III SYSTEM MAY NOW BE STARTED BY TYPING 22!

%% LATER COLD STARTS MAY BE DONE BY
%% LOADING MACM FROM SINTRAN DISKETTE-I,
%% TYPE )HENT (CR) AND WAIT FOR LINE FEED.
%%
%% TO START SINTRAN, TYPE 22!.
%%
%% SINTRAN DISKETTE-III CONTAINS THE SYMBOL-LISTS
%% FOR YOUR SYSTEM AND A PROGRAM CALLED NEW-SYSTEM.
%% THIS PROGRAM SHOULD BE STARTED AS SOON AS
%% THE MAIN DIRECTORY HAS BEEN ENTERED.
%% THE PROGRAM WILL GUIDE YOU THROUGH SOME OF THE PROCEDURES
%% THAT HAS TO BE DONE AFTER LOADING A NEW SYSTEM.
%%
)LINE
**** 000000 DIAGNOSTICS ****

```

```

22!
OCTAL NO. OF PAGES THE SYSTEM WILL USE ON THE SEGMENT FILE(S): 11457
FIRST SYSTEM SEGMENT STARTS ON PAGE (OCT.): 605
NUMBER OF BACKGROUND PROCESSES (DEC.) : 34
EACH BACKGROUND PROCESS NEEDS (OCT. PAGES): 205

```

```

00.07.36      9 DECEMBER 1982
SINTRAN III - VSE H REVISION: 0
CPU (SYSTEM NUMBER): 685
GENERATED: 13.54.00      7 DECEMBER 1982
SINTRAN III RUNNING -

```

```

PAGES FOR SWAPPING(OCT.): 670

```

```

00.08.17      9 DECEMBER 1982
SINTRAN III - VSE H
ENTER)
PASSWORD:)

```

```

NO MAIN DIRECTORY

```

```

OK
@ENT-DIR,,D-2-7-1,0)
@LOG)
00.09.30      9 DECEMBER 1982
--EXIT--

```

00.09.37 9 DECEMBER 1982
 SINTRAN III - VSE H
 ENTER SYS
 PASSWORD:

OK
 @ENT-DIR,,F-D-1
 @SIN-SER
 *DEF-SEG-FIL
 MEMORY? Y
 SAVE-AREA? Y
 SEGMENT FILE NO: 0
 SEGMENT FILE NAME: SEGFILO:DATA
 *EXIT
 @ (N---:)NEW-SYS

* SINTRAN INITIATOR V. 1.0 *

====>> TIME ACCORDING TO SINTRAN:

====>> 00.13.07 9 DECEMBER 1982

##>> DO YOU WANT TO UPDATE THE CLOCK (DEF. 'NO'): ?N
 THIS IS A ND-100 WITH 48 BIT FLOATING
 AND COMERSIAL EXTENDED INSTRUCTION SET

COPY FILES FROM SINTRAN-FLOPPY-III TO SYSTEM
 SYMBOL-1-LIST:SYMB
 SYMBOL-2-LIST:SYMB
 FILSYS-SYMBOLS:SYMB
 LIBRARY-MARKS:SYMB
 F48-FMAC:PROG
 DMAC-1915E:BPUN
 @RELEASE-DIRECTORY N---III

====>> TAKE AWAY THE FLOPPY IN THE FLOPPY-DISK-1 UNIT 0 SLOT AND
 ====>> REPLACE IT BY THE 4TH SYSTEM FLOPPY (THE PATCH FLOPPY).

####>> OK: ?Y

@ENTER-DIRECTORY PATCH-SINTRAN FLOPPY-DISC-1 0 ,,,
 @CREATE-FILE (PATCH-SINTRAN:SYSTEM)PATCH-FILE:OUT,0

FILE ALREADY EXISTS
 @MODE (PATCH-SINTRAN:SYS)PATCH-FILE:MODE,(PATCH-SINTRAN:SYS)PATCH-FILE:OUT

THIS COULD TAKE SOME TIME,
 MESSAGES WILL APPEAR ON THE ERROR DEVICE.....

***00.15.00 TERMINAL 1:
 ***SYMBOL LISTS CHECKED. OK!

***00.15.31 TERMINAL 1:
 ***START PATCHING OF SINTRAN

***00.16.52 TERMINAL 1:
 ***PATCHING SUCCESSFULLY COMPLETED

***00.16.53 TERMINAL 1:
 ***DO A COLD START TO RESTART YOUR SYSTEM

@

ND-30.003.05

PATCHING SINTRAN III/VS

SINTRAN III should be patched (errors corrected) the very first time using a mode file called PATCHFILE. PATCHFILE is delivered to customers on a diskette delivered with SINTRAN III. The symbol list (i.e., the list of all symbols used, and their addresses in SINTRAN III) is also on the same diskette. Customers get this symbol list when they order SINTRAN III. Two additional, separate SINTRAN III listings are available. They are ordered separately.

PATCHFILE contains all known «error» patches. Mode file PATCHFILE must be entered from the diskette before it can be run. Before entering PATCHFILE, make certain that the subsystem's FMAC:PROG and DMAC:BPUN exist. List the file on a printer. Check if 7ENDC (see Section 7.4) is less than an address specified in the file. (There is a listing of the parts of this file in Section 7.6.) The execution of PATCHFILE is done from a cold start.

«Modification» patches (e.g., setting the speed of the terminals) are not included in PATCHFILE. Modifications to SINTRAN using «modification» patches must be done separately - preferably using another mode file (e.g., MODIF-PATCHES).

A System Supervisor should carefully study the ND-Bulletin. Each month, the monthly bulletin should be checked for changes and modifications that apply to the Systems Supervisor's installation version of SINTRAN III. In addition to Software System Report (SSR) information, the «Error Information List» (EIL) is of special interest to the System Supervisor. The installation version of SINTRAN III should be promptly modified, and the PATCHFILE and MODIF-PATCHES updated, with the new patches listed in the SSR and the EIL. By listing PATCHFILE and MODIF-PATCHES, the System Supervisor can, at any time, see which patches have been added to his system. The procedure to follow in running a new PATCHFILE is explained in Section 6.3.2.8.

Different patching methods will be explained in this chapter. The key terms that are used in these explanations are defined as follows.

PATCH

A program modification made by changing the octal code rather than by changing the source code.

RESIDENT

Resident refers to that part of SINTRAN which is always in memory (i.e., that part which is not swapped in and out of memory).

PAGING-OFF AREA

That part of SINTRAN which is always in memory. This part is only accessed with the memory management system turned OFF (i.e., with paging OFF). The area known as RESIDENT consists of pages on page table 0. The PAGING-OFF AREA pages, however, are not in any page table (i.e., they are not permanent content in the page table entries).

IMAGE

Refers to the copy, on SIGFIL0, of the RESIDENT part of SINTRAN. This copy is fetched to memory each time MASTER CLEAR/LOAD (as in a warm start) is performed.

Note. The PAGING-OFF AREA is copied from the SAVE AREA (MACM-AREA:DATA) in a warm start.

SEGMENTS

These are the swapped parts of SINTRAN. For example, segment 3 is the command segment, segment 4 is the RT loader segment, segment M is the error log segment, segment 6 is the file system segment, segment 7 is the DMAC segment, segment 10 is the RTFIL segment, and segment 14 is the error program segment.

SAVE AREA

The SAVE AREA is the general name given to those areas of the disk which contain code and data for SINTRAN, and from which the current IMAGE and SEGMENTS are created. The code here is never executed directly. HENT copies the code and data from the SAVE AREA to the IMAGE and SEGMENTS. The file SINTRAN:DATA is the SAVE AREA for RESIDENT, and for the system segments and the command segment. MACM-AREA:DATA is the SAVE AREA for the paging-off area, and for the File System and error program segment. (The paging-off area has no «image». Each time MASTER CLEAR/LOAD is performed, the paging-off area is copied from MACM-AREA to memory.) The SAVE AREA for the parts of SINTRAN that are not on SINTRAN:DATA or MACM-AREA:DATA are on segments. The SAVE AREA for the RT loader is segment 13 (i.e., the RT loader on segment 4 is initially a copy of segment 13). The SAVE AREA for the Spooling RT program is segment 24 (i.e., the Spooling RT program on segment 25 is initially a copy of segment 24).

From the above definition of SAVE AREA, it should be noted that any modification made to the SAVE AREAS SINTRAN:DATA and MACM-AREA:DATA will remain until SINTRAN is reloaded from diskettes. Modifications to the IMAGE area of the SEGMENTS will remain until a new cold start is performed. Any modification made to RESIDENT or the PAGING-OFF AREA lasts until a warm start is performed.

The addressing of the areas indicated above are straight forward procedures, except for patching of the PAGING-OFF area on MACM-AREA:DATA. The area on MACM-AREA:DATA used for this code starts at 0. The convert from the physical address (i.e., from a listing to a file address) it is necessary to subtract 100000B.

The SINTRAN operating system can be modified (patched) in the following ways by using:

- the command LOOK-AT (see Section 3.3.14)
- the subsystem FMAC
- the command DMAC
- the subcommands of the SINTRAN-SERVICE-SYSTEM

SINTRAN can also be modified off-line during a cold start procedure.

Note concerning addresses:

Addressing of the different areas mentioned above is straight forward except for the patching of the PAGING-OFF area on MACM-AREA:DATA. The code begins physically at an installation dependent address in excess of 100000B. Hence, to convert from a physical address (e.g., from a listing to a file address), one must subtract 100 000 B from the actual address (as seen in the ??? symbol list).

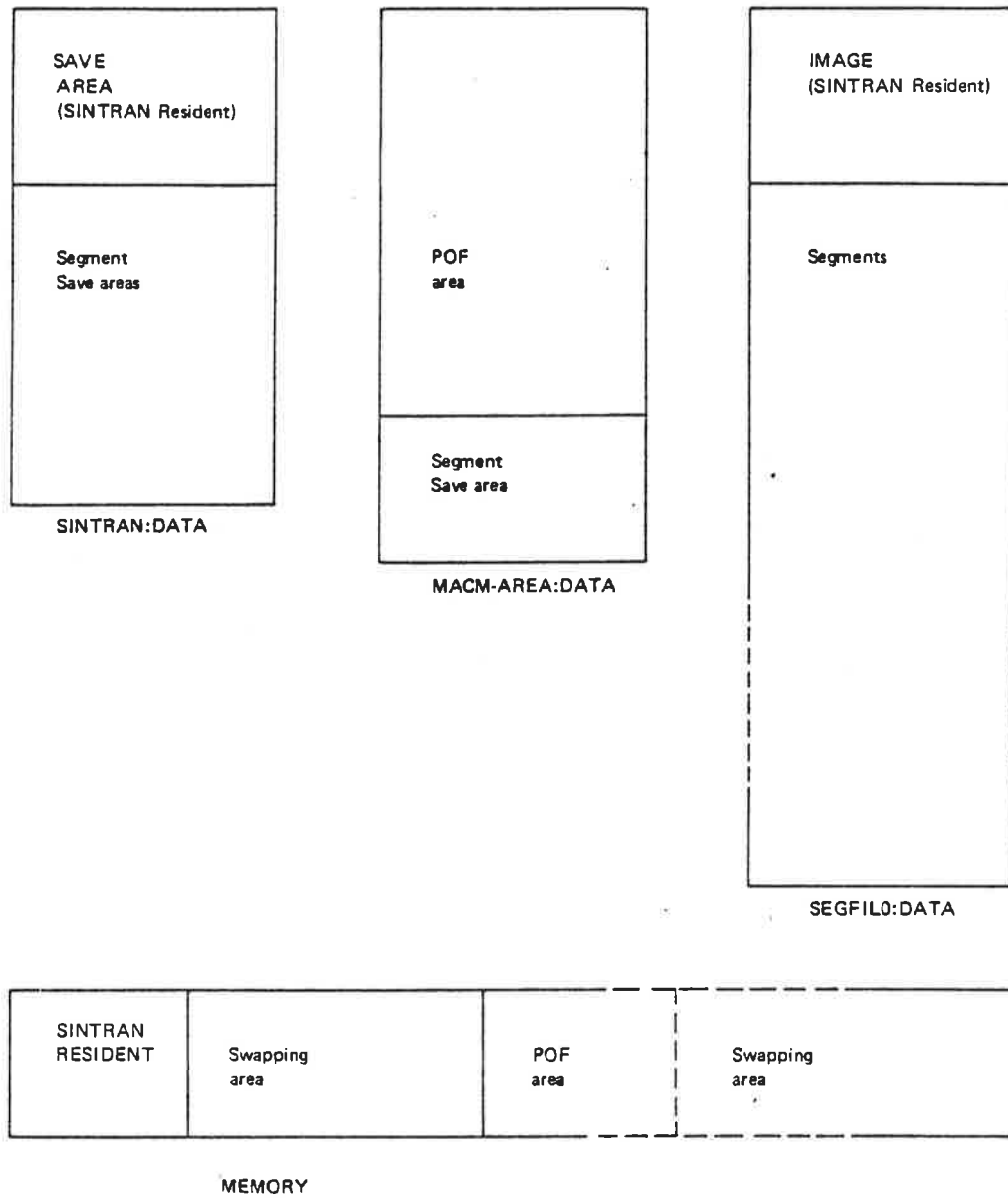


Figure 7.1: DIFFERENT SYSTEM FILES AND MEMORY LAYOUT

7.1 PATCHING USING FMAC

FMAC is a subsystem delivered to all customers on a diskette and it is the System Supervisor's responsibility to load and save it. FMAC can access programs of up to 64K, so both SINTRAN:DATA and MACM-AREA:DATA can be reached.

Also, the first 64K of SEGFIL0 can be patched using FMAC (FMAC can be used to change 64K of *any* file) but this will have the same effect as using the commands

@LOOK-AT IMAGE and @LOOK-AT SEGMENT. The advantage of using FMAC is that the changes can be made with symbolic coding instead of octal machine code.

A patch implemented on MACM-AREA:DATA or SINTRAN:DATA is permanent but will not become effective before the system is restarted using the)HENT command. Care must be taken when patching the IMAGE area with either @LOOK-AT IMAGE or @FMAC. There is no protection against simultaneously updating by the RT loader or file system and the resulting loss of one of the two updates. Use the @SET-UNAVAILABLE command.

Examples:

@FMAC

— MACF —

IMAGE—FILE: SINTRAN:DATA

< address > / < old value > < new value > (CR)

)9EXIT

@

(Input from the user is underlined.)

Example:

@FMAC

— MACF —

CORE IMAGE FILE-NAME: SINTRAN:DATA

14052/045135 51751

51751/000000 150405

)9EXIT

@

7.2 PATCHING USING DMAC

DMAC is a subsystem which is loaded onto a segment and which may be used to make changes to RESIDENT and all segments. It is loaded as follows:

```
@RT-LOADER
```

```
*READ-BINARY DMAC:BPUN 7
CHANGING EXISTING SEGMENT? YES
*END-LOAD
*EXIT
@
```

The segment to be operated upon is defined by the command:

```
)CLOAD n
```

where n is the required segment number.

n = 0, 1 and 2 has special meaning. 0 means RESIDENT, 1 means RTCOMMON and 2 means IMAGE. (RESIDENT means physical memory, i.e., including the PAGING-OFF area.)

Example:

```
@DMAC
)CLOAD 2
46540/124003 JMP I * 1
46541/131006 52320
)9EXIT
@
```

7.3

PATCHING USING THE COMMAND @SINTRAN-SERVICE- PROGRAM

This command activates a program which may change system variables, system tables, etc. The @SINTRAN-SER-PROG is only available for user System and it can only be activated from one terminal at a time. The command has a number of subcommands, which may be accepted by the service program when an asterisk (*) is written onto the terminal.

The service program will not return to SINTRAN III before the EXIT subcommand is given. The service program may operate on resident memory, memory-image and the save area (SINTRAN:DATA). The relevant area to operate upon will be asked for in each subcommand and the user need only answer YES or NO. Only a few of the subcommands will be mentioned here. For further details see Section 3.12.

Note that only octal numbers are used for numeric input and output.

CHANGE-DATAFIELD <logical unit> <input> <output>

where

<logical unit> is the logical device number of the relevant device.

<input/output> denotes the INPUT/OUTPUT data field.

This command may be used for examination and/or change of locations of the specified data field.

A period (.) terminates this subcommand.

CHANGE-VARIABLE <variable name> [<index>] [<value>]

where

<variable name> is the name of the variable. If the variable is an array the array index <index> must be specified.

<value> is the new value to insert into the variable.

This is a command to examine and to change system variables.

N.B.!

When writing a mode file which is to use the SINTRAN-SERVICE-PROGRAM, the subcommands must be preceded by @, e.g., @CHANGE-DATAFIELD.

Example using SINTRAN-SERVICE-PROGRAM:

SILENT AND CENTRONIX FASTER THAN 110 BAUD

A carriage return delay is necessary when using devices of this type. One way of doing this is;

Terminals using the terminal interfaces may use a hardware facility on the interface by patching the input CNTREG for the relevant terminal. Bit 7 must be set.

@ SINTRAN-SERVICE-PROGRAM

*CHANGE-DATAFIELD

LOG. UNIT NO: 11

INPUT OR OUTPUT? INPUT

MEMORY? YES

IMAGE? YES

SAVE-AREA? YES

MEMORY IMAGE SAVE-AREA

CNTREG/	44005	44005	44005	<u>44205</u>
	0	0	0	<u> </u>

*EX

②

(Input from the user is underlined.)

7.4 THE SINTRAN VARIABLE ENDCOR

ENDCOR is the name of a SINTRAN variable, and 7ENDC is the symbol name of ENDCOR's contents.

When extensions/patches have been added to SINTRAN, the contents of ENDCOR must be changed.

ENDCOR is the name of the location containing the first free address in the last page used by the resident part of SINTRAN. Its contents may be inspected or changed using the CHANGE-VARIABLE command in the SINTRAN service program or by looking at address 141 in SINTRAN resident or the file SINTRAN:DATA. The initial value of 7ENDC is found in the symbol list.

Example of how to find the value of 7ENDC (the contents of ENDCOR):

@SIN-SER-PROG

*CHANGE-VARIABLE

VARIABLE: ENDCOR

VALUE: (cr)

IMAGE? Y

SAVE-AREA? Y

IMAGE: 51750 :(old content of ENDCOR)

SAVE-AREA: 51750

*EX

or

@LOOK-AT RESIDENT

*READY:

141/51750 .

— END —

@

7.5 **PATCHING THE OPERATING SYSTEM WHILE SINTRAN III IS NOT RUNNING**

This procedure should not be used unless absolutely necessary.

There are patches which cannot be done on-line. The following procedure must then be performed:

- press STOP and MASTER CLEAR
- fetch MACM by using the first SINTRAN III diskette, and typing 1560&
- do a)HENT command
- do the patch <address>/<value> <new value>
The patch is now valid on IMAGE area (input from user is underlined)
- do a)GJEM command if the patch is to be made permanent (i.e., on SINTRAN:DATA)
- start SINTRAN III by typing 22!

7.6

EXAMPLE OF THE PATCHFILE FILE

```

@CC
@CC PATCH-FILE FOR SINTRAN-III VS/VSE/VSE-500 VERSION F
@CC
@CC REVISION 04 6 OCTOBER 1981 BY TJO.
@CC
@FMAC
SINTRAN:DATA

```

```

%=====
%
% FOR THIS MODE-FILE TO WORK PROPERLY YOU NEED
%
% 1. (SYSTEM)FMAC:PROG
% 2. (SYSTEM)DMAC:BPUN
% 3. THE SYSTEM-FLOPPY PART II IN FLOPPY-UNIT 0
%
%=====

```

```

175770/ 33CPV=4 % REVISION
175770/ YVE33
175770/ 33CPU
175770/ 33CPN

```

```

%=====
%
% UNDEFINE ALL NEEDED SYMBOLS IN PART I LISTING
%
%=====

```

```

%=====
%
% UNDEFINE ALL NEEDED SYMBOLS IN PART II LISTING
%
%=====

```

```

175770/7ENDC % TO ENSURE CORRECT START
175770/SBFIE % TO DECIDE BETWEEN VS & VSE
175770/RWSEG
175770/MC144
175770/HDMOD
175770/33MDT
175770/DBTRA
175770/CAOCL
175770/XTRDL
175770/IOAPD
175770/B8INB
175770/B8OUT
175770/B8INS
175770/FDISK
175770/TLPRI
175770/FDIRT

```

```

%=====
%
%      DEFINE ALL NEEDED SYMBOLS
%
%=====
%33MDT=175000      % FOR SYSTEMS GENERATED BEFORE 11/9 AND HAVING
%                  % DIRECT TRANSFER ON MAGTAPE REMOVE % IN %33MDT

```

```

BHOLD=16
BUFBA=232
CBHOL=-11
DISP=-100000
LOGPH=2361
MDBUF=40
NOWRE=30
OFLCK=70005
PAT1=134110
PAT2=134120
XLOCK=2612

```

```

%=====
%
%      DEFINE ALL NEEDED SYMBOLS IN THE RT-LOADER
%
%=====

```

```

%=====
%
%      DEFINE ALL UNDEFINED SYMBOLS FROM THE FLOPPY
%
%=====

```

% SOME POSSIBLE FAULT ERRORS MAY OCCUR NOW. IT IS OK.

```

)SYSDF
)9ASSM (N---II:SYSTEM)SYMBOL-1-LIST
)SYSDF
)9ASSM (N---II:SYSTEM)SYMBOL-2-LIST

```

```

%=====
%
%      SYMBOLS NOT PRESENT IN YOUR CONFIGURATION:
%
?

```

```

%=====
%
%      SYMBOLS PRESENT IN YOUR CONFIGURATION:
%
1,0,1$
)LIST

```

```

)9EXIT
@CONT
SINTRAN:DATA

```

```

YVE33/ -1      % FLAG "PATCHING STARTED"
"-33CPU; YVE33+1/33CPU
"-33CPN; YVE33+2/33CPN
"

```

```

)9EXIT
@CC
@CC PATCHES
@CC
@CONT
SINTRAN:DATA

```

```

%=====
%
% ==> SIN-567  ERROR IN @SET-TERMINAL-FILE
%
%=====

```

```

104474/ 157165                % OLD VALUE IS 177603

```

```

)9EXIT
@CONT
MACM-AREA:DATA

```

```

%=====
%
% ==> SIN-568  STOP ON LEVEL 11
%
%=====
"SBFIE

```

```

RWSEG+57-100000/ JMP I *+1    % OLD 46002
*/7ENDC                % OLD 70XXX
)9EXIT
@CONT
SINTRAN:DATA

```

```

7ENDC/  LDA ,X 2
        AND (777
        JMP I (RWSEG+57+2
)FILL
)KILL 7ENDC; 7ENDC=*; 7ENDC: ; 141/7ENDC

```

```

"

```

```

%=====
%
% ==>  END OF PATC-FILE-F-01:PATCH
%
%=====

```

```

)9EXIT
@CONT
SINTRAN:DATA

```

```

%=====
%
% ==> SIN-377G HASP DMA, TO PREVENT LONG REVERSAL TIME
%
%=====
"-HDMOD

% IF YOU PUT THIS PATCH INTO YOUR SYSTEM, REMEMBER THAT THE PATCH
% IN THE EMULATOR, IDT-48 OR IDT-70 ALSO HAS TO BE DONE!!

"-33MDT -HDMOD
XDISP=321
"33MDT -HDMOD
XDISP=0
"-HDMOD

MC144+XDISP+702/      JMP I *+1          %OLD: 45367
*/                    7ENDC          %OLD: 135027

7ENDC/                LDA ,B 035
                      JAF *017
                      LDX ,B 036
                      LDA ,X 003
                      BSKP ONE 70 DA
                      JMP *013
                      LDA ,B 025
                      SAT 1
                      SKP IF DA UEQ ST
                      JMP *004
                      SAT 055
                      SKP IF DA EQL ST
                      JMP *004
                      STZ ,B 025
                      JMP *010
                      0
                      LDA I *005
                      JPL I *002
                      JMP I *002
                      XLOCK
                      MC144+XDISP+704
                      OFLCK
                      LDA ,B 020
                      JPL I *014
                      JAF *002
                      COPY SD DA
                      COPY SA DX
                      LDA ,X 025
                      STA ,B 037
                      LDA ,X 022
                      STA ,B 035
                      JPL I *004
                      STA ,B 036
                      JMP I *001
                      MC144+XDISP+371
                      LOGPH

)FILL
)KILL 7ENDC; 7ENDC=*; 7ENDC:
141/7ENDC
"

```

```
)9EXIT
@CONT
SINTRAN:DATA
```

```
%=====
%
% ==> SIN-571   ERROR IN MAGTP, WFILE MONITOR CALLS
%
%=====
"-DBTRA -MC144

"-33MDT -DBTRA -MC144
YDISP=1152          % IF DIRECT TRANSFER ON MAGTAPE
"-33MDT -DBTRA -MC144
YDISP=631          % IF NOT DIRECT TRANSFER ON MAGTAPE
"-DBTRA -MC144

XPATC=MC144+YDISP

XPATC/   JMP I *+1          % OLD 51103
*/7ENDC          % OLD 135103
7ENDC/   STT ,B MDBUF
          LDT I (BUFBA
          JPL I (DBTRA
          LDT ,B MDBUF
          JMP I (XPATC+2

)FILL
)KILL 7ENDC; 7ENDC=*; 7ENDC:
141/7ENDC
"
```

```
)9EXIT
@CONT
SINTRAN:DATA
```

```
%=====
%
% ==> SIN-572   IOTRANS ROUTINES FOR FLOPPY DISK, MAGTAPE,
%               VERSATEC ON DMA OR CASSETTE
%
%=====

"-CAOCL

YPATC=CAOCL+211

YPATC/   JMP I *+1          % OLD 146115
          7ENDC
7ENDC/   LDA ,B BHOLD
          SHA SHR 1
          STA ,B NOWRE
          JMP I (YPATC+2

)FILL

)KILL 7ENDC; 7ENDC=*; 7ENDC:
141/7ENDC
"
```

)9EXIT
 @CONT
 SINTRAN:DATA

```
%=====
%
% ==> SIN-576   ERRONEOUS "CURRENT ENTERED COUNTS" WHEN
%               ACCOUNTING IS RUNNING
%
%=====
```

```
PAT1/      JMP * +2           % OLD  44677
PAT2/      JMP * +2           % OLD  44677
```

)9EXIT
 @CONT
 MACM-AREA:DATA

```
%=====
%
% ==> SIN-577   ERROR IN THE INPUT-ROUTINE "IOAPD"
%
%=====
```

```
IOAPD+32+DISP/  SUB  ,B -16      % OLD : 50762
*/              JAZ  *+4         % OLD : 142065
*/              JMP  *+1         % OLD : 124003
*/              LDA  ,B -16      % OLD : 146165
```

```
%=====
%
% ==>   END OF PATC-FILE-F-02:PATCH
%
%=====
```

)9EXIT
 @CONT
 SINTRAN:DATA

```
%=====
%
% ==> SIN-575   8BYTE MONITOR-CALL ON SYNCHRONOUS MODEM
%
%=====
"-B8INS -B8INB -B8OUT
```

```

B8INB+75/   SAT    6
              SKP    ST UEQ DA      %OLD: 171025
              JMP    #11             %OLD: 143056
              SAT    16              %OLD: 124012
              SKP    ST UEQ DA      %OLD: 171032
              JMP    #6              %OLD: 141065
              SAT    25              %OLD: 124006
              SKP    SA LST DT       %OLD: 171006
              JMP    #4              %OLD: 142065
              SAT    32              %OLD: 124003
              SKP    ST GRE DA      %OLD: 171016
              %OLD: 142065
B8OUT+57/   SAT    6
              SKP    ST UEQ DA      %OLD: 171025
              JMP    #11             %OLD: 143056
              SAT    16              %OLD: 124012
              SKP    ST UEQ DA      %OLD: 171032
              JMP    #6              %OLD: 141065
              SAT    25              %OLD: 124006
              SKP    SA LST DT       %OLD: 171006
              JMP    #4              %OLD: 142065
              SAT    32              %OLD: 124003
              SKP    ST GRE DA      %OLD: 171016
              %OLD: 142065

```

```

)9EXIT
@CONT
MACM-AREA:DATA

```

```

%=====
%
% ==> SIN-578   ERROR IN "GET-FILE-ACCESS" IN FILESYSTEM
%
%=====

```

```

PATCH=136041
TUSEN=130532
PATCH/JMP I #+1      % OLD: 54104
#7ENDC               % OLD: 146037

```

```

)9EXIT
@CONT
SINTRAN:DATA

```

```

7ENDC/JPL I (TUSEN
                JMP I (136124
                LDX  (11
                RADD SB DX
                JMP I (PATCH+2

```

```

)FILL
)KILL 7ENDC PATCH TUSEN; 7ENDC=#; 141/7ENDC; 7ENDC:

```



```
)9EXIT
@CONT
MACM-AREA:DATA
```

```
%=====
%
% ==> SIN-579    NO DATA PRINTED ON THE LINE PRINTER
%                WHEN SPOOLING IS RUNNING
%
%=====
```

```
"-TLPRI
```

```
TLPRI+2+DISP/ JMP I *+1      % OLD 131004
      7ENDC
```

```
)9EXIT
@CONT
SINTRAN:DATA
```

```
7ENDC/   COPY ST DL
          LDT I (BUFBA
          SKP IF SA EQL DT
          JMP ERROR
          COPY SL DT
          JMP I (TLPRI+6
ERROR,    SAA 153
          JMP I (TLPRI+4
)FILL
)KILL 7ENDC; 7ENDC=*; 7ENDC:
141/7ENDC
"
```

```
)9EXIT
@CONT
MACM-AREA:DATA
```

```
%=====
%
% ==> SIN-580    ERROR IN FLOPPY DISK DRIVER
%
%=====
"-FDISK
```

```
FDISK+333-100000/ JMP I *1      % OLD 4661
      7ENDC          % OLD 70052
```

```
)9EXIT
@CONT
SINTRAN:DATA
```

```
7ENDC/   STA ,B-117
          LDX I (FDISK+701
          SKP DX EQL 0
          JMP *+3
          BSKP ZRO 50 DA
          JMP I (FDISK+656
          AND (320
          JMP I (FDISK+335
)FILL
)KILL 7ENDC; 7ENDC=*; 7ENDC:
141/      7ENDC
"
```

```
)9EXIT
@CONT
SINTRAN:DATA
```

```
%=====
%
% ==> SIN-581   MISSING DATA WHEN USING FLOPPY FORMATS 1 AND 2
%
%=====
```

```
"-FDIRT
```

```
FDIRT+134/ 124001          % OLD 172777
"
```

```
%=====
%
% ==>   END OF PATC-FILE-F-03:PATCH
%
%=====
```

```
)9EXIT
@SIN-SERV-PROG
@CHANGE-VAR,MAXP,200,Y,Y,Y
@EXIT
@CONT
SINTRAN:DATA
```

```
%=====
%
% ==> SIN-582   ERROR IN RFILE/WFILE WHEN DIRECT TRANSFER
%
%=====
```

```
7ENDC/          % OLD: RANDOM
PATCH,         LDX I (70004
                LDT ,X 21
                JMP I (112721
```

```
)FILL
)KILL 7ENDC;7ENDC=*;141/7ENDC;7ENDC:
```

```
)9EXIT
@CONT
MACM-AREA:DATA
112716/JMP I *+1          % OLD: 54413
*/PATCH                  % OLD: 56001
```

```
)KILL PATCH
```

```
)9EXIT
@CONT
SINTRAN:DATA
```

```
%=====
%
% ==> SIN-587   ERROR WHEN DOING MON ABSTR ON FLOPPY
%
%=====
"-FDIRT
```

FDIRT+54/	LDA ,B 14	% OLD: 44746
*/	JMP *+2	% OLD: 70017
FDIRT+105/	LDT ,B 14	% OLD: 44746
*/	JMP *+3	% OLD: 70043

```
"
)9EXIT
@CONT
SINTRAN:DATA
```

```
YVE33/ 33CPV      % UPDATE REVISION
```

```
%=====
%
% ==>   END OF PATC-FILE-F-04:PATCH
%
%=====
```

```
)9EXIT
```

8

METHODS OF BACKUP

Backup is a key software term which means taking copy of data stored on a media such as disk, drum, magnetic tape and floppy. Important data that one is afraid of losing will be copied from one media to another media and used if the original data is destroyed.

Data can be destroyed due to a system software or hardware error or due to an user error, eg. giving a @DELETE-FILE command with the wrong file name.

How often to take backup depends on the importance of the data, and can vary from several times a day to once a month. In addition to ordinary backup, it can be useful that the users take their own personal backup, usually on diskettes, see Section 8.3 for personal backup.

In this chapter we will look at different backup methods and what to be aware of in this connection. It is possible to copy all files or a set of files on a directory to another directory, and to copy all pages on a device to another device. The latter applies to devices such as disk, drum, floppy or magnetic tape.

Before taking backup, be sure your directory is located correct by using the stand-alone program FILSYS-INVEST (file system investigator).

What method to use depends on the needs of the customer and the configuration.

There are three different ways of performing backup

- using stand alone programs
- using commands to the file system
- using the BACKUP subsystem

8.1 STAND ALONE PROGRAMS

Four stand-alone programs are available:

- DIMS (Disk Maintenance System) — for 5/10 Mb disks

DIMS has a copy command that may be used for copying one complete cartridge disk pack to another plus REFRESH and FORMAT. The program is delivered with a user's guide.

- BIMS (Big Disk Maintenance System) — for 33/66 Mb disks

BIMS does about the same as DIMS. The program is delivered with a user's guide.

- DISC—TEMA replaces GREMS — for 37.5/75/288/30/60/90 Mb disks.

- MCOPY

MCOPY is a program for the copying of disks and drums to and from magnetic tapes (for example, MCOPY can copy a complete disk pack to a magnetic tape and copy it back when necessary). The program is delivered with a user's guide.

Stand-alone programs are programs that run in an otherwise empty computer. The machine is in STOP mode when such a program is loaded and nobody else than the system supervisor can work with the computer. A warm start must be executed after the backup, see Chapter 2.

Users of the installation should be informed in due time before the program is started (backup take place), using either the mail system or some sort of publication. (Some customers have a fixed time in a day, e.g., before 8 o'clock in the morning or after 8 o'clock in the evening where backup can take place and no users are allowed to log on).

Before STOP & MASTER CLEAR are pressed make sure that there is no activity on the system, i.e.,

- 1 no users are logged on
(also remote users)
- 2 the batch processors are idle
- 3 the line printers are idle
- 4 the user RT programs are passive

Remember to test your backup for validity using the functions VERIFY or COMPARE in the same stand alone program.

VERIFY compares the contents of two disk areas by reading them both from the disk, and then comparing them word by word in memory (memory compare).

COMPARE compares the contents of two disk areas by reading the first area (disk read) and comparing it with the second area (disk compare). (The first area is read into memory and then back to the interface and the second area is read to the interface. The comparison is then done on the interface, not in the memory. Obviously, VERIFY takes more time than COMPARE.)

8.1.1 Examples of Use of These Stand-Alone Programs

8.1.1.1 Use of DIMS

```
#1560%
*LOAD-FILE
FILE NAME: DIMS
DISK MAINTENANCE SYSTEM (DIMS)

HUT-1453F

ISSUED : 1 FEBRUARY 1981

THE PROGRAM NOW RUNS IN BANK          0

THE COMMAND HELP GIVES YOU A LIST OF THE COMMANDS

>HELP
HELP
COMMAND :
EXPLAIN-COMMANDS
LIST-SPECIAL-COMMANDS
HELP
TERMINAL-MODE
STOP-SYSTEM
SET-CONSOLE-DEVICE-NUMBER
OPCOM
MESSAGE
PROGRAM-PURPOSE
GO-TO-ADDRESS
PRINT-NOTE
FLOPPY-LOAD
SET-PRINTER-DEVICE-NUMBER
STOP-CLOCK
START-CLOCK
UPDAT
DATCL
DUMP-PRINTER-BUFFER
CLEAR-PRINTER-BUFFER
DUMP-DISK-CONTENTS
CHANGE
COMPARE
COPY
VERIFY
PARITY-CHECK
FORMAT
REFRESH
SET-DISK-CONTENTS
TRANSLATE
```

>COPY
COPY

A WHOLE CARTR., S-III AND MACM-AREA, RT-LOADER, OR OTHER (W/S/R/O): W
FROM DISK SYSTEM (1/2): 1
FROM UNIT NO. (0-3): 0
FROM REMOV. OR FIXED (R/F): R
TO DISK SYSTEM (1/2): 1
TO UNIT NO. (0-3): 0
TO REMOV. OR FIXED (R/F): F

END COPY

>COMPARE
COMPARE

A WHOLE CARTR., S-III AND MACM-AREA, RT-LOADER, OR OTHER (W/S/R/O): W
FROM DISK SYSTEM (1/2): 1
FROM UNIT NO. (0-3): 0
FROM REMOV. OR FIXED (R/F): R
TO DISK SYSTEM (1/2): 1
TO UNIT NO. (0-3): 0
TO REMOV. OR FIXED (R/F): F

END COMPARE

>STOP-SYSTEM
STOP-SYSTEM
#

8.1.1.2 Use of BIMS

*15601
*LO BIMS

BIG DISK MAINTENANCE SYSTEM (BIMS)

HUT-1872C AUG. 4, 1976

IF YOU DONT KNOW THE ANSWER TO QUESTIONS THAT BIMS MAY ASK,
TYPE X!

IS THIS A 33 MBYTE DISK OR A 66 MBYTE DISK (3 OR 6) ? 6

FUNCTION: COPY
FROM: U0
TO: U3
AMOUNT:
BLOCK SIZE:

WARNING: MARGINAL RECOVERY.
DISK ADDR., EXT.CYL., UNIT, STATUS: 133020 000000 000000 041033

END COPY

FUNCTION: COMPARE
FROM: U0
TO: U3
AMOUNT:
BLOCK SIZE:

WARNING: MARGINAL RECOVERY.
DISK ADDR., EXT.CYL., UNIT, STATUS: 105020 000000 000000 041033

WARNING: MARGINAL RECOVERY.
DISK ADDR., EXT.CYL., UNIT, STATUS: 150420 000000 000000 041033

END COMPARE

FUNCTION: COPY
FROM: U1
TO: U3
AMOUNT:
BLOCK SIZE:

END COPY

FUNCTION: COMPARE
FROM: U1
TO: U3
AMOUNT:
BLOCK SIZE:

END COMPARE

FUNCTION: COPY
 FROM: U2
 TO: U3
 AMOUNT:
 BLOCK SIZE:

WARNING: MARGINAL RECOVERY.
 DISK ADDR., EXT.CYL., UNIT, STATUS: 001020 000000 000003 051433

WARNING: MARGINAL RECOVERY.
 DISK ADDR., EXT.CYL., UNIT, STATUS: 005020 000000 000003 041033

WARNING: MARGINAL RECOVERY.
 DISK ADDR., EXT.CYL., UNIT, STATUS: 011020 000000 000003 041033

WARNING: MARGINAL RECOVERY.
 DISK ADDR., EXT.CYL., UNIT, STATUS: 012600 000000 000003 041033

WARNING: MARGINAL RECOVERY.
 DISK ADDR., EXT.CYL., UNIT, STATUS: 012620 000000 000003 041033

END COPY

FUNCTION: COMPARE
 FROM: U2
 TO: U3
 AMOUNT:
 BLOCK SIZE:

END COMPARE

In case the warning MARGINAL RECOVERY is given, do not worry. However, if you, in addition, get the following messages DISK ADDR., EXT.CYL., UNIT, STATUS: , something is wrong and hardware service must be informed. It is especially the status word they are interested in.

As seen from this example:

- run FILSYS-INVESTIGATOR
- do the copying
- at last do a COMPARE or VERIFY

8.1.1.3 Use of DISC—TEMA

```

#1560&
*LOAD DISC-TEMA)
DISC TEST AND MAINTENANCE SYSTEM (DISC-TEMA)

203134.C

ISSUED : 1. SEPTEMBER 1982

DISC NAME: D-2-7-1)
DISC-2-75MB-1

MEMORY BUFFERS INITIALIZED
DATA WAY TO DISC SYSTEM 1 TESTED
MEMORY ADDRESS REGISTER ON DISC SYSTEM 1 TESTED

THE COMMAND HELP GIVES YOU A LIST OF THE COMMANDS

>HELP)
HELP
COMMAND: ) ALL COMMANDS)
MONITOR-COMMANDS:
*****
EXPLAIN-COMMANDS
LIST-SPECIAL-COMMANDS
HELP
TERMINAL-MODE
EXIT
SET-CONSOLE-DEVICE-NUMBER
OPCOM
MESSAGE
GO-TO-ADDRESS
PRINT-NOTE
FLOPPY-LOAD
SET-PRINTER-DEVICE-NUMBER
STOP-CLOCK
START-CLOCK
UPDAT
DATCL
PROGRAM-STATUS

PROGRAM-COMMANDS:
*****
CHANGE
CLEAR-DEVICE
COMPARE
MATCH
COPY
DUMP-DISC-CONTENT
FORMAT
PARITY-CHECK
SET-DISC-CONTENT
SEEK
TRANSLATE
VERIFY
ALIGN
SET-DISC-TYPE
MODE
CLEAR-COUNTERS
FUNCTION

```

>SET-DISC-TYPE↵
 SET-DISC-TYPE

"FROM" DISC NAME: D-2-7-1↵
 DISC-2-75MB-1

"TO" DISC NAME: D-7-1↵
 DISC-75MB-1

>

>COPY↵
 COPY
 FROM DISC-2-75MB-1
 UNIT (0-3 OCT.): 0↵
 SUB UNIT (0-1 OCT.): 1↵

TO DISC-75MB-1
 UNIT (0-3 OCT.): 1↵

>COMPARE↵
 COMPARE
 FROM DISC-2-75MB-1
 UNIT (0-3 OCT.): 0↵
 SUB UNIT (0-1 OCT.): 1↵

TO DISC-75MB-1
 UNIT (0-3 OCT.): 1↵

>

8.1.1.4 Use of MCOPY

```

#1560#
*LO MC-TAN
MAG.TAPE - DISK/DRUM COPY
VERSION H
ISSUED : 25.FEBRUARY 1980

```

```

STANDARD DEVICE NUMBERS ? Y
DISK SIZE (5,10,33,37,66,75 OR 288) ? 5
SYSTEM BACKUP ? Y
NUMBER OF DISK CARTRIDGES: 4

```

```

MAG.TAPE UNIT: 0

```

```

SINTRAN BLOCK SIZE (1K) ? N
COPY TO MAG.TAPE ? Y
OK ? Y
END COPY START COMPARE

```

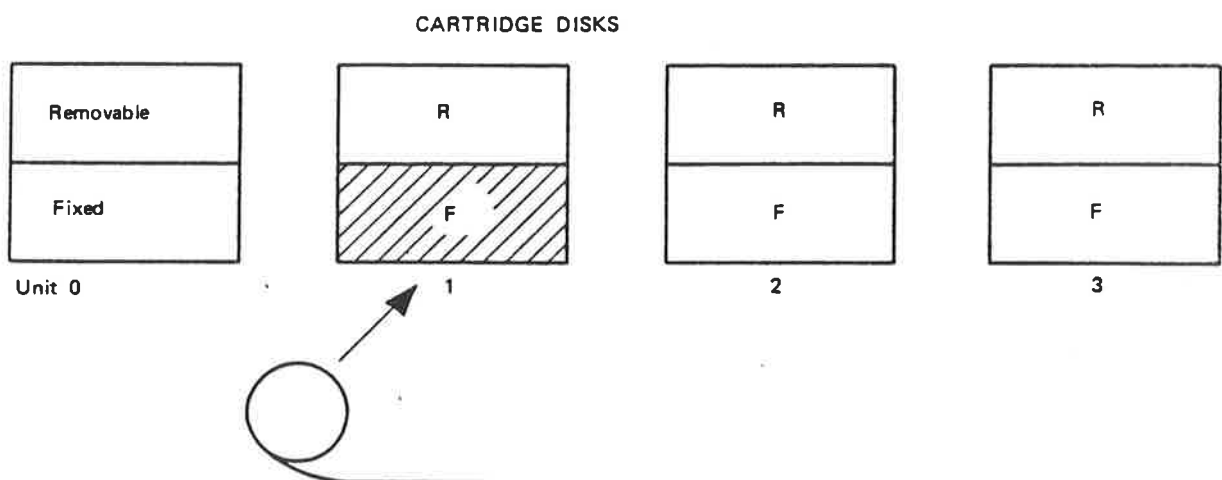
```

000002 MAG.TAPE WRITE RETRIES
MORE TO BE COPIED ? N
FINISHED #

```

Here backup from four cartridges, including the removable and fixed disk packs are copied to a magnetic tape on unit 0. If answering N to the question, SINTRAN BLOCK SIZE, the space on the magnetic tape is utilized better, however, the command @COPY-DEVICE can not be used on this magnetic tape. MCOPY must be used if files on the magnetic tape are to be retrieved.

Say that you have destroyed the fixed disk pack on unit 1 and want to copy this disk pack's backup back.



#15608
 *LO MC-TAN
 MAG.TAPE - DISK/DRUM COPY
 VERSION H
 ISSUED : 25.FEBRARY 1980

STANDARD DEVICE NUMBERS ? Y
 DISK SIZE (5,10,33,37,66,75 OR 288) ? 5
 SYSTEM BACKUP ? N
 FIXED OR REMOVABLE CARTRIDGE ? (F/R) F
 DISK UNIT: 1

MAG.TAPE UNIT: 0
 MAG.TAPE FILE NR: 4

SINTRAN BLOCK SIZE (1K) ? N
 COPY TO MAG.TAPE ? N
 COPY FROM MAG.TAPE ? Y
 OK ? Y
 END COPY START COMPARE

MORE TO BE COPIED ? N
 FINISHED #

Disk packs are numbered as follows:

removable disk pack unit 0	=	1
fixed disk pack unit 0	=	2
removable disk pack unit 1	=	3
fixed disk pack unit 1	=	4
etc.		

8.2 ON-LINE BACKUP

8.2.1 Directory Commands

@COPY-DIRECTORY <destination directory name> , <source directory name>

copies all files in the source directory onto the destination directory. The users and the file names will be the same in the destination directory as in the source directory. The destination directory should be empty when the command is given, i.e., the directory should be created but no users or files should exist.

The destination file will be reorganized, thus giving more contiguous space.

@COPY-DEVICE <destinaton device name> , <source device name>

copies all pages on the source device onto the destination device. Applies to devices such as disks, drums, magnetic tapes and floppy disks. Destination device cannot be an entered directory.

These two commands are system commands. When typing backup of a disk pack, drum or magnetic tape, the users of these devices should be informed, e.g., using the mail system so that these devices are not used. If it is the disk pack with the main directory, then no one should use the system at all while the copying is taking place. Then make sure there is no activity on the system before starting the backup (see points 1, 2, 3, and 4 in Section 8.1).

When these commands are used on diskettes, no specific action needs to take place.

8.2.2 The Backup-System

8.2.2.1 Introduction

The BACKUP-SYSTEM offers a variety of facilities for copying files, using the COPY-USERS-FILES command, to and from disc and tape media. The files may be copied for archive, backup or other purposes. To enable communication with other installations ANSI standard label format is available for magnetic tapes.

The old SINTRAN commands COPY-USERS-FILES, CREATE-VOLUME and LIST-VOLUME are now available as commands under the BACKUP-SYSTEM, with some extended and altered facilities. While there are new options available, every effort has been made to ensure compatibility and the ability to handle files produced under older versions of the SINTRAN III operating system (prior to the SINTRAN III/F version).

The following documentation is intended to give first an overview of the commands available in the BACKUP-SYSTEM and some of their more important options. The BACKUP-SYSTEM has also a detailed description of all its commands and their options, available interactively while using the system. The 'help' and question mark character (?) functions are available in all levels of dialogue to give descriptions of parameters for the command being used or information about the other commands which may be used.

The following is a list of all the commands and their parameters:

```
DESCRIBE-ALL-COMMANDS
  <OUTPUT-FILE>
```

```
COPY-USERS-FILES
```

```
  DESTINATION TYPE:
```

```
    DIRECTORY
```

```
      <DEST. DIRECTORY-NAME>
```

```
      <DEST. USER-NAME>
```

```
    VOLUME
```

```
      <DEST. VOLUME-NAME>
```

```
      <DEST. DEVICE-NAME>
```

```
      <DEST. UNIT-NUMBER>
```

```
      <DEST. FILE-GENERATION>
```


SOURCE TYPE:

DIRECTORY

<SOURCE DIRECTORY-NAME>

<SOURCE USER-NAME>

<SOURCE FILE-NAME>

<MANUAL CHECK>

VOLUME

<SOURCE VOLUME-NAME>

<SOURCE DEVICE-NAME>

<SOURCE DEVICE-UNIT>

<SOURCE FILE-GENERATION>

<SOURCE FILE-NAME>

<MANUAL CHECK>

PARAMETER-FILE

<PARAMETER-FILE-NAME>

<MANUAL CHECK>

CREATE-VOLUME

<VOLUME-NAME>

<DEVICE-NAME>

<DEVICE-UNIT>

LIST-VOLUME

<DEVICE-NAME>

<DEVICE-UNIT>

<FILE-NAME>

<OUTPUT-FILE>

SERVICE-PROGRAM-CUF

DUMP-BACKUP-SYSTEM

<BPUN-USER-NAME>

MASTER-LOG-MODE

<MASTER-LOG-FILE>

<APPEND-ACCESS>

MODE-STANDARD-VOLUME

MANUAL-STANDARD-VOLUME

MODE-BACKUP-SYSTEM-VOLUME

USER-COPY-LOG-MODE

<LOG-FILE>

<APPEND-ACCESS>

SET-ALLOCATE-CREATE-DEFAULT

<DEFAULT ANSWER>

SET-SINGLE-SEARCH

RESET-SINGLE-SEARCH

EXIT

EXIT

8.2.2.2 Simple Use of the Backup-System

The BACKUP-SYSTEM may carry out simple tasks by using the COPY-USERS-FILES command to copy some files. If magnetic tape is to be used, the CREATE-VOLUME command should be used first and the user executing this command becomes the owner of the VOLUME. VOLUME's will be written in the BACKUP-SYSTEM's default format. VOLUME's produced by the old COPY-USERS-FILES command (before SINTRAN III/F) can also be read. All available different magnetic tape formats, produced by the BACKUP-SYSTEM or SINTRAN COPY-USERS-FILES, are automatically detected.

8.2.2.3 Commands

The system can be entered by using the command:

@BACKUP-SYSTEM

Once the BACKUP-SYSTEM has been entered the following commands are available:

DESCRIBE-ALL-COMMANDS

will give detailed descriptions of each command available and its options and parameters. Listing this command on a hard-copy device is recommended for an inexperienced user.

EXIT

leave the BACKUP-SYSTEM and return to the SINTRAN III operating system.

CREATE-VOLUME

creates a 'VOLUME' on magnetic tape. Only one VOLUME may exist on a tape. A VOLUME may, following the use of the Create command, be written in different formats, STANDARD-VOLUME and BACKUP-SYSTEM-VOLUME, see options under SERVICE-PROGRAM-CUF. A VOLUME can contain files from many users, but it is owned by the user who created the VOLUME, and can only be accessed by the owner.

LIST-VOLUME

will list the contents of a VOLUME on magnetic tape.

COPY-USERS-FILES

will copy one or more files from a user on one medium to a user on the same medium or a different medium. For media selection, there are options available in the SERVICE-program-CUF to assist with more complex copying requirements. File accessing is by the normal SINTRAN III rules. However, user SYSTEM can access any user's files with the same access rights as the file owner, allowing files to be copied on behalf of a user.

If copying from or to a VOLUME, a user can only access his own tapes. User SYSTEM can, however, have both read and write access to tapes other than his own.

Note: that while DIRECTORY, VOLUME and PARAMETER-FILE are referred as sub-commands, they describe the destination and source types respectively.

If copying between directories, the DESTINATION user may be different from the SOURCE user. If the SOURCE medium is a VOLUME, the parameter DEST. USER-NAME will choose between the original owner of the file or a new user-name. If a new user-name is specified, you will be asked if you want to copy to this new user.

If copying between directories, and if DESTINATION-file already exists, the source and destination date for last opened for write is checked. If the destination is written to later than source, you will be asked if you copy the right direction.

The user must ensure enough space is available for all files to be copied. The BACKUP-SYSTEM will create all the necessary file names.

The BACKUP-SYSTEM will only access the DEFAULT directory of a user when no explicit name is given for the DIRECTORY-NAME. Any directory may be accessed by giving its name explicitly.

Use of the COPY-USERS-FILES command will also result in the contents of the fields FILE-ACCESS, LAST-DATE OPENED FOR READ, LAST-DATE OPENED FOR WRITE, CREATION-DATE and MAX BYTE POINTER being copied from the source file to the destination file.

If you are user SYSTEM or have DIRECTORY-ACCESS to the source, the last date OPENED FOR READ and number of times OPENED will not be updated.

SERVICE-PROGRAM-CUF

can be used to select from the various options relating to the COPY-USERS-FILES command.

The following commands are available under the SERVICE-PROGRAM-CUF:

EXIT

leaves the SERVICE-PROGRAM-CUF and returns to the BACKUP-SYSTEM.

DUMP-BACKUP-SYSTEM

dumps the BACKUP-SYSTEM on the file 'BACKUP-SYSTEM:BPUN'.

MODE-STANDARD-VOLUME, MANUAL-STANDARD-VOLUME,
MODE-BACKUP-SYSTEM-VOLUME

These options are only significant for output to magnetic tape. VOLUMES's exist on magnetic tape only. The information on a VOLUME may be in the following formats:

- STANDARD-VOLUMES - are similar to ANSI defined format, compatible to SINTRAN III/E and earlier versions of SINTRAN.
- BACKUP-SYSTEM-VOLUME — are similar to ANSI defined format plus some SINTRAN -III file system information.

Note that one VOLUME may contain files written in a mixture of these formats.

The device MAG-TAPE-1 unit 0 must have the name MAG-TAPE-1-0, unit 1 must have the name MAG-TAPE-1-1, etc. This can be set by using the command SET-PERIPHERAL-FILE.

SET-ALLOCATE-CREATE-DEFAULT

During file copying, the BACKUP-SYSTEM will require operator input if it cannot Allocate or Create contiguous files, as they are described by the file system information on the original directory or VOLUME. If this situation arises and the operator inputs 'yes', then the following rules apply:

1. Allocated source files will be created as contiguous files if possible or else they will be Created as Indexed files.
2. Contiguous files will be Created as Indexed files.

If the operator inputs 'no', then such files will not be copied. This option may be set to give a default answer to all such questions. This option applies to BACKUP-SYSTEM files only.

This facility is an aid for copying many files interactively and should be used for MODE and Batch jobs.

SET-SINGLE-SEARCH, RESET-SINGLE-SEARCH

SINGLE-SEARCH operates in the same way as the normal search until one file or a group of consecutive files have been copied. The search begins from wherever the tape is positioned, and no tape rewinds are done while in SINGLE-SEARCH mode. Copying terminates at the first non-matching file-name. SINGLE-SEARCH makes it possible to copy a number of files with one pass through a tape. In order to achieve this, the files must be selected in the same order as they appear on the tape. Care must be taken when copying files to tape if SINGLE-SEARCH is to successfully gather all files which a user wishes to retrieve.

MASTER-LOG-MODE, USER-COPY-LOG-MODE

there are two LOG-MODE's, MASTER-LOG for user SYSTEM only, and USER-LOG for public users only. These 'modes' cause copy command information to be written into a LOG file.

8.3 PERSONAL BACKUP

If no backup is done by the system supervisor, the users need to have their own personal backup. If a user has some very important files, then he/she will have his/her own personal backup.

Backup media is usually a floppy diskette. Section 8.3.2 contains information about using a floppy disk as file directory.

Note that the commands @CREATE-DIRECTORY, @CREATE-USER, and @GIVE-USER-SPACE can be given by the public when used on floppy. However, @CREATE-USER and @GIVE-USER-SPACE can only have <user name> equal to the logged in person's name.

The commands @COPY and @COPY-FILE, as well as the program BACKUP-SYSTEM are used in connection with personal backup.

8.3.1 Copying Data to and from Files and Devices

Two commands are implemented to copy data between peripheral units and files:

`@COPY <destination> <source>`

reads bytes from the <source> unit and writes on the <destination> unit; the destination unit may be a new file to be created by enclosing the name in double quotation marks. The command should be used for byte oriented devices. The copy operation continues until maximum byte pointer is reached, if <source> is a mass storage file.

`@COPY-FILE <destination> <source>`

reads pages of 1K words from <source file> and writes on the <destination file>. This command is recommended for devices connected to DMA channels.

For both commands, data is completely code independent. For @COPY-FILE the copy operation continues until all pages have been copied from a file or unit time out is received from a peripheral unit.

Default file type for files is :SYMB.

Both commands may also be used to or from peripherals and are public commands. @COPY-FILE will also correctly copy files with holes.

Example:

`@COPY "MYFILE0", T-R`

copies the paper tape in the tape reader to a disk file called MYFILE0.

`@COPY-FILE "MYFILE1" (DIR:TOM) HISFILE`

copies the file HISFILE on a diskette with directory name DIR and owner TOM to a disk file called MYFILE1.

8.3.2 Floppy Disk As File Directory

The SINTRAN III system can handle a maximum of two floppy disk controllers with three drives (units) on each controller.

Before a diskette can be used, it must be formatted using the @DEVICE-FUNCTION command as in the following example:

```
@DEVICE-FUNCTION FLOPPY-1, FORMAT-FLOPPY
```

A diskette may be used as a file directory. Due to the relatively small storage capacity, 154K words, it is recommended that there is only one user on each diskette. The sequence of commands to make a file directory on a diskette is:

1. Insert a formatted diskette in a free floppy disk drive.

2. Give the following commands:

```
@CREATE-DIRECTORY
@ENTER-DIRECTORY
@CREATE-USER
@GIVE-USER-SPACE (maximum 148 pages)
```

3. When the work with the diskette is finished, type the command:

```
@RELEASE-DIRECTORY
```

and remove the diskette from the floppy disk before logging out.

The next time the diskette is to be used, the command sequence will be:

1. Insert the diskette into a free floppy disk drive and log in using your own user name.
2. Type the command @ENTER-DIRECTORY and the diskette may be used as a file directory.
3. When the work with the diskette is finished, type the command:

```
@RELEASE-DIRECTORY
```

and remove the diskette from the floppy disk unit.

8.4

THE FILESYSTEM INVESTIGATOR

This is a stand-alone program which can be used to check the consistency of a directory, ie. that its structure is correct, pointers to structures within the directory are correct, files do not conflict, the bit file is correct, the number of pages used is correct and user and object entries are correct. The program only reads from disk; it diagnoses errors, but does not attempt to correct them. The only exception is DIRECTORY-SIZE-UPDATE which moves pages to other locations on the disk.

It is advisable to use this program regularly to check your directories and certainly it should be used before taking backup of a directory. It only takes 5 minutes on a 75 Mb disk. To check that a directory is free from errors three commands are needed:

DUMP—DIRECTORY—ENTRY
LIST—USERS
PAGE—LIST

Select option E when using PAGE-LIST and only errors will be listed. If required, output may be directed to a line-printer by using SET—PRINTER—DEVICE—NUMBER.

If a directory has serious errors, eg. page conflicts between files, take a backup of the directory before attempting to correct them. After backup restart SINTRAN III and with the system set UNAVAILABLE try to correct errors manually by using

@CHANGE—DIRECTORY—ENTRY	@DUMP—DIRECTORY—ENTRY
@CHANGE—PAGE	@DUMP—PAGE
@CHANGE—USER—ENTRY	@DUMP—USER—ENTRY
@CHANGE—OBJECT—ENTRY	@DUMP—OBJECT—ENTRY

Alternatively by copying selected pages from a previous backup to the disk using DISC—TEMA (Test Programs No. 1 diskette), pages containing erroneous pointers, user entries etc. can sometimes be corrected. This requires thorough knowledge of the filesystem; a good description is given in the "NORD Filesystem: System Documentation".

Users with insufficient experience of the filesystem can use the SINTRAN commands below, when you have BITFILE—ERROR, PAGES MARKED AS OCCUPIED BUT THEY ARE NOT USED BY ANYONE or ERROR IN PAGES USED. Do not use them with other errors!

@TEST—DIRECTORY
@REGENERATE—DIRECTORY

See SINTRAN III Reference Manual (ND-60.128.03) for command descriptions.

The system must be set UNAVAILABLE and all users logged out before using these commands. @TEST—DIRECTORY rebuilds the bit-file and resets the number of pages used, corrects open and current enter counts and other minor errors. It also reports major errors to the operator. @REGENERATE—DIRECTORY performs the same functions and also deletes all but one of any conflicting files and generally tidies up a directory so that its structure is correct. A lot of information may be lost in this process so it is essential to take backup first so that at least part of any conflicting files can be recovered.

@TEST—DIRECTORY and @REGENERATE—DIRECTORY may take 10 hours on a 5 Mb disk and 2 to 3 days on a 288 Mb disk if the directory is badly corrupted.

COMMANDS

Each command to the filesystem investigator consists of a character string terminated by carriage return. These commands can be abbreviated provided this does not create ambiguity. The commands are:

```
PAGE—LIST
DUMP—DIRECTORY—ENTRY
LIST—USERS
DUMP—BIT—FILE
DUMP—FILE
DUMP—OBJECT—ENTRY
DUMP—PAGE
DUMP—USER—ENTRY
LIST—FILE—NAMES
LIST—PAGE—NUMBERS
REDEFINE—DISC—TYPE
SET—PRINTER—DEVICE—NUMBER
HELP
```

To specify an output device other than the terminal use SET—PRINTER—DEVICE—NUMBER. The number is 430 for the line-printer, 310 for terminal 2 etc.

Example:

```
#1560&
IF HERE TYPE ANY CHAR
*LO FILSYS
IF HERE TYPE ANY CHAR
FILE SYSTEM INVESTIGATOR
```

```
SUT-2135H
ISSUED AUG 20, 1981
```

```
DEVICE NAME : : D-7-1
DISC-75MB-1
```

```
DEVICE UNIT : 0
```

```
DIRECTORIES CREATED BY SINTRAN VERSION E OR LATER ARE
A FEW PAGES SMALLER THAN THOSE CREATED BY VERSIONS A, B, C, D.
IF YOU WANT THE SMALLER SIZE, TYPE Y, ELSE N: Y
```

```
TOTAL NO. OF PAGES IS 110121
```

```
THE COMMAND HELP GIVES YOU A LIST OF THE COMMANDS
```

>HELP
 HELP
 COMMAND :

MONITOR-COMMANDS:

 EXPLAIN-COMMANDS

LIST-SPECIAL-COMMANDS
 HELP
 TERMINAL-MODE
 STOP-SYSTEM
 SET-CONSOLE-DEVICE-NUMBER
 OPCOM
 MESSAGE
 PROGRAM-PURPOSE
 GO-TO-ADDRESS
 PRINT-NOTE
 FLOPPY-LOAD
 SET-PRINTER-DEVICE-NUMBER
 STOP-CLOCK
 START-CLOCK
 UPDAT
 DATCL
 DUMP-PRINTER-BUFFER
 CLEAR-PRINTER-BUFFER
 PROGRAM-STATUS
 EXIT

PROGRAM-COMMANDS:

 DUMP-BIT-FILE
 DUMP-DIRECTORY-ENTRY
 DUMP-FILE
 DUMP-OBJECT-ENTRY
 DUMP-PAGE
 DUMP-USER-ENTRY
 LIST-FILE-NAMES
 LIST-USERS
 LIST-PAGE-NUMBERS
 PAGE-LIST
 REDEFINE-DISC-TYPE

>D-D
 DUMP-DIRECTORY-ENTRY

DIRECTORY ENTRY DUMP:

050101	041513	026517	047105	023400	000000	000000	000000	PACK-ONE
040000	044374							OBJECT FILE POINTER
040000	044376							USER FILE POINTER
000000	044050							BIT FILE POINTER
000000	063505							PAGES NOT RESERVED

>L-U
LIST-USERS

USER LIST:

000 SYSTEM
ENTER COUNT IS NOT ZERO

001 SCRATCH
002 RT
003 FLOPPY-USER

PAGES RESERVED ON THIS DIRECTORY (ACC. FROM USER ENTRIES): 024404

>P-L
PAGE-LIST

THE WHOLE PAGE LIST (W), PART OF IT (P), OR ONLY ERROR MESSAGES (E): E

FETCHING OF ALL PAGE NUMBERS IS STARTED

WARNING: CURRENT OPEN COUNT IS NOT ZERO. THE FILE IS OPEN FOR READ
USER AND FILE NOS.: 000000 000025

WARNING: CURRENT OPEN COUNT IS NOT ZERO. THE FILE IS OPEN FOR WRITE
USER AND FILE NOS.: 000001 000000

SORTING IS STARTED

PAGE LIST AND BIT FILE CHECK IS STARTED

CHECK FOR UNUSED, BUT OCCUPIED PAGES IS STARTED

BIT FILE ERROR (OR BAD PAGES, SET BY @CREATE-DIRECTORY).
PAGES ARE MARKED AS OCCUPIED IN THE BIT FILE,
BUT THEY ARE NOT USED BY ANYONE. PAGE NOS.:

075303

>D-O-E
DUMP-OBJECT-ENTRY

USER NO. (0-0377): 0
FILE NO. (0-0377): 25

USER 000 OBJECT ENTRY 025 DUMP:

110001	U/W/R/M	TERM. NO OF RESERVING USER
044105 047124 026515 047504 042447 000000 000000 000000	HENT-MODE	
051531 046502	TYPE (SYMB)	
000025 000025	POINTERS TO NEXT AND PREVIOUS VERSION	
002377	ACCESS WORD	
000010	TEMP/L/M/A/C/I/S/P/T	
000000	DEVICE NUMBER	
000000	MAIN DIR INDEX / USER INDEX OF RESERVING USER	
000025	OBJECT INDEX OF THIS ENTRY	
000001 000004	CURRENT AND TOTAL OPEN COUNT	
100131 005514	DATE CREATED (1982.1.12 16.45.12)	
076133 000203	LAST DATE OPENED FOR READ (1981.1.13 16.02.03)	
100131 005514	LAST DATE OPENED FOR WRITE (1982.1.12 16.45.12)	
000000 000001	PAGES IN FILE	
000000 003015	MAX. BYTE POINTER	
040000 044765	FILE POINTER	

ND-30.003.05.

>D-O-E
DUMP-OBJECT-ENTRY

USER NO. (0-0377): 1
FILE NO. (0-0377): 0

USER 001 OBJECT ENTRY 000 DUMP:

```

150001          U/W/R/M TERM. NO OF RESERVING USER
051503 051101 052103 044060 030447 000000 000000 000000 SCRATCH01
042101 052101      TYPE ( DATA )
000400 000400      POINTERS TO NEXT AND PREVIOUS VERSION
016367          ACCESS WORD
000010          TEMP/L/M/A/C/I/S/P/T
000000          DEVICE NUMBER
000000          MAIN DIR INDEX / USER INDEX OF RESERVING USER
000400          OBJECT INDEX OF THIS ENTRY
000001 000007      CURRENT AND TOTAL OPEN COUNT
100130 175512      DATE CREATED ( 1982.1.12  15.45.10 )
076132 176727      LAST DATE OPENED FOR READ ( 1981.1.13  15.55.23 )
076132 176727      LAST DATE OPENED FOR WRITE ( 1981.1.13  15.55.23 )
000000 000040      PAGES IN FILE
000001 177777      MAX. BYTE POINTER
040000 044744      FILE POINTER

```

>D-U-E
DUMP-USER-ENTRY

USER NO. (0-0377): 0

USER 000 ENTRY DUMP:

```

100401          ENTER COUNT ETC.
051531 051524 042515 023400 000000 000000 000000 000000 SYSTEM
000000          PASSWORD
100130 175022      DATE CREATED ( 1982.1.12  15.40.18 )
076132 176727      LAST DATE ENTERED ( 1981.1.13  15.55.23 )
000000 023420      PAGES RESERVED
000000 012625      PAGES USED
000000          USER INDEX
000000          MAIL FLAG
002377          USER DEFAULT FILE ACCESS
000000 000000 000000      FREE SPACE
103402 000000 000000 000000 000000 000000 000000 000000      FRIEND TABLE

```

>#

APPENDIXES

APPENDIX A

BASIC CONCEPTS

This appendix will introduce concepts and terms used by Norsk Data.

An understanding of this appendix is assumed in the remainder of this manual.

A.1 *USER'S CATEGORIES AND COMMANDS*

There exist three different categories of SINTRAN users:

- Timesharing and Batch users
- User RT
- User System

Timesharing and Batch Users:

This user group will access the system through a terminal or by submitting jobs for batch processing from disk files containing the necessary commands or data.

These users are known to the system by names which must be presented at the beginning of the terminal session or as the first command in a batch job.

The user name may be protected by a password chosen by the user.

User RT:

This is a privileged user which is capable of controlling real-time programs.

This user acts like any other timesharing user to the system. The difference is the availability of an extended command set, the extra commands give the control functions necessary for the supervision of the RT programs.

User RT should be protected by a password.

User System

This user has, in addition to the command sets of timesharing user and user RT, a set of privileged commands capable of creating and deleting users, creating file directories on different devices, etc.

This user should be protected by a password.

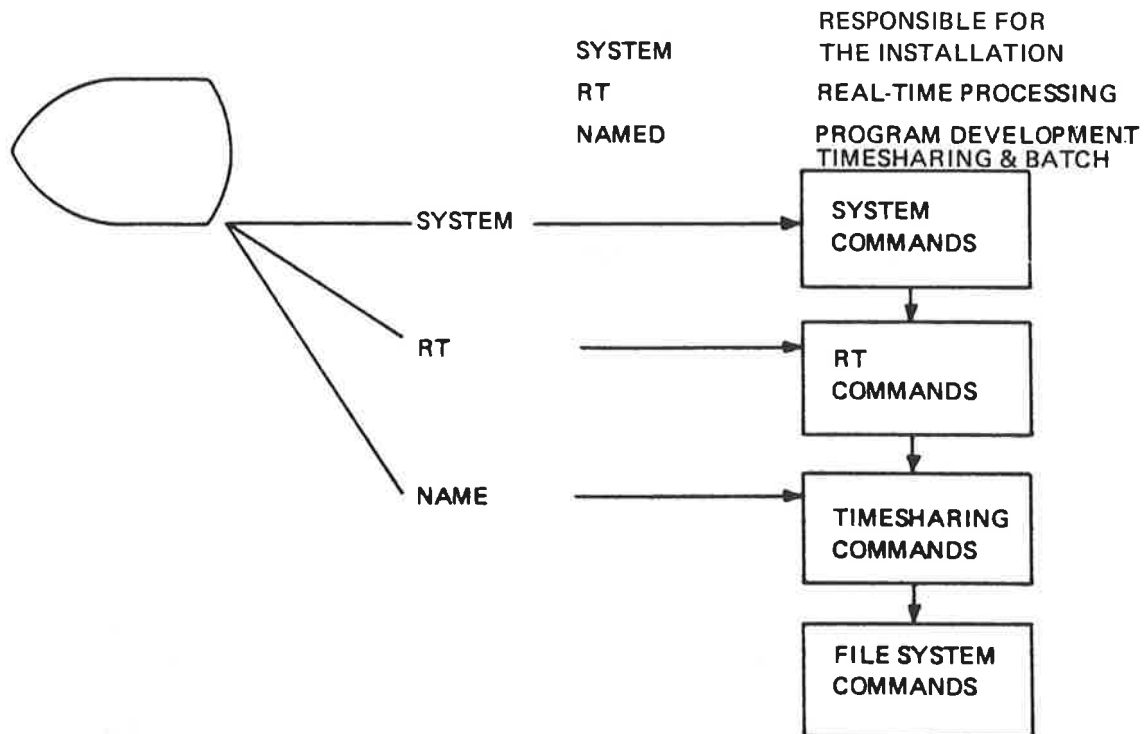
SINTRAN III USER CATEGORIES

Figure A.1: SINTRAN III User Categories

The SINTRAN III system provides its users with a large set of functions which may be activated by commands.

A command is a string of characters separated into fields by a comma or a number of spaces. The first field is the command name, followed by parameter fields if necessary. Certain parameters may take a default value which will be used if the parameter field is omitted by giving the comma separator or carriage return when the parameter is asked for. The hyphen (-) is used to separate the name into two or more distinct parts. Any part may be abbreviated as long as the command does not become ambiguous. SINTRAN III responds with the error message **AMBIGUOUS COMMAND** if a command is ambiguous.

Examples:

```

@CREATE-USER ANNE
@GIVE-USER-SPACE ANNE, 100
@TAKE-USER-SPACE
USER NAME: ANNE
NUMBER OF PAGES: 10

@TAKE-US-SP ANNE 10
@T-US-SP ANNE 5
@T-U-S ANNE 10
@T-U ANNE 10
AMBIGUOUS COMMAND
@T ANNE 2
AMBIGUOUS COMMAND

```

The @ sign is a signal from SINTRAN III letting us know that it is ready to accept a new command.

Every command is placed in one of three command groups according to the type of users the command is available for. The groups are:

- Timesharing commands
- Real-time commands
- System commands

A complete list of all commands is found in the "SINTRAN III Reference Manual". System commands will be mentioned in this manual, (See Chapter 3.) Note that all available commands can be listed with the @HELP command.

The user system can use all commands i.e., timesharing, real-time and system commands. The user RT can use the timesharing commands and RT commands while a timesharing user can only use the timesharing command set.

While typing in a command:

- Depressing the CONTROL key together with A deletes one character at a time, responding with ↑ for each deleted character
- Depressing the CONTROL key together with Q deletes the whole line responding with ← and allowing a new line to be typed

A.2 FILES

The File Management System

This is a general purpose file management system for use of permanent files, scratch files and peripheral device files. This system is an integral part of SINTRAN III.

A File:

A file is an organized collection of records (except for peripheral files). The records of a file may be organized in different ways (see the manual "NORD File System").

A file is named by a character string and this name is used in all commands to the file system. Examples of information stored in a file:

1. the text of a FORTRAN program
2. output from a program
3. a set of commands
4. data

An Indexed File:

An indexed file may have its pages scattered on mass storage.

A Contiguous File:

A contiguous file is allocated on a contiguous area on mass storage.

A Scratch File:

A scratch file is a working area belonging to a terminal or a batch processor. Each terminal and batch processor has its own scratch file. The scratch file will always be opened when logging in and is given file number 100.

Peripheral Files:

Peripherals such as card readers, line printers, etc. may be treated by a user very much like sequential disk files. Peripherals are given symbolic names by user SYSTEM and a user may access the peripheral by using these names.

File Types:

In addition to the object name, an alphanumeric file type is added to the file name to designate the purpose of the file. This file type may be set by the user as a 4 character extension of the file name, separated by a colon. The following file types are used as default:

```
:SYMB
:PROG
:BRF
:DATA
:TEXT, :OUT, :BPU (depending upon the command or subsystem)
```

The File Name:

<file name>:= [([<directory name:>] [<owner name>])] <object name> [<:type>] [<;version>]

[] denotes that part of the name may be omitted.

File Directory:

Files are organized into file directories containing files for one or more users. Simply, a file directory can be thought of as a catalogue. When a file is asked for, the system looks it up in this directory.

When a new file is created a new entry is made in the file directories.

Each mass storage device has its own independent file directory. For details refer to the manual "NORD File System".

Main Directory:

The main directory is the file directory on the mass storage device where SINTRAN III resides.

Default Directories:

Any directory may be declared as a default directory. This means that the users need not specify the directory name when creating or accessing files in this directory. A user should not be given space in more than one default directory. If he has, he must still specify the directory name as a prefix to the name. Main directory is always default.

A.3 *KEY SOFTWARE TERMS (SORTED ALPHABETICALLY)*

Assembler

This is a program that translates assembly language mnemonic source statements into machine code.

Basic Time Unit

A basic time unit is normally 20 ms. The real-time clock will give an interrupt every 20ms (50 times a second).

Batch Job

A batch job is a file consisting of commands to the SINTRAN III system and possibly of source input to subsystems or user programs called. Batch jobs are executed independently of any terminals, under control of a batch processor.

Baud

One baud means that one bit of information is transmitted each second. This is not necessarily the same as "bits per second". An 8 bit character sent in 1 second will be 8 bits per second, but in reality at least 2 control bits must be sent in addition to this. So 1 character per second will be 8 baud or 10 bits per second.

Block

A block is a set of data treated as a logical unit. The size of a block may vary.

Bootstrap Program

A program which runs in an otherwise empty computer and controls the loading and execution of another program.

Character (byte) Oriented Device

This is a common name for terminals, paper tape readers, card readers, line printers, etc. This is a device which transfers information to/from the computer via the accumulator — A register.

Compiler

A computer program that translates high-level source code into relocatable (e.g., BRF) code.

Data Formats

The standard NORD-100 instruction set provides instructions for the following six different data formats:

- single bit
- 8-bit byte
- 16-bit word
- 32-bit double word
- 48-bit floating point word
- 32-bit floating point word

DMAC

A special version of MAC used for debugging of RT-programs and to perform patching on segments.

Flowchart

A flowchart is a graphical representation of a program.

FMAC

A special version of MAC where output goes to a file called the image-file.

High-level Language

This is a language that allows programmers to specify problem solving procedures in a notation more familiar than the computers machine code. Some examples are, FORTRAN, COBOL, ALGOL, BASIC.

Ident Code

All input/output external devices have an ident code on one or two interrupt (program) levels 10,11,12 or 13. The ident code is used to identify a device causing an interrupt.

Logical Numbers

Each device has a unique logical device number which SINTRAN III uses when accessing the device.

Mass Storage Device

This is a common name for disks, drums, mag. tapes and floppy disks.

MAC

An assembler on a NORD computer.

MACM

A modified MAC assembler used for system generation. A stand alone system and when running it has complete control of the CPU and external devices.

MACM-AREA:DATA

A system file containing the "SAVE" area for the file system and paging off area. It is a contiguous file (64 pages) starting with page 100.

Object Program

An object program is a set of machine language instructions obtained through the compilation and subsequent loading of a compiler's relocatable output, or the assembly of a source program.

Operating System

The operating system is that part of the software which supports the sharing of resources. A resource may be memory, processors or different devices.

Page

A page is a unit of information. One page is 1K = 1024 words or 2048 bytes in ND-100. Both physical and virtual memory is divided into pages.

Patch

A program modification by changing the octal code or the object code, rather than changing the source code.

Physical Device Number

Each input/output external device has an unique device number, used in the IOX control instruction when accessing the device.

Real-Time Program (RT Program)

These programs are terminal independent and have user assigned priorities. They are controlled through special commands in SINTRAN III.

There exist both System RT programs and User RT programs. System RT programs are programs included in a SINTRAN III system. The user written RT programs are loaded on segments by the RT loader.

Relocatable Code (BRF)

Compiler output which must be loaded by a loader to create machine executable code.

Segment

The basic program concept is the segment. A segment is a contiguous and limited virtual address area residing on a segment file on mass storage. A virtual address area is an image of the memory. Segments consist of an arbitrary number of contiguous 1K pages (maximum 64 pages).

Segment Files

The segment files are contiguous files on mass storage where all segments reside. A system can have 4 segment files called SEGFIL0, SEGFIL1, SEGFIL2 and SEGFIL3 respectively. (SINTRAN itself will use a certain amount of SEGFIL0. How much is printed out after a cold start or initial start.)

SINTRAN:DATA

A system file containing the "SAVE" area for RESIDENT, the system segments and the command segment. It is a contiguous file (63 pages) starting at page 1.

Software

Software is programs, languages and procedures for a computer system, as contrasted with the hardware make-up of the machine. This includes operating systems, assemblers, compilers, subroutine libraries and user application programs.

Source Program

A source program is a set of user written instructions designed to solve a problem after compilation or assembly into machine language object code.

Spooling

The technique by which output to low-speed devices (line printers) is placed into queues on faster devices (disks) while awaiting transmission to the slower devices.

Stand-alone Program

This is a program that contains its own bootstrap and hence can execute without an operating system.

System Generation Time

System generation time is the time the operating system is compiled.

Word

The NORD-100 has a 16-bit word format. The bits are conventionally numbered 0 to 15 (from right to left) with the most significant bit numbered 15 and the least significant bit numbered 0.

A word consists of two bytes of 8 bits each. The content of a NORD-100 word is conventionally represented by a 6-digit octal number.

The representation of a negative number is in the 2's complement range $-32768 \geq x \geq 32767$.

Thus, the contents of a word with all 16 bits set to zero are represented as 000000, while the contents with all bits set to one (i.e., -1) are represented as 177777.

A.4 THE BINARY AND OCTAL NUMBER SYSTEM

<i>Decimal</i>	<i>Binary</i>		<i>Octal</i>
0	000	000	00
1	000	001	01
2	000	010	02
3	000	011	03
4	000	100	04
5	000	101	05
6	000	110	06
7	000	111	07
8	001	000	10
9	001	001	11
10	001	010	12
11	001	011	13
12	001	100	14
13	001	101	15
14	001	110	16
15	001	111	17
16	010	000	20
17	010	001	21

From the above and basic knowledge of numbers

$$\text{decimal number } 135 = 1 \times 10^2 + 3 \times 10^1 + 5 \times 10^0$$

$$\text{binary } 010 \ 000 \ 111 = 2^7 + 2^2 + 2^1 + 2^0 = 135$$

$$\text{octal } \ 2 \ 0 \ 7 = 2 \times 8^2 + 0 \times 8^1 + 7 \times 8^0 = 135$$

Conversion:

From decimal to octal $135_{10} = ? \text{ octal}$

	Q	R
8)135	16	7
8) 16	2	0
8) 2	0	2
$135_{10} = \quad \quad \quad 2 \ 0 \ 7_8 = 010 \ 000 \ 111$		

Octal to decimal

2 1 6 7₈ = ? decimal

$$7 \times 8^0 = 7 \times 1 = 7$$

$$6 \times 8^1 = 6 \times 8 = 48$$

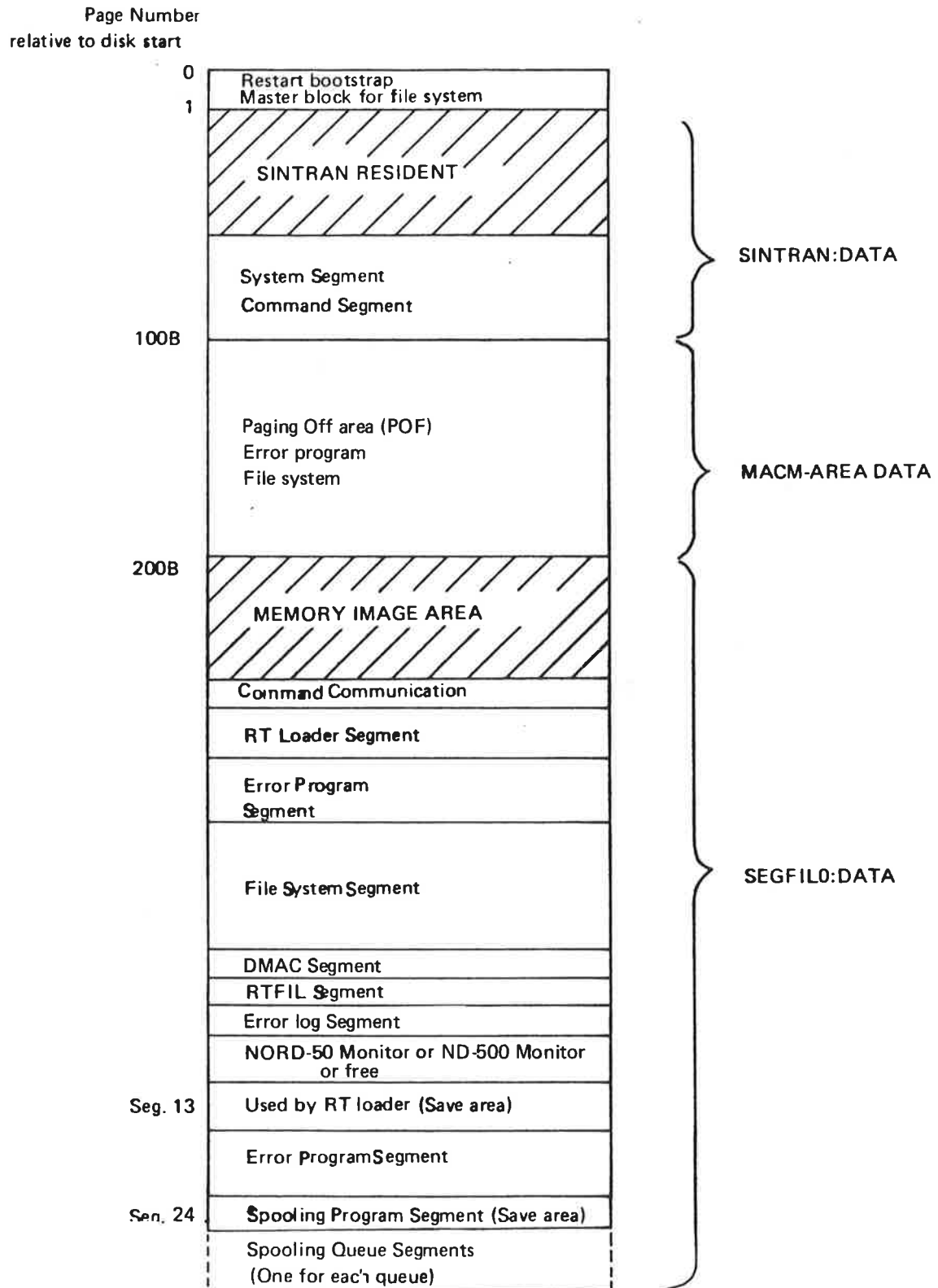
$$1 \times 8^2 = 1 \times 64 = 64$$

$$2 \times 8^3 = 2 \times 512 = 1024$$

1143

APPENDIX B

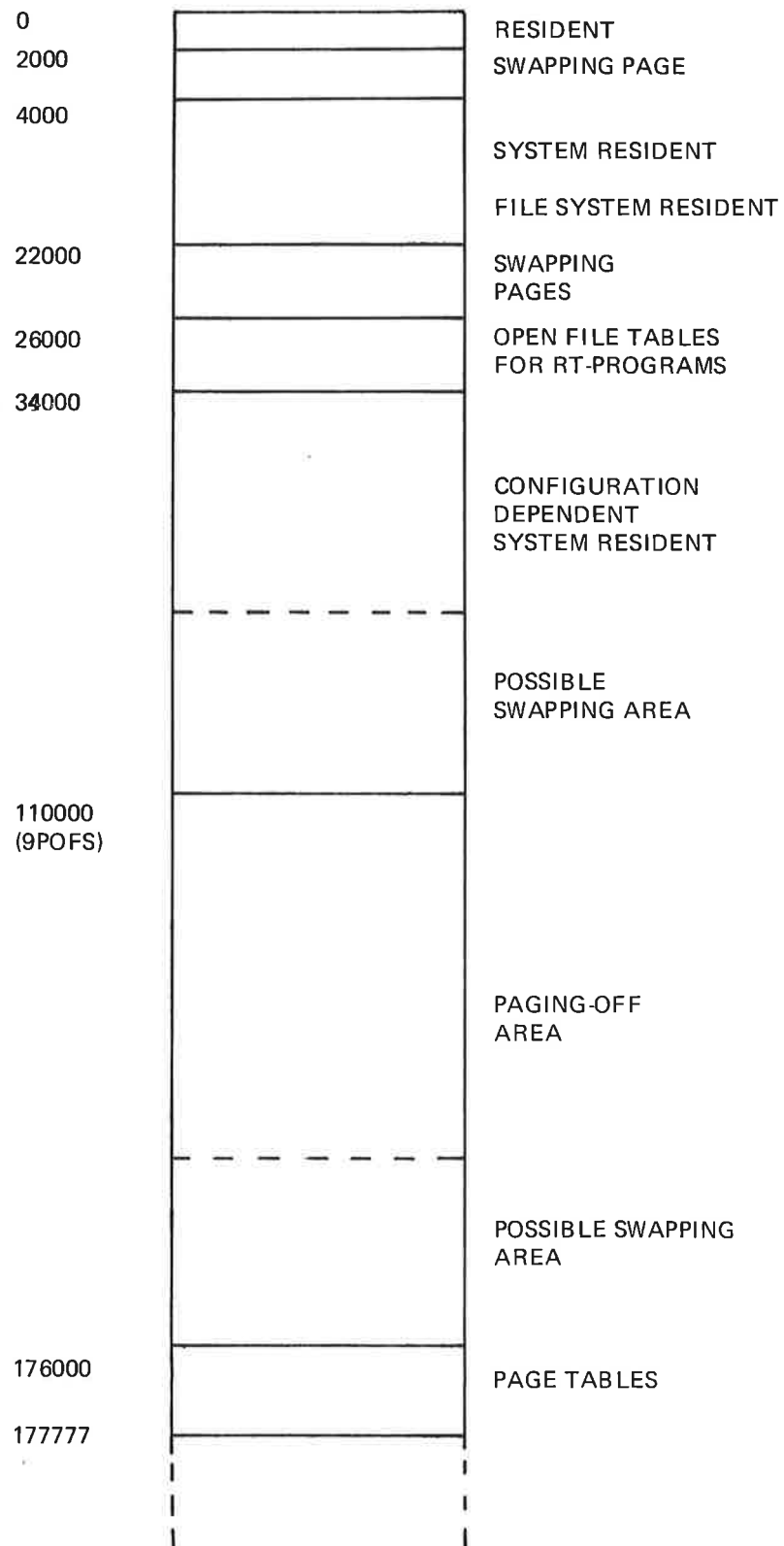
EXAMPLE OF A DISK LAYOUT



System segment 1 (4K) and Background segment 1 (64K)	}	SEGFIL0:DATA cont.
System and background 2		
System and background 3		
System and background 4		
System and background 5		
System and background 6		
System and background 7		
System and background 8		
System and background 9		
System and background 10		
System and background 11		
System and background 12		
System and background 13		
System and background 14		
Used for RJE subsystems RT programs SIBAS	}	
Free for files		

APPENDIX C

SYSTEM LAYOUT OF PHYSICAL MEMORY

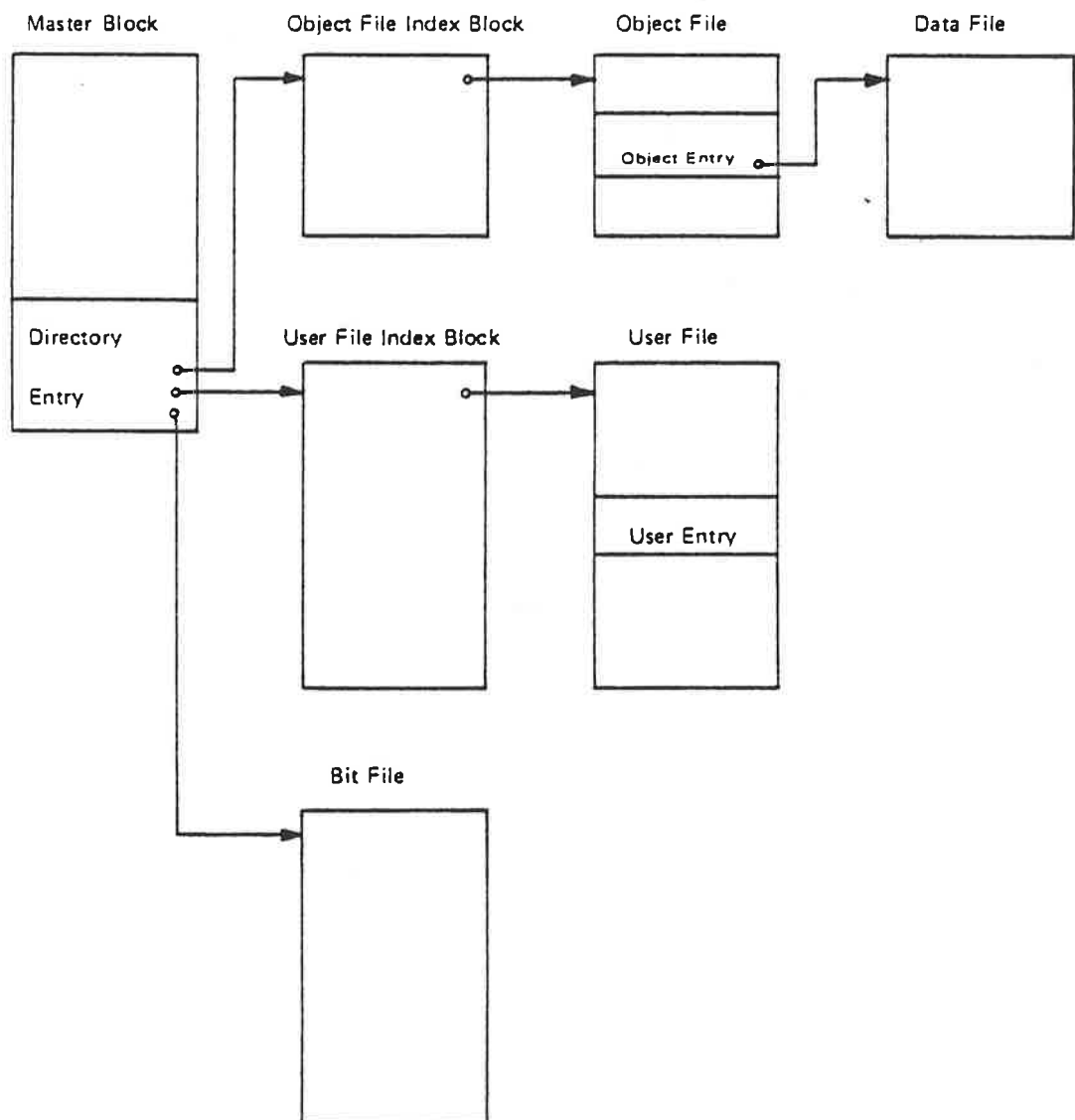


APPENDIX D

FILE SYSTEM LAYOUT

D.1 *DISK AND DRUM*

A disk or drum unit is organized by the file system in the following way:



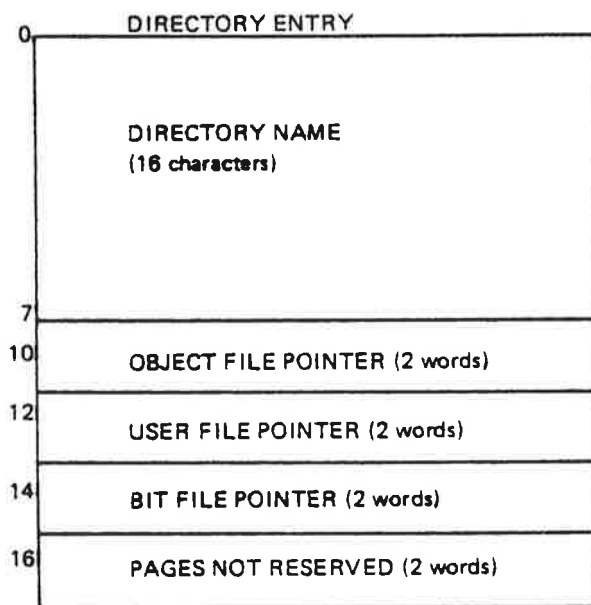
*1: The system will expand itself with a subindex block where necessary.

*2: Files are indexed when necessary.

D.1.1 *Master Block*

The master block is a 1K block located at the lowest address on the unit. Only the last part of the master block is used by the file system. The remaining part of the master block is used, for instance, for a restart program.

The last part of the master block is called the directory entry. The directory entry contains the name of the device unit (the "directory name"), pointers to three files, the bit file, the user file and the object file, and the number of pages not reserved for any users.



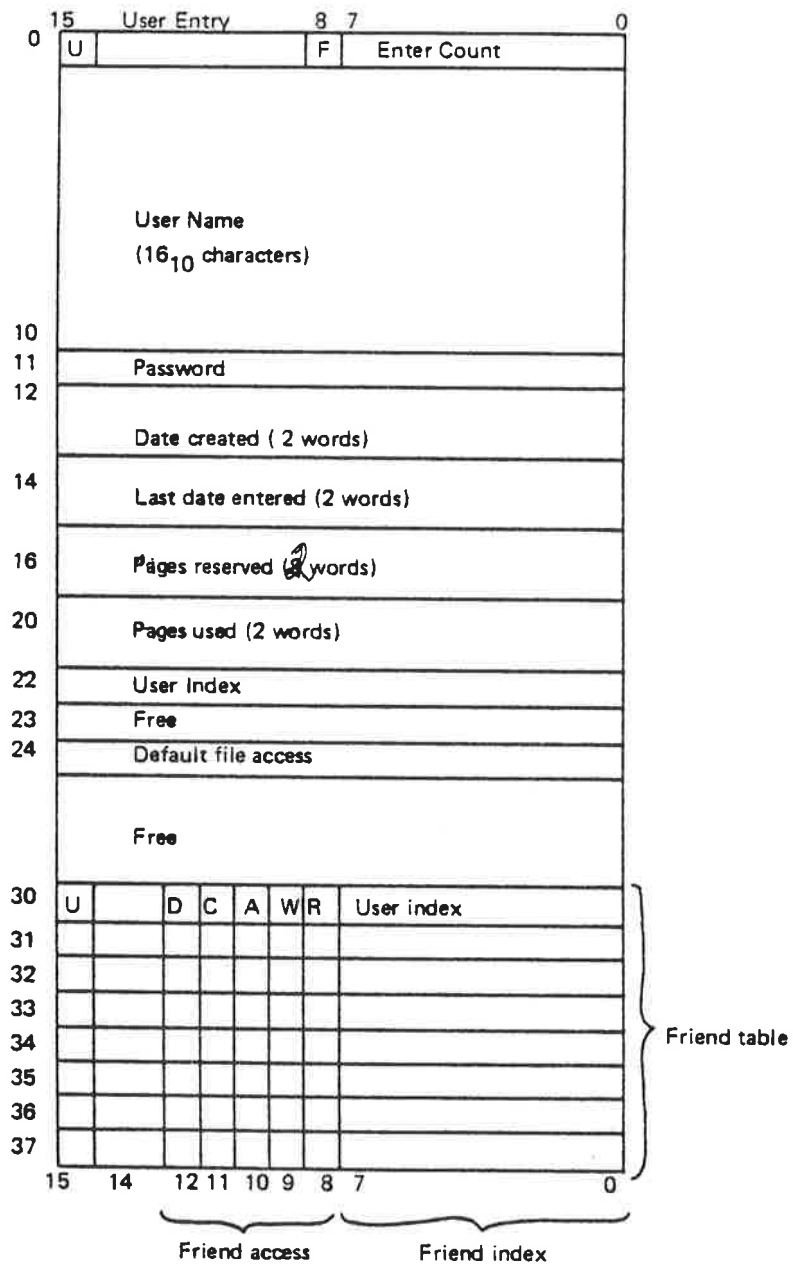
D.1.2 *Bit File*

The bit file contains a free/reserved map of the device unit. Each bit in the bit file corresponds to one page (1K) of the device unit. The page is free if the bit is 0, and occupied if the bit is one.

D.1.3 *User File*

The user file contains information about all users of the device unit. Each user has one entry in the user file. This entry contains the name of the user and a table of friends, and each friend may have different access restrictions to the user's file.

Each device unit may have 256 users.

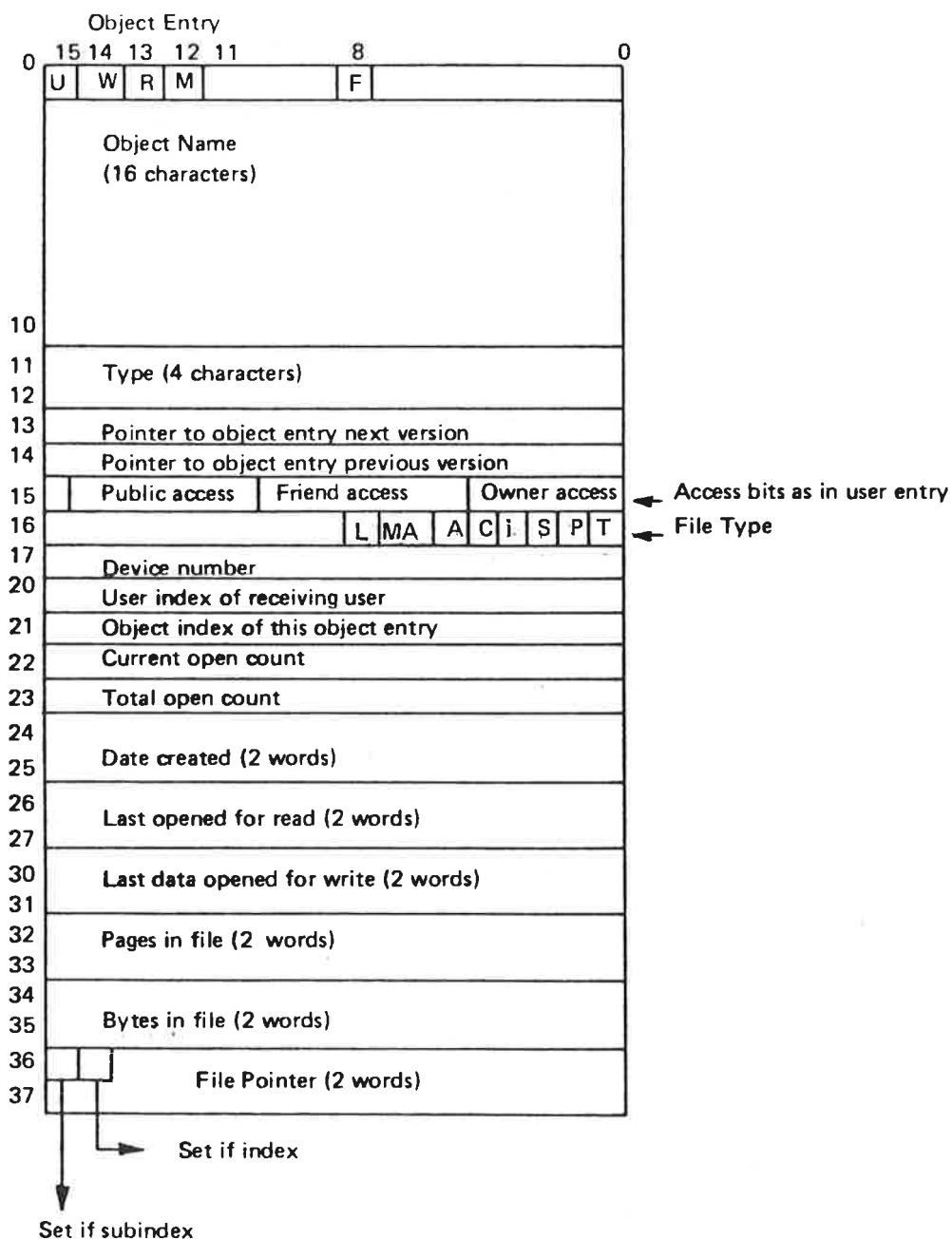


- U entry used
- D directory access
- C common access
- A append access
- W write access
- R read access
- F user/object entry flag (1 for user entry)

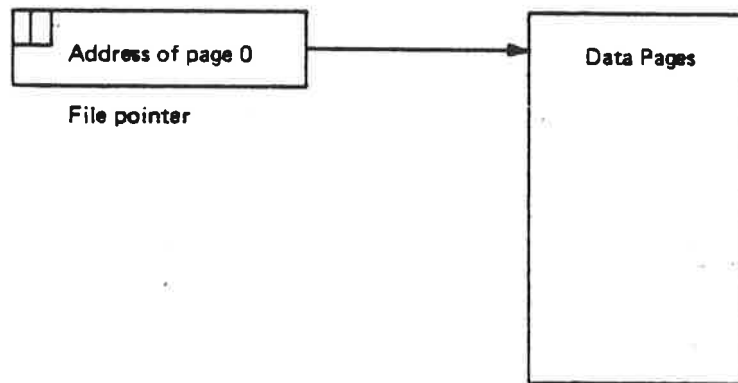
D.1.4 *Object File*

The object file contains information about all user's files on the device unit. Each file has one entry in the object file. This entry contains the name and type of the object, access restrictions, file length, version pointers, and a point to the file.

Each device unit may have 64K files, divided into 256 files for each user. User zero has object entry 0 - 255, user one object entry 256 - 511, etc.



U	entry used
W	currently opened for write
R	file reserved
M	file modified (opened for write or spooling file in use)
F	user/object entry flag (0 for object entry)
L	library file
MA	magnetic tape file
A	allocated file
C	continuous file
I	indexed file
S	spooling file
P	peripheral file
T	terminal file



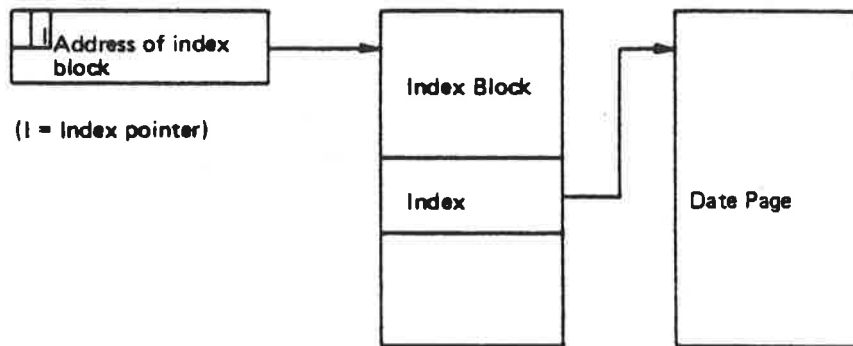
D.1.5 *Data Files*

Each object entry corresponds to a data file. The data files contain the user's data. The file user may access this data in sequential or random mode by means of a set of file access routines. Indexed files may be expanded automatically in write operations.

D.1.6 *File Layout*

A file on disk or drum is either organized as a contiguous or an index-sequential file. A contiguous file may be of any length, and is defined by start address and length.

An index-sequential file is defined by a 1K index block, which contains pointers to the 1K data pages of the file.



APPENDIX E

PHYSICAL LAYOUT OF DISKS

The file system supports a number of different disk types with different physical layout. The general structures, however, are common to all of them and will be discussed first.

All disk packs consist of one or more platters, providing a number of recordable surfaces.

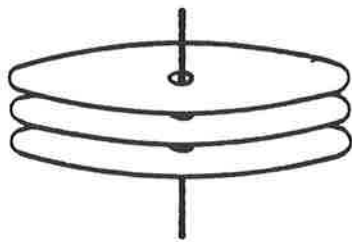


Figure E.1: DISK PACK

For a given disk, some of the surfaces are used for alignment purposes, while the rest are available for data. The available surfaces are numbered from 0 and upwards. The numbering method is disk dependent.

Each surface has a number of concentric circles, called tracks. The number of tracks is disk dependent, varying between 400 and 823 for our disk types. The tracks are numbered from 0 and upwards, starting at the outer track.

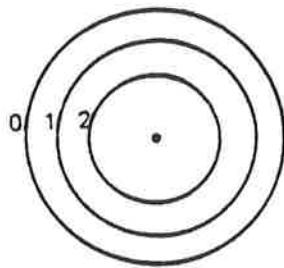


Figure E.2: SURFACE WITH TRACKS

Each surface has a track number 0, a track number 1, etc. All tracks of a given number are referred to as a cylinder. Thus, we may speak of cylinder 0 being track 0 on all surfaces.

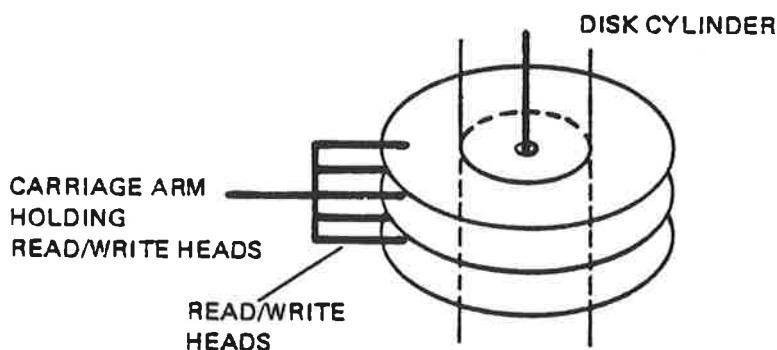


Figure E.3: DISK CYLINDER

Physical disk addresses are organized by disk cylinders, i.e., the lowest disk addresses are in cylinder 0, the next in cylinder 1, etc. This reduces carriage arm movements when accessing data at subsequent disk addresses. In each cylinder the lowest disk addresses are on surface 0, the next on surface 1, etc.

Each track is divided into sectors. The number of sectors per track is 16, 18 or 24 for our disk systems. The sectors are numbered from 0 and upwards.

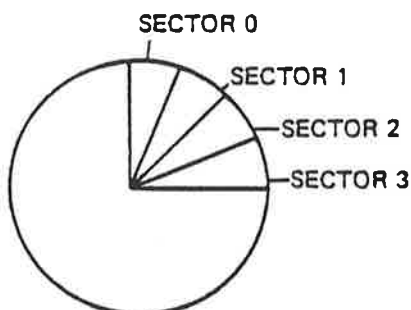


Figure E.4: SECTORS

Each sector consists of a number of 8 bit bytes. In our disk systems this number is either 256 or 1024. The number of bytes per sector is the same for all tracks on a disk. Therefore, the tracks closer to the center of the disk have a higher density than those at the edge.

The file system operates in units of pages (= 1024 words = 2048 bytes). The table below gives the physical characteristics of the disk types supported by SINTRAN III.

<i>Disk type</i>	<i>Size designation</i>	<i>Exact capacity in bytes</i>	<i>No. of surfaces</i>	<i>No. of tracks/surface</i>	<i>No. of sectors/track</i>	<i>No. of bytes/sector</i>	<i>No. of pages/cylinder</i>	<i>Total capacity in pages</i>
HAWK	5MB	4,988,928	2/pack	406	24	256	6	2,436
SMD	33MB	33,751,040	5	412	16	1024	40	16,480
SMD	66MB	67,420,160	5	823	16	1024	40	32,920
SMD	38MB	37,969,920	5	412	18	1024	45	18,540
SMD	75MB	75,847,680	5	823	18	1024	45	37,035
CMD	30MB	30,339,072	2	823	18	1024	18	14,814
CMD	60MB	60,678,144	4	823	18	1024	36	29,628
CMD	90MB	91,017,216	6	823	18	1024	54	44,442
SMD	288MB	288,221,184	19	823	18	1024	171	140,733

Figure E.5: PHYSICAL CHARACTERISTICS OF VARIOUS DISK TYPES

The numbering of the surfaces is illustrated in Figure E.6.

HAWK	0	Removable (5MB)
	1	
	2	Fixed (5MB)
	3	
FALCON	0	
SMD 33MB	1	
SMD 66MB		alignment surface
SMD 37MB	2	
SMD 75MB	3	
	4	
	0	
CMD 30MB		alignment surface
CMD 60MB	2	(for 60MB and 90MB only)
CMD 90MB	3	(for 60MB and 90MB only)
	1	
		alignment surface
	4	(for 90MB only)
	5	(for 90MB only)
	0	
SMD 288MB	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
		alignment surface
	10	
	11	
	12	
	13	
	14	
	15	
	16	
	17	
	18	

Figure E.6: NUMBERING OF DISK PACK SURFACES

APPENDIX F

EXAMPLE OF A SOFTWARE SYSTEM REPORT

NORSK DATA A/S		NORD SOFTWARE LIBRARY SOFTWARE SYSTEM REPORT		PAGE 1 OF 1
PROGRAM	NAME		PROGRAM NUMBER	
	SINTRAN-III-VS SINTRAN-III-RT (80A ONLY)		ALL	
			PART OF ND-NUMBER 10048 & 10047	
ISSUED	DATE 80.04.28	BY (INIT.) TLS	SSR NUMBER: SIN-283E	
REASON	INFORMATION	X MODIFICATION	ERROR	
SUBJECT	TO SET THE SPEED OF A TERMINAL INTERFACE FROM SOFTWARE			

DESCRIPTION, ACTION, PATCHES


1. Location TSPEED in the terminals input datafield must be set according to one of the following tables. The initial value of TSPEED is 177777.
2. It is not possible to set the speed of the current-loop interface ND 250 (1020) or the console on NORD-100 by software!!
3. If the speed of any one of the terminals on a multi-terminal interface is to be set by software, all other terminals on the same interface must also be set by software!!!
4. The software-programmed speed will be effective after the next start of SINTRAN (i.e. @RESTART-SYSTEM;)CTOM/)HENT/22!; @STOP-SYSTEM followed by <master-clear>/20!))!!!!!!
5. TSPEED should be changed in RESIDENT, IMAGE and on SINTRAN:DATA. NB!! For RT-SINTRAN only in RESIDENT (CORE).

TABLE I	Baud rate	TSPEED	TABLE II	Baud rate	TSPEED
NORMAL:	50	42	1095-card	50	377
	75	63	i.e.:	75	273
	110	377	ND 253	100	356
	134.5	104	ND 254	110	314
	150	356	ND 257	150	252
	200	125		200	335
	300	335		300	231
	600	146		600	210
	1200	273		1200	63
	1800	256		2400	42
	2400	167		4800	21
	4800	231		9600	0
	9600	210			

APPENDIX G

EXAMPLE OF A NORD SOFTWARE LIBRARY

PROGRAM DESCRIPTION

		NORD SOFTWARE LIBRARY		PAGE 1 OF 1
PROGRAM DESCRIPTION				
PROGRAM	NAME	PROGRAM	SUT-1644 J	
	QED	NUMBER		
		PART OF	10005J, 10044I	
	NO NUMBER			
COMPUTERS	<input checked="" type="checkbox"/> 10 <input type="checkbox"/> 12 <input type="checkbox"/> 50 <input checked="" type="checkbox"/> 100 <input type="checkbox"/> 500 <input type="checkbox"/> _____ <input type="checkbox"/> _____			
INSTRUCTION SET	<input checked="" type="checkbox"/> 48 BIT FL. <input checked="" type="checkbox"/> 32 BIT FL. <input type="checkbox"/> COMMERCIAL <input type="checkbox"/> _____			
OPERATING SYSTEMS	<input checked="" type="checkbox"/> SIN III VS <input type="checkbox"/> SIN III RT <input type="checkbox"/> ALONE <input type="checkbox"/> _____			
PROGRAM TYPE	<input checked="" type="checkbox"/> BINARY <input type="checkbox"/> BRJ <input type="checkbox"/> SYMBOLIC <input type="checkbox"/> _____			
DOCUMENTATION	NUMBER ND-60.031.04 TITLE QED USERS MANUAL			
ADDRESS SPACE (For Binary Programs)	BOUNDARIES	0 < 64K		
	START ADDRESS	0	RESTART ADDRESS	1
PURPOSE	Conversational editor.			

LOADING/OPERATING PROCEDURE, USE

This program uses all the virtual memory except the program area as buffers (56K).

Example of dump :

DUMP-REENTRANT QED-1644J,0,1,QED-1644J:BPUN

APPENDIX H

OPERATING THE NORD-10/S IN STOP MODE

The NORD-10/S has a microprogram in a high speed read only memory for communication between the operator and the computer. This program is called MOPC (microprogrammed operators communication) and is always running when the machine is in STOP mode (i.e., a predefined state). The NORD-10/S may either be controlled from the console terminal (usually terminal number one) or from the operator's panel.

This chapter gives information about how to communicate with MOPC, and how to use the operator's panel.

For further reference refer to the manual "NORD-10/S Reference Manual", Chapters 7 and 8.

H.1 *OPERATING NORD-10/S USING THE CONSOLE TERMINAL*

MOPC includes bootstrap programs and automatic hardware loads from both character oriented devices and mass storage devices. A bootstrap program is a program which runs in an otherwise empty computer and controls the loading and execution of another program. The following characters are taken as legal input to the MOPC:

0, 1, 2, 3,	
4, 5, 6, 7	Octal digits used to specify addresses and data
@	Restart MOPC, clear PIE (priority enable bit)
\$	Octal load
&	Binary load
!	Start program in main memory
/	Specifies register or memory cell to be examined
CR	(Carriage Return), Terminator of a line
LF	(Line Feed), Echoed, no other effect
	(Space), octal number before the space is ignored
B	Used to specify bank number
I	Internal register examine
R	Specifies operation on one of the eight registers STS, D, P, B, L, A, T, X on a specified level
*	Current location counter for memory examine

Illegal characters are ignored. A "?" is displayed to indicate input error and the Master Clear button lights up.

H—2

A summary of the different functions of MOPC and some examples are given below. All addresses, physical device numbers and levels are octal and input from user is underlined in the examples.

Functions:

Example:

START A PROGRAM
<address>!

22!; start execution in location 22

MEMORY EXAMINE
<address>/<value>

3271/004444; location 3271 contains the value 4444

MEMORY DEPOSIT
<address>/<value> <new value>

3271/004444 7711 carriage return; location 3271 now contains the value 7711, so doing a new examine on 3271 gives 3271/007711. If doing a CR after this examination the value of the content of the location immediately following will be printed out.

3271/007711 (CR)
004310

location 3272 contains the value 004310.

REGISTER EXAMINE
<level> R <register no.> /<value>

4R6/007351

The T register on level 4 has the value 7351.

REGISTER DEPOSIT

4R6/007351 117651(CR)

<level>R <register no.>/<value> <new value>

The T register on level 4 has now the value 117651. Doing a register examine now gives 4R6/117651

Register: No.

STS	0	status register
D	1	extension of A register
P	2	program counter
B	3	base register or second index register
L	4	link register
A	5	main register for arithmetic and logical operators
T	6	temporary register
X	7	index register

H—3

The NORD-10/S has 16 distinct program levels, each with their own register set. SINTRAN uses the following levels:

0	idle program
1	user programs
3	monitor
4	input and output of character monitor operations
10	character output
11	mass storage transfers
12	character input
13	real-time clock
14	internal interrupt

INTERNAL REGISTER EXAMINE	I7/076033
I <Internal Reg. No.> / <value>	The PIE register has the value 76033, i.e., normal PIE for SINTRAN III.

INTERNAL REGISTER DEPOSIT	I7/76033 76031 will change PIE to 76031
---------------------------	---

I <Internal Reg. No.> / <value> <new value>

The different internal registers and what is changed with the internal register deposit is described in the manual "NORD-10/S Reference Manual", Chapter 8.

CURRENT LOCATION COUNTER	7321/002244 * 007321
* <address where last memory examine has taken place>	

BANK NUMBER	2B177511/011313
<octal number> B	
	Location 177511 in Bank 2 contains 011313.

OCTAL LOAD	400\$
<physical device> \$	
	Octal load from tape reader.

BINARY LOAD	1560&
<physical device> &	
	Binary load from floppy disk.

H.2 OPERATING NORD-10 USING THE OPERATOR'S PANEL

The operator's panel has the following main elements:

- An 18-bit switch register
- An 18-bit light diode register
- 16 selector push buttons and 16 associated light emitting diodes
- 10 control buttons
- 6 mode indicators
- a two-digit display and two push buttons
- power on/off button
- panel key-lock

Some of the control buttons and push buttons will be explained here.

The Different Control Buttons:

Push buttons:

Power:	Press for power supply.
Master Clear:	Generates a master clear signal to all hardware devices, turns off interrupt system, should only be used when the STOP light is on. Be aware that this signal will clear the old status of the computer. Do not press this button unless you are sure you want to do so. Light in Master Clear indicates an error input to the CPU from MOPC or one of the load programs.
Restart:	This button generates a restart signal. When this signal is detected by MOPC in STOP mode, the CPU will start in address 20 _h . The restart button is often used after the command @STOP SYSTEM.
Load:	Load from the device specified in the ALD register, only when the STOP button light is on.
Set Address:	When the machine is in STOP mode and memory examination is wanted, the address may be set up in the panel switch register and the SET ADDRESS and EXM buttons pushed. The address is now saved and it is not changed before the set address button is pushed again with a new content in the switch register. The address is also changed when a memory examination is executed from the console terminal.

Note that this button is used in STOP mode only. When the machine is running, the address in the switch register is used directly.

When the machine enters STOP mode, the register used by the set address function is set to zero. This means that after a single instruction the examined address is zero.

Deposit:	When an address is selected with the SET ADDRESS button, the contents of this cell may be changed with the DEPOSIT button. The new contents are set up in the switch register and the DEPOSIT button pushed. The display selection must be EXM.
Enter Register:	This button is used to load a register. One of the registers STS, P, L, B, X, T, A or D is selected with the register selection switches. Level is selected with the level selector. The contents of the switch register are now stored in the selected register when the ENTER REGISTER button is pushed.
Single Instruction:	Pushing the SINGLE INSTRUCTION button causes a program to advance one instruction. The address is taken from the P register and the CPU goes back to STOP mode after execution of one instruction. The instruction is executed on the level given by the PIE and PID registers.
Continue:	When this button is pressed, the computer starts running from the address specified by the P register. Level is given by the contents of PIE and PID registers. If Master Clear is pressed PIE is cleared and the program is started on level 0. Light in this button indicates that CPU is running.
Stop:	This button lights when the computer is in STOP mode and MOPC is started.
Active Levels:	When this button is pushed, the data display will show the active program levels.
Data:	Displays data going to and from memory and on the I/O bus.

Exm:	<p>CPU in STOP;</p> <p>The data display will show the contents of the memory location whose address is set in the switch register when the set address button was last pushed (see above). When the CPU stops, this address is preset to zero (the selected address is always zero after pushing the single instruction button).</p> <p>CPU runs;</p> <p>The data display will show the contents of the memory location whose address is set in the switch register. The memory location is sampled after each panel interrupt (about every 20 ms).</p>
STS, P, L, B, X, T, A, D:	<p>If one of these registers are selected, the data display will show the contents of the data register.</p>
Key:	<p>When the key switch is in the lock position the 10 control buttons are disabled, and the power fail unit is switched on. On the NORD-10/S with the old panels, the 16 selector push buttons are disabled. This is not the case on the new panel.</p> <p>When the key is in the unlock position the system will not be automatically restarted after power fail, the operator has to press the restart button.</p>
Mode Indicators:	
Interrupt	indicates that the interrupt system is on.
Paging	indicates the paging system is on.
Ring	four indicators show active program protect rings.

H.3 OPERATOR'S PANEL

The NORD-10/S operator's panel depicts the complete status of the CPU.

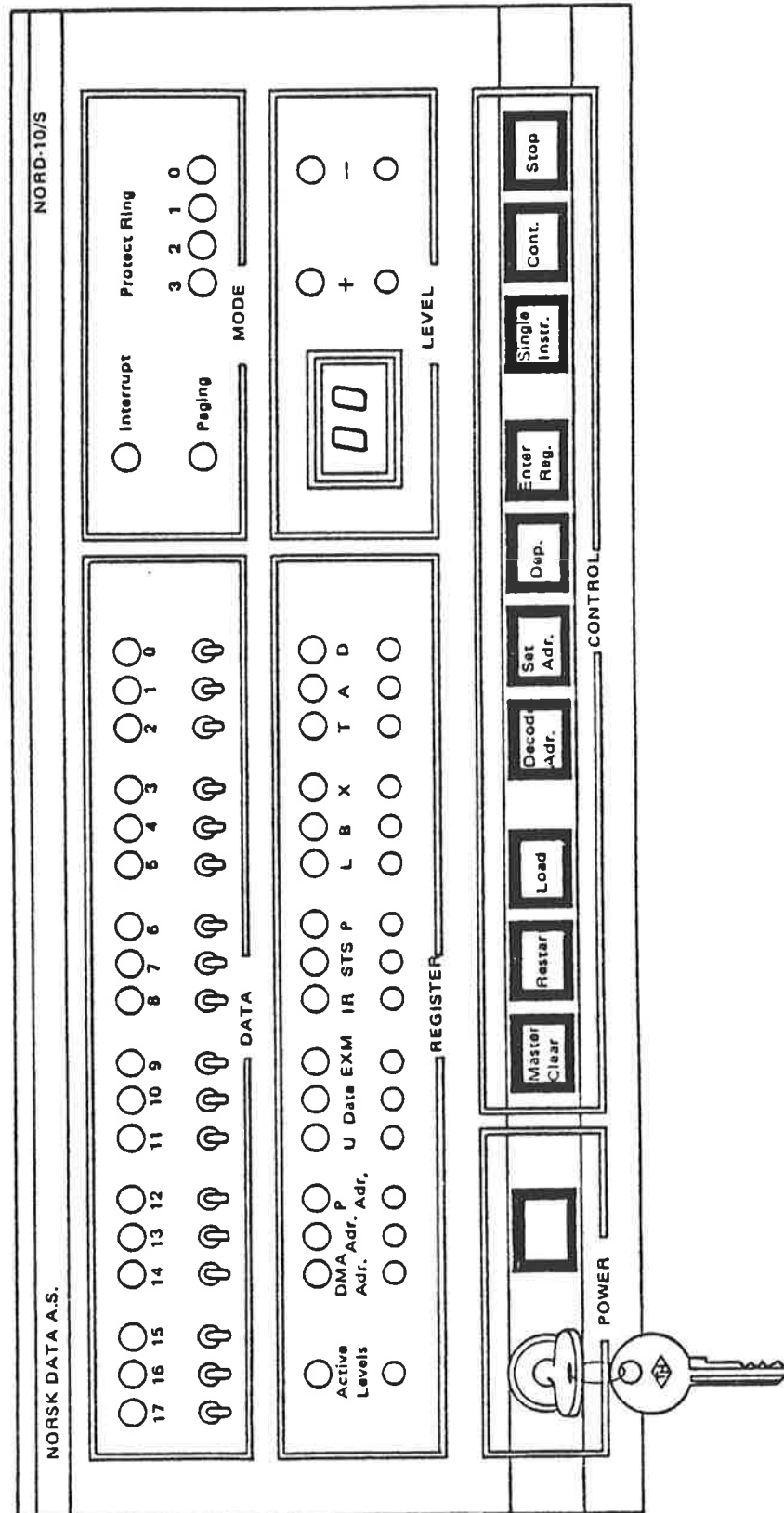


Figure H.1: OPERATOR'S PANEL — PHYSICAL LAYOUT

APPENDIX I

NORD-10/S CONFIGURATION PARAMETERS

This chapter describes how to verify that a given NORD-10/S installation has the correct configuration and how to change some configuration parameters. The configuration parameters are the ALD (Automatic Load Descriptor), IOX device numbers, ident codes and transmission speeds.

IOX device Numbers

All program controlled transfers between external devices and the CPU A register are controlled by using these device numbers (standard device numbers are used).

Ident Codes

When a device is ready for service its interface issues an interrupt to the SINTRAN III system. The ident code is used to identify the device that caused an interrupt. All I/O devices are connected to an interrupt level (10, 11, 12 or 13) in NORD-10/S.

I.1 *HOW TO VERIFY A NORD-10/S COMPUTER CONFIGURATION*

Besides individual control of each device in a computer installation it is necessary to know the connection between each device interface and the CPU. This can be done by using the program configuration investigator (CONFI-INV). The program is delivered on a diskette (See Section 5.2.8).

I.2 INTERFACE COMPONENT ADDRESSING

Before discussing the switch setting in detail and looking at some tables it is necessary to know how to locate the switches on the device interface. The component location on an interface card is addressed as shown below.

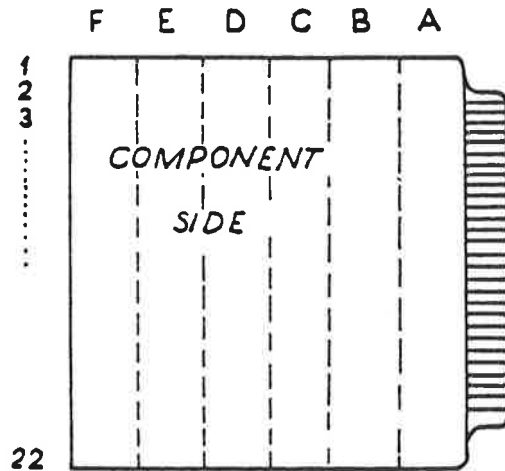


Figure I.1: THE LAYOUT OF AN INTERFACE CARD

An interface consists of 6 columns (A, B, ..., F) and about 22 rows. A switch setting is referred to as the setting in the *rth* row and the *ith* column, e.g., 15E means a switch setting located in row 15, column E.

The interface card is seen from the component side, with the contacts to the right.

A particular switch X in the setting is referred to as the *Xth* switch in the *rth* row in column *i*, e.g., 15E 4 means switch 4 in the switch setting located in row 15 and column E.

Each interface card has a predefined position in one of the three crates A, B or C. A crate has 32 positions numbered from left to right.

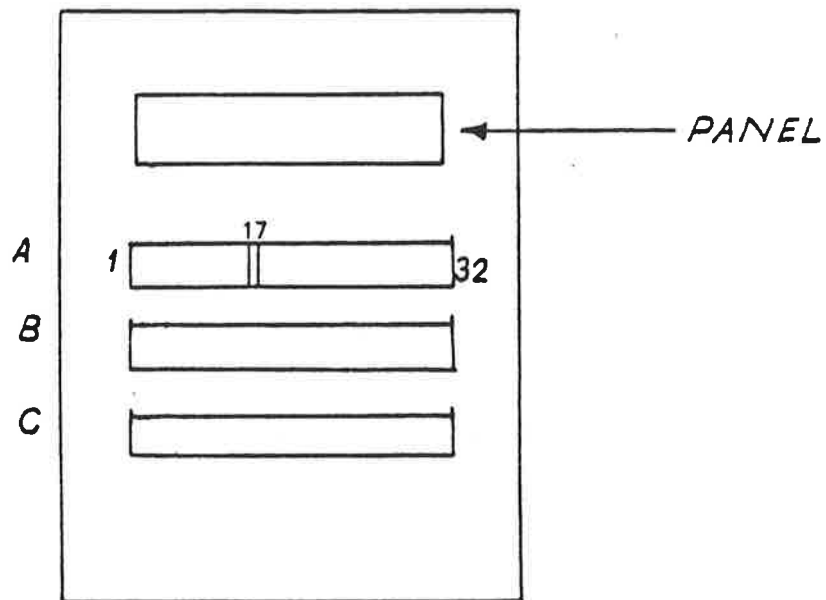


Figure I.2: THE CRATES IN A NORD-10/S

Example:

An interface card located in A17 means that the card is found in crate A position 17. Most of the interface cards are given a name and a number, which is printed on them.

I.3

THE ALD REGISTER

The NORD-10/S has a 16-bit switch register called the Automatic Load Descriptor (ALD). This register specifies the load procedure to be used when the LOAD button is pushed or when a single \$ or & is typed on the operator console.

The NORD-10/S MOPC includes bootstrapping programs and automatic hardware load from both character-oriented devices and mass storage devices.

When loading from mass storage, 1K words will be read from mass storage address 0 into main memory starting in address 0. After successfully loading, the CPU is started in main memory address 0. If an error occurs the loading is terminated and ? is typed on the console and control is returned to MOPC.

The different ALD settings are:

20500	cartridge disk controller 1
20510	cartridge disk controller 2
21540	big disk, great disk and Phoenix disk
20540	drum controller 1
20550	drum controller 2
01560	floppy disk
00400	tape reader

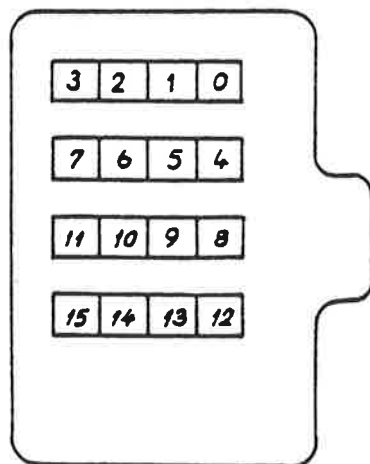
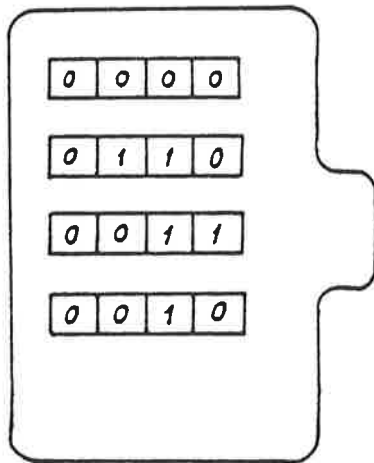


Figure I.3: THE LAYOUT OF THE ALD INTERFACE CARD

There are four switch settings to be set. The ALD register is placed on an interface card named PANEL DRIVER located in A17.



*Figure I.4: THE LAYOUT OF THE ALD INTERFACE CARD FOR MASS STORAGE
LOAD FROM BIG DISK (ON = 1, OFF = 0)*

Exercise with answer:

Exercise;

Say ALD setting is 21540 and we want a load from (1) big disk, (2) floppy disk, (3) tape reader. What do we do?

Answer;

- (1) Press LOAD or type \$ or &
- (2) Type 1560&
- (3) Type 400\$

I.4 *SETTING OF DEVICE NUMBERS, IDENT CODES AND TRANSMISSION SPEEDS*

The system supervisor may have to change the settings of IOX device numbers, ident codes and transmission speeds of certain interface cards. Some tables are needed for this purpose.

I.4.1 *Synchronous Modem Coding*

On the NORD-10/S 1050 Synchronous Modem Buffer Card there are two select functions to be set.

Select 1: Device number, Position 15E

Select 2: Ident code, Position 1E

15E 4 3 2 1 → to finger contacts 1E 4 3 2 1 → to finger contacts

Device No.(IOX)	Modem No.(octal)	Ident Code	Device No.				Ident Code			
			15E1	15E2	15E3	15E4	1E1	1E2	1E3	1E4
100	1(0)	4	OFF	OFF	OFF	OFF	OFF	ON	ON	ON
110	2(1)	14	OFF	OFF	OFF	ON	OFF	OFF	ON	ON
120	3(2)	20	OFF	OFF	ON	OFF	ON	ON	OFF	ON
130	4(3)	24	OFF	OFF	ON	ON	OFF	ON	OFF	ON

I.4.2 Asynchronous Modem Coding

On the NORD-10/S 1046 asynchronous modem buffer card there are three select functions to be set.

Select 1: Device number

Position 13B

4 3 2 1 → to finger contacts

Device No. (IOX)	Terminal No.	13B1	13B2	13B3	13B4
200	1	OFF	OFF	OFF	OFF
210	2	OFF	OFF	OFF	ON
220	3	OFF	OFF	ON	OFF
230	4	OFF	OFF	ON	ON
240	5	OFF	ON	OFF	OFF
250	6	OFF	ON	OFF	ON
260	7	OFF	ON	ON	OFF
270	8	OFF	ON	ON	ON
1200	9	ON	OFF	OFF	OFF
1210	10	ON	OFF	OFF	ON
1220	11	ON	OFF	ON	OFF
1230	12	ON	OFF	ON	ON
1240	13	ON	ON	OFF	OFF
1250	14	ON	ON	OFF	ON
1260	15	ON	ON	ON	OFF
1270	16	ON	ON	ON	ON

Select 2: Transmission speed

Position 1B

4 3 2 1 → to finger contacts

	1B1	1B2	1B3	1B4	
110 baud	OFF	ON	OFF	ON	
150 baud	ON	ON	ON	OFF	
300 baud	ON	ON	OFF	OFF	
600 baud	ON	OFF	OFF	OFF	
1200 baud	ON	ON	ON	ON	STRAP
2400 baud	ON	ON	ON	OFF	STRAP
4800 baud	ON	ON	OFF	OFF	STRAP
9600 baud	ON	OFF	OFF	OFF	STRAP

STRAP means break connection between terminal 4 and C1. Connect C1 to C2.

Select 3: Ident code

Position 1C

6 5 4 3 2 1 + to finger contacts

Teletype Number	Ident Code	1C1	1C2	1C3	1C4	1C5	1C6
1	60	ON	ON	ON	ON	OFF	OFF
2	61	OFF	ON	ON	ON	OFF	OFF
3	62	ON	OFF	ON	ON	OFF	OFF
4	63	OFF	OFF	ON	ON	OFF	OFF
5	64	ON	ON	OFF	ON	OFF	OFF
6	65	OFF	ON	OFF	ON	OFF	OFF
7	66	ON	OFF	OFF	ON	OFF	OFF
8	67	OFF	OFF	OFF	ON	OFF	OFF
9	70	ON	ON	ON	OFF	OFF	OFF
10	71	OFF	ON	ON	OFF	OFF	OFF
11	72	ON	OFF	ON	OFF	OFF	OFF
12	73	OFF	OFF	ON	OFF	OFF	OFF
13	74	ON	ON	OFF	OFF	OFF	OFF
14	75	OFF	ON	OFF	OFF	OFF	OFF
15	76	ON	OFF	OFF	OFF	OFF	OFF
16	77	OFF	OFF	OFF	OFF	OFF	OFF

1.4.3 *Device Number and Ident Code Selection for Dual Async. V24 Modem Buffer Card*

Device numbers and ident codes are selected by the switches in positions 10A and 6E. The two interfaces on one card has consecutive device numbers and ident codes. The switches are binary coded and other combinations than those in the table may be used. Switch number 6E8 is not used.

DEVICE NUM- BERS							IDENT CODES							
	10A6 BA9	10A5 BA8	10A4 BA7	10A3 BA6	10A2 BA5	10A1 BA4		6E7 7	6E6 6	6E5 5	6E4 4	6E3 3	6E2 2	6E1 1
200	OFF	OFF	ON	OFF	OFF	OFF	60	OFF	OFF	ON	ON	OFF	OFF	OFF
210	OFF	OFF	ON	OFF	OFF	OFF	61	OFF	OFF	ON	ON	OFF	OFF	OFF
220	OFF	OFF	ON	OFF	OFF	ON	62	OFF	OFF	ON	ON	OFF	OFF	ON
230	OFF	OFF	ON	OFF	OFF	ON	63	OFF	OFF	ON	ON	OFF	OFF	ON
240	OFF	OFF	ON	OFF	ON	OFF	64	OFF	OFF	ON	ON	OFF	ON	OFF
250	OFF	OFF	ON	OFF	ON	OFF	65	OFF	OFF	ON	ON	OFF	ON	OFF
260	OFF	OFF	ON	OFF	ON	ON	66	OFF	OFF	ON	ON	OFF	ON	ON
270	OFF	OFF	ON	OFF	ON	ON	67	OFF	OFF	ON	ON	OFF	ON	ON
300	OFF	OFF	ON	ON	OFF	OFF	120	OFF	ON	OFF	ON	OFF	OFF	OFF
310	OFF	OFF	ON	ON	OFF	OFF	121	OFF	ON	OFF	ON	OFF	OFF	OFF
320	OFF	OFF	ON	ON	OFF	ON	122	OFF	ON	OFF	ON	OFF	OFF	ON
330	OFF	OFF	ON	ON	OFF	ON	123	OFF	ON	OFF	ON	OFF	OFF	ON
340	OFF	OFF	ON	ON	ON	OFF	44	OFF	OFF	ON	OFF	OFF	ON	OFF
350	OFF	OFF	ON	ON	ON	OFF	45	OFF	OFF	ON	OFF	OFF	ON	OFF
360	OFF	OFF	ON	ON	ON	ON	46	OFF	OFF	ON	OFF	OFF	ON	ON
370	OFF	OFF	ON	ON	ON	ON	47	OFF	OFF	ON	OFF	OFF	ON	ON
1100	ON	OFF	OFF	ON	OFF	OFF	130	OFF	ON	OFF	ON	ON	OFF	OFF
1110	ON	OFF	OFF	ON	OFF	OFF	131	OFF	ON	OFF	ON	ON	OFF	OFF
1120	ON	OFF	OFF	ON	OFF	ON	132	OFF	ON	OFF	ON	ON	OFF	ON
1130	ON	OFF	OFF	ON	OFF	ON	133	OFF	ON	OFF	ON	ON	OFF	ON
1140	ON	OFF	OFF	ON	ON	OFF	134	OFF	ON	OFF	ON	ON	ON	OFF
1150	ON	OFF	OFF	ON	ON	OFF	135	OFF	ON	OFF	ON	ON	ON	OFF
1160	ON	OFF	OFF	ON	ON	ON	136	OFF	ON	OFF	ON	ON	ON	ON
1170	ON	OFF	OFF	ON	ON	ON	137	OFF	ON	OFF	ON	ON	ON	ON

DEVICE NUM- BERS							IDENT CODES							
	10A6 BA9	10A5 BA8	10A4 BA7	10A3 BA6	10A2 BA5	10A1 BA4		6E7 7	6E6 6	6E5 5	6E4 4	6E3 3	6E2 2	6E1 1
1200	ON	OFF	ON	OFF	OFF	OFF	70	OFF	OFF	ON	ON	ON	OFF	OFF
1210	ON	OFF	ON	OFF	OFF	OFF	71	OFF	OFF	ON	ON	ON	OFF	OFF
1220	ON	OFF	ON	OFF	OFF	ON	72	OFF	OFF	ON	ON	ON	OFF	ON
1230	ON	OFF	ON	OFF	OFF	ON	73	OFF	OFF	ON	ON	ON	OFF	ON
1240	ON	OFF	ON	OFF	ON	OFF	74	OFF	OFF	ON	ON	ON	ON	OFF
1250	ON	OFF	ON	OFF	ON	OFF	75	OFF	OFF	ON	ON	ON	ON	OFF
1260	ON	OFF	ON	OFF	ON	ON	76	OFF	OFF	ON	ON	ON	ON	ON
1270	ON	OFF	ON	OFF	ON	ON	77	OFF	OFF	ON	ON	ON	ON	ON
1300	ON	OFF	ON	ON	OFF	OFF	50	OFF	OFF	ON	OFF	ON	OFF	OFF
1310	ON	OFF	ON	ON	OFF	ON	51	OFF	OFF	ON	OFF	ON	OFF	OFF
1320	ON	OFF	ON	ON	OFF	ON	52	OFF	OFF	ON	OFF	ON	OFF	ON
1330	ON	OFF	ON	ON	OFF	ON	53	OFF	OFF	ON	OFF	ON	OFF	ON
1340	ON	OFF	ON	ON	ON	OFF	54	OFF	OFF	ON	OFF	ON	ON	OFF
1350	ON	OFF	ON	ON	ON	OFF	55	OFF	OFF	ON	OFF	ON	ON	OFF
1360	ON	OFF	ON	ON	ON	ON	56	OFF	OFF	ON	OFF	ON	ON	ON
1370	ON	OFF	ON	ON	ON	ON	57	OFF	OFF	ON	OFF	ON	ON	ON

BAUD RATE	BIT	OUTPUT				INPUT				SWITCHES			
		7	6	5	4	3	2	1	0	15F4	15F3	15F2	15F1
0		1	1	1	1	1	1	1	1	ON	ON	ON	ON
0		1	1	1	0	1	1	1	0	ON	ON	ON	OFF
50		1	1	0	1	1	1	0	1	ON	ON	OFF	ON
75		1	1	0	0	1	1	0	0	ON	ON	OFF	OFF
110		0	0	0	0	0	0	0	0	OFF	OFF	OFF	OFF
134.5		1	0	1	1	1	0	1	1	ON	OFF	ON	ON
150		0	0	0	1	0	0	0	1	OFF	OFF	OFF	ON
200		1	0	1	0	1	0	1	0	ON	OFF	ON	OFF
300		0	0	1	0	0	0	1	0	OFF	OFF	ON	OFF
600		1	0	0	1	1	0	0	1	ON	OFF	OFF	ON
1200		0	1	0	0	0	1	0	0	OFF	ON	OFF	OFF
1800		0	1	0	1	0	1	0	1	OFF	ON	OFF	ON
2400		1	0	0	0	1	0	0	0	ON	OFF	OFF	OFF
2400		0	0	1	1	0	0	1	1	OFF	OFF	ON	ON
4800		0	1	1	0	0	1	1	0	OFF	ON	ON	OFF
9600		0	1	1	1	0	1	1	1	OFF	ON	ON	ON

1.4.4 Terminal Buffer (NORD-10 1095) Interface

Device Number Selection

Device numbers are selected by the switches in position 9B. The combinations are:

Device No. (IOX)	Terminal/Modem No.	9B1	9B2	9B3	9B4	9B5	
200	1	OFF	OFF	OFF	OFF	OFF	Asynchronous modem
210	2	OFF	OFF	OFF	OFF	ON	
220	3	OFF	OFF	OFF	ON	OFF	
230	4	OFF	OFF	OFF	ON	ON	
240	5	OFF	OFF	ON	OFF	OFF	
250	6	OFF	OFF	ON	OFF	ON	
260	7	OFF	OFF	ON	ON	OFF	
270	8	OFF	OFF	ON	ON	ON	
300	1	OFF	ON	OFF	OFF	OFF	Teletype display
310	2	OFF	ON	OFF	OFF	ON	
320	3	OFF	ON	OFF	ON	OFF	
330	4	OFF	ON	OFF	ON	ON	
340	5	OFF	ON	ON	OFF	OFF	
350	6	OFF	ON	ON	OFF	ON	
360	7	OFF	ON	ON	ON	OFF	
370	8	OFF	ON	ON	ON	ON	
1200	9	ON	OFF	OFF	OFF	OFF	Asynchronous modem
1210	10	ON	OFF	OFF	OFF	ON	
1220	11	ON	OFF	OFF	ON	OFF	
1230	12	ON	OFF	OFF	ON	ON	
1240	13	ON	OFF	ON	OFF	OFF	
1250	14	ON	OFF	ON	OFF	ON	
1260	15	ON	OFF	ON	ON	OFF	
1270	16	ON	OFF	ON	ON	ON	
1300	9	ON	ON	OFF	OFF	OFF	Teletype display
1310	10	ON	ON	OFF	OFF	ON	
1320	11	ON	ON	OFF	ON	OFF	
1330	12	ON	ON	OFF	ON	ON	
1340	13	ON	ON	ON	OFF	OFF	
1350	14	ON	ON	ON	OFF	ON	
1360	15	ON	ON	ON	ON	OFF	
1370	16	ON	ON	ON	ON	ON	

Input Channel (To the Computer):

SWITCH SETTING					IOX (GP + 1) CONTENT IN A REGISTER										
	15E4	15E3	15E2	15E1	Bit 7				Bit 0				Octal		
9600	ON	ON	ON	ON	X	X	X	X	0	0	0	0	0		
4800	ON	ON	ON	OFF	X	X	X	X	0	0	0	1	1		
2400	ON	ON	OFF	ON	X	X	X	X	0	0	1	0	2		
1200	ON	ON	OFF	OFF	X	X	X	X	0	0	1	1	3		
600	OFF	ON	ON	ON	X	X	X	X	1	0	0	0	10		
300	OFF	ON	ON	OFF	X	X	X	X	1	0	0	1	11		
200	OFF	OFF	ON	OFF	X	X	X	X	1	1	0	1	15		
150	OFF	ON	OFF	ON	X	X	X	X	1	0	1	0	12		
110	OFF	OFF	ON	ON	X	X	X	X	1	1	0	0	14		
100	OFF	OFF	OFF	ON	X	X	X	X	1	1	1	0	16		
75	OFF	ON	OFF	OFF	X	X	X	X	1	0	1	1	13		
50	OFF	OFF	OFF	OFF	X	X	X	X	1	1	1	1	17		

Output Channel (From the Computer):

SWITCH SETTING					IOX (GP + 1) CONTENT IN A REGISTER										Octal
15E8	15E7	15E6	15E5	Bit 7				Bit 0							
9600	ON	ON	ON	ON	0	0	0	0	X	X	X	X	000		
4800	ON	ON	ON	OFF	0	0	0	1	X	X	X	X	020		
2400	ON	ON	OFF	ON	0	0	1	0	X	X	X	X	040		
1200	ON	ON	OFF	OFF	0	0	1	1	X	X	X	X	060		
600	OFF	ON	ON	ON	1	0	0	0	X	X	X	X	200		
300	OFF	ON	ON	OFF	1	0	0	1	X	X	X	X	220		
200	OFF	OFF	ON	OFF	1	1	0	1	X	X	X	X	320		
150	OFF	ON	OFF	ON	1	0	1	0	X	X	X	X	240		
110	OFF	OFF	ON	ON	1	1	0	0	X	X	X	X	300		
100	OFF	OFF	OFF	ON	1	1	1	0	X	X	X	X	340		
75	OFF	ON	OFF	OFF	1	0	1	1	X	X	X	X	260		
50	OFF	OFF	OFF	OFF	1	1	1	1	X	X	X	X	360		

Note:

Input and output baud rates are selected by the same IOX instruction. If the A register is set to octal value 14 before the IOX instruction is executed, 110 baud will be selected for input, and 9600 baud will be selected for output. To get 110 baud on both the input and output channel, the octal value 314 should be placed in the A register before the IOX instruction is executed.

Terminal Buffer 1095

Select 3: Ident code

Position IE

7 6 5 4 3 2 1 → to finger contacts

Teletype/ Modem No.			Ident							
			Code	IE7	IE6	IE5	IE4	IE3	IE2	IE1
1	200		60	ON	OFF	OFF	ON	ON	ON	ON
2	210		61	ON	OFF	OFF	ON	ON	ON	OFF
3	220		62	ON	OFF	OFF	ON	ON	OFF	ON
4	230	Async. modem	63	ON	OFF	OFF	ON	ON	OFF	OFF
5	240		64	ON	OFF	OFF	ON	OFF	OFF	ON
6	250		65	ON	OFF	OFF	ON	OFF	ON	OFF
7	260		66	ON	OFF	OFF	ON	OFF	OFF	ON
8	270		66	ON	OFF	OFF	ON	OFF	OFF	OFF
1	300		1	ON	ON	ON	ON	ON	ON	OFF
2	310		5	ON	ON	ON	ON	OFF	ON	OFF
3	320		6	ON	ON	ON	ON	OFF	OFF	ON
4	330	Teletype display	7	ON	ON	ON	ON	OFF	OFF	OFF
5	340		44	ON	OFF	ON	ON	OFF	ON	ON
6	350		45	ON	OFF	ON	ON	OFF	ON	OFF
7	360		46	ON	OFF	ON	ON	OFF	OFF	ON
8	370		47	ON	OFF	ON	ON	OFF	OFF	OFF
9	1200		70	ON	OFF	OFF	OFF	ON	ON	ON
10	1210		71	ON	OFF	OFF	OFF	ON	ON	OFF
11	1220		72	ON	OFF	OFF	OFF	ON	OFF	ON
12	1230	Async. modem	73	ON	OFF	OFF	OFF	ON	OFF	OFF
13	1240		74	ON	OFF	OFF	OFF	OFF	ON	ON
14	1250		75	ON	OFF	OFF	OFF	OFF	ON	OFF
15	1260		76	ON	OFF	OFF	OFF	OFF	OFF	ON
16	1280		77	ON	OFF	OFF	OFF	OFF	OFF	OFF
9	1300		50	ON	OFF	ON	OFF	ON	ON	ON
10	1310		51	ON	OFF	ON	OFF	ON	ON	OFF
11	1320		52	ON	OFF	ON	OFF	ON	OFF	ON
12	1330	Teletype display	53	ON	OFF	ON	OFF	ON	OFF	OFF
13	1340		54	ON	OFF	ON	OFF	OFF	ON	ON
14	1350		55	ON	OFF	ON	OFF	OFF	ON	OFF
15	1360		56	ON	OFF	ON	OFF	OFF	OFF	ON
16	1370		57	ON	OFF	ON	OFF	OFF	OFF	OFF

Select 3: Ident code

Position 1E

6 5 4 3 2 1 → to finger contacts

Teletype Number	IOX	Code Ident	1E1	1E2	1E3	1E4	1E5	1E6
1	300	1	OFF	ON	ON	ON	ON	ON
2	310	5	OFF	ON	OFF	ON	ON	ON
3	320	6	ON	OFF	OFF	ON	ON	ON
4	330	7	OFF	OFF	OFF	ON	ON	ON
5	340	44	ON	ON	OFF	ON	ON	OFF
6	350	45	OFF	ON	OFF	ON	ON	OFF
7	360	46	ON	OFF	OFF	ON	ON	OFF
8	370	47	OFF	OFF	OFF	ON	ON	OFF
9	1300	50	ON	ON	ON	OFF	ON	OFF
10	1310	51	OFF	ON	ON	OFF	ON	OFF
11	1320	52	ON	OFF	ON	OFF	ON	OFF
12	1330	53	OFF	OFF	ON	OFF	ON	OFF
13	1340	54	ON	ON	OFF	OFF	ON	OFF
14	1350	55	OFF	ON	OFF	OFF	ON	OFF
15	1360	56	ON	OFF	OFF	OFF	ON	OFF
16	1370	57	OFF	OFF	OFF	OFF	ON	OFF

I.4.5 *Device Number and Ident Code Selection for 4 Async. Current Loop Buffer Card*

Device numbers and ident codes are selected by the switches in positions 10A and 6E. The two interfaces on one card has consecutive device numbers and ident codes. The switches are binary coded and other combinations than those in the table may be used. Switch number 10A6 is not used.

DEVICE NUMBERS						IDENT CODES							
	10A6	10A5	10A4	10A3	10A2	10A1		6E6	6E5	6E4	6E3	6E2	6E1
	None	BA9	BA8	BA7	BA6	BA5		7	6	5	4	3	2
200		OFF	OFF	ON	OFF	OFF	60	OFF	OFF	ON	ON	OFF	OFF
210		OFF	OFF	ON	OFF	OFF	61	OFF	OFF	ON	ON	OFF	OFF
220		OFF	OFF	ON	OFF	OFF	62	OFF	OFF	ON	ON	OFF	OFF
230		OFF	OFF	ON	OFF	OFF	63	OFF	OFF	ON	ON	OFF	OFF
240		OFF	OFF	ON	OFF	ON	64	OFF	OFF	ON	ON	OFF	ON
250		OFF	OFF	ON	OFF	ON	65	OFF	OFF	ON	ON	OFF	ON
260		OFF	OFF	ON	OFF	ON	66	OFF	OFF	ON	ON	OFF	ON
270		OFF	OFF	ON	OFF	ON	67	OFF	OFF	ON	ON	OFF	ON
300		OFF	OFF	ON	ON	OFF	120	OFF	ON	OFF	ON	OFF	OFF
310		OFF	OFF	ON	ON	OFF	121	OFF	ON	OFF	ON	OFF	OFF
320		OFF	OFF	ON	ON	OFF	122	OFF	ON	OFF	ON	OFF	OFF
330		OFF	OFF	ON	ON	OFF	123	OFF	ON	OFF	ON	OFF	OFF
340		OFF	OFF	ON	ON	ON	44	OFF	OFF	ON	OFF	OFF	ON
350		OFF	OFF	ON	ON	ON	45	OFF	OFF	ON	OFF	OFF	ON
360		OFF	OFF	ON	ON	ON	46	OFF	OFF	ON	OFF	OFF	ON
370		OFF	OFF	ON	ON	ON	47	OFF	OFF	ON	OFF	OFF	ON
1100		ON	OFF	OFF	ON	OFF	130	OFF	ON	OFF	ON	ON	OFF
1110		ON	OFF	OFF	ON	OFF	131	OFF	ON	OFF	ON	ON	OFF
1120		ON	OFF	OFF	ON	OFF	132	OFF	ON	OFF	ON	ON	OFF
1130		ON	OFF	OFF	ON	OFF	133	OFF	ON	OFF	ON	ON	OFF
1140		ON	OFF	OFF	ON	ON	134	OFF	ON	OFF	ON	ON	ON
1150		ON	OFF	OFF	ON	ON	135	OFF	ON	OFF	ON	ON	ON
1160		ON	OFF	OFF	ON	ON	136	OFF	ON	OFF	ON	ON	ON
1170		ON	OFF	OFF	ON	ON	137	OFF	ON	OFF	ON	ON	ON

DEVICE NUMBERS						IDENT CODES						
10A6	10A5	10A4	10A3	10A2	10A1		6E6	6E5	6E4	6E3	6E2	6E1
None	BA9	BA8	BA7	BA6	BA5		7	6	5	4	3	2
1200	ON	OFF	ON	OFF	OFF	70	OFF	OFF	ON	ON	ON	OFF
1210	ON	OFF	ON	OFF	OFF	71	OFF	OFF	ON	ON	ON	OFF
1220	ON	OFF	ON	OFF	OFF	72	OFF	OFF	ON	ON	ON	OFF
1230	ON	OFF	ON	OFF	OFF	73	OFF	OFF	ON	ON	ON	OFF
1240	ON	OFF	ON	OFF	ON	74	OFF	OFF	ON	ON	ON	ON
1250	ON	OFF	ON	OFF	ON	75	OFF	OFF	ON	ON	ON	ON
1260	ON	OFF	ON	OFF	ON	76	OFF	OFF	ON	ON	ON	ON
1270	ON	OFF	ON	OFF	ON	77	OFF	OFF	ON	ON	ON	ON
1300	ON	OFF	ON	ON	OFF	50	OFF	OFF	ON	OFF	ON	OFF
1310	ON	OFF	ON	ON	OFF	51	OFF	OFF	ON	OFF	ON	OFF
1320	ON	OFF	ON	ON	OFF	52	OFF	OFF	ON	OFF	ON	OFF
1330	ON	OFF	ON	ON	OFF	53	OFF	OFF	ON	OFF	ON	OFF
1340	ON	OFF	ON	ON	ON	54	OFF	OFF	ON	OFF	ON	ON
1350	ON	OFF	ON	ON	ON	55	OFF	OFF	ON	OFF	ON	ON
1360	ON	OFF	ON	ON	ON	56	OFF	OFF	ON	OFF	ON	ON
1370	ON	OFF	ON	ON	ON	57	OFF	OFF	ON	OFF	ON	ON

BAUD RATE	OUTPUT				INPUT				SWITCHES			
	7	6	5	4	3	2	1	0	15F4	15F3	15F2	15F1
0	1	1	1	1	1	1	1	1	ON	ON	ON	ON
0	1	1	1	0	1	1	1	0	ON	ON	ON	OFF
50	1	1	0	1	1	1	0	1	ON	ON	OFF	ON
75	1	1	0	0	1	1	0	0	ON	ON	OFF	OFF
110	0	0	0	0	0	0	0	0	OFF	OFF	OFF	OFF
134.5	1	0	1	1	1	0	1	1	ON	OFF	ON	ON
150	0	0	0	1	0	0	0	1	OFF	OFF	OFF	ON
200	1	0	1	0	1	0	1	0	ON	OFF	ON	OFF
300	0	0	1	0	0	0	1	0	OFF	OFF	ON	OFF
600	1	0	0	1	1	0	0	1	ON	OFF	OFF	ON
1200	0	1	0	0	0	1	0	0	OFF	ON	OFF	OFF
1800	0	1	0	1	0	1	0	1	OFF	ON	OFF	ON
2400	1	0	0	0	1	0	0	0	ON	OFF	OFF	OFF
2400	0	0	1	1	0	0	1	1	OFF	OFF	ON	ON
4800	0	1	1	0	0	1	1	0	OFF	ON	ON	OFF
9600	0	1	1	1	0	1	1	1	OFF	ON	ON	ON

APPENDIX J

OPERATOR'S INTERACTION WITH NORD-100

J.1 CONTROL PANEL PUSH BUTTONS

When the panel key is unlocked, the panel push buttons are active and have the following effect:

MCL This is the MASTER CLEAR button used to force the computer system into a defined initialized state. First, the red and green indicator lamps on the CPU board will light up. Then the micro-program is forced to execute the master clear routine. This will also be executed when the MACL command is given to MOPC (refer to Section J.2.1), when the CPU goes through the power up sequence, or when the bus line called MCL is activated by an interface.

The master clear routine turns off the green indicator lamp, then the PIE register is cleared. The paging and interrupt systems are turned off. The paging system is set in REX mode. Subsequent memory examine functions with MOPC are set to 24 bit physical examine mode. The CPU self test microprogram is executed. If no errors are found, the green indicator lamp is lit, and the terminal interface on the CPU board (the MOPC terminal) is initialized to receive and transmit 7 bits and even parity. Parity is not checked by MOPC on input. An interrupt level change to level 0 is then executed. After this the CPU will be in stop mode.

STOP This push button has the same effect as giving the STOP command to MOPC. The CPU will enter stop mode and MOPC will be active.

LOAD This push button has the same effect as writing \$ or & to MOPC. Its exact effect is determined by the setting of the ALD thumb-wheel switch on the CPU board (See Section J.2.4).

OPCOM OPCOM is always operative in stop mode. When the machine is running, pressing this button will allow the operator to use the CPU board terminal for operator communication. When the CPU is running, it will enable MOPC to read input from the terminal interface located on the CPU board. It will also inhibit input interrupts from this terminal, and disable the transfer of data from the terminal interface to any macro program (main memory program). The terminal interface will be in this state until the escape character is typed, or the CPU is stopped and restarted.

When MOPC is entered a # is printed at the beginning of each line.

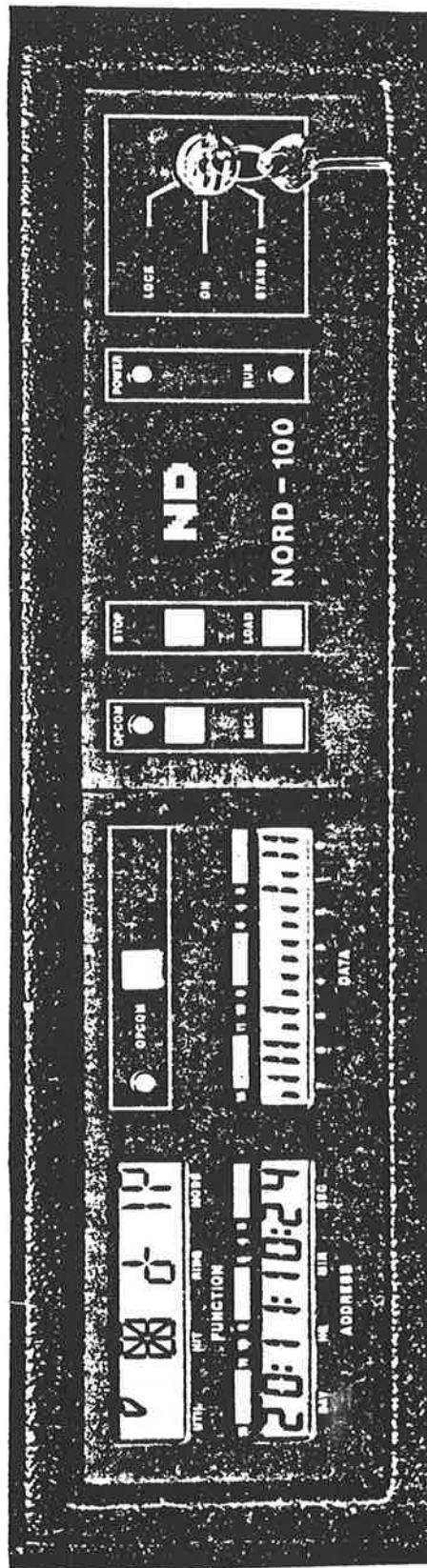


Figure J.1: OPERATOR'S PANEL

J.1.1 *The Panel Lock Key*

The Panel Lock Key has three positions:

1. LOCK

When placed in this position, the operator's panel control switches are disabled. This is the normal position for an operating machine. Main power is applied to the computer.

Note: Automatic restart may be initiated after power failure only if the lock key is in this position.

2. ON

In this position the panel switches can be operated. Main power is applied to the computer.

3. STAND-BY

In this position the main power is disabled. Stand-by voltage is applied to memory and display. This position will not be present (or valid) on machines delivered from January 1980.

J.1.2 *Status Indicators*

POWER ON

Indicates that +5V is present in the rack.

RUN

Indicates that the CPU is running.

OPCOM

Indicates that the operators communication microprogram is running. This light may also be lit in RUN mode by pressing the OPCOM button. (OPCOM and RUN are lit at the same time). The OPCOM light will always be lit when the computer is not running.

Note: When OPCOM and RUN are lit at the same time, input from the console terminal will only interact with the OPCOM microprogram. Output to console may come from OPCOM or the active program.

J.2 MICROPROGRAMMED OPERATOR'S COMMUNICATION

J.2.1 General Considerations

The NORD-100 has a microprogram in the read only memory for communication between the operator and the machine. This program is called MOPC (Micro-programmed Operator's Communication) and is used for operational control of the NORD-100. It includes such functions as memory and register examine and deposit, breakpoint control, bootstrap loading, etc.

Whenever entered, MOPC will perform the necessary communication with the terminal connected to the current loop interface on the CPU printed circuit board. This terminal will be shared as output device between MOPC and other possible programs. As input device MOPC will receive input from the terminal as long as the OPCOM lamp on the operator's panel is lit.

MOPC will never wait if the terminal is not ready for the transmission of characters. Instead, it will start executing the STOP routine or the running program. MOPC will then be dormant until next time it is entered, and continue with the tasks it had to postpone. The maximum time spent in MOPC is 20 μ s. If MOPC does not have any activity to sustain on the terminal, it will use 6 μ s every time it is entered.

The NORD-100 operator's communication includes bootstrap programs and automatic hardware load from both character oriented devices and mass storage devices.

When communicating with the MOPC program, the following characters are legal input characters:

Characters legal in STOP or RUN:

<i>Character:</i>	<i>Use:</i>
0 - 7	Octal digits used to specify addresses and data.
A - Y	Letters used to specify commands and register names. Letters typed in succession are acted upon when CR (carriage return) or / is typed. Different letter combinations may have the same effect because of a scrambling algorithm used to pack the letters.
@ or (space)	All characters written before this character are ignored (break character).
<	Used to separate lower and upper bounds in dump commands.

/	Specifies memory or register examine.
␣ (carriage return)	Ends a line. Used to terminate commands or to perform a register or memory deposit function.
*	This character will cause the address of the last examined memory address to be printed.
"escape"	Terminates the communication between the CPU board terminal and MOPC. This character has no effect if the CPU is in STOP mode.

Characters only legal in STOP:

<i>Character:</i>	<i>Use:</i>
!	Start program in main memory command.
Z	Single instruction command.
\$ or &	Bootstrap load command.
*	Breakpoint command.
"	Manual instruction command.
#	Start microprogrammed memory test.

All other characters are answered with a ?, and characters written before the erroneous character will be forgotten (as if "space" had been typed).

J.2.2 *Control Functions (Does not affect display)*

J.2.2.1 SYSTEM CONTROL

J.2.2.1.1 Master Clear

When MACL \square is written to MOPC, the CPU microprogram will execute the master clear routine. The effect of this routine is described in the section on Panel Pushbuttons.

J.2.2.1.2 Stop

When STOP \square is written to MOPC, the CPU will stop execution of the program in main memory. No level change will be performed and program execution can be continued by typing the exclamation mark character.

J.2.2.1.3 ALD Load

In the following table the different columns signify:

ALD	Position of the ALD thumbwheel switch on the CPU board (refer to Appendix A).
I12	Corresponding value of the internal register number 12.
POW OK	Indicates the action performed when the panel key is locked and power comes on (or hardware master clear is finished), and standby power has been on all the time since power last went off.
POW NOK	Indicates the action performed when the panel key is locked and power comes on (or hardware master clear is finished), and standby power has been missing for some time since power last went off.
LOAD	Indicates the action performed if the load button is pressed, or \$ or & is written to MOPC.

ALD	I12	STB POW OK	STB POW NOK	LOAD
15	0	Start in address 20	Stop	Nothing
14	1560	Start in address 20	Binary load from 1560	Binary load from 1560
13	20500	Start in address 20	Mass load from 500	Mass load from 500
12	21540	Start in address 20	Mass load from 1540	Mass load from 1540
11	400	Start in address 20	Binary load from 400	Binary load from 400
10	1600	Start in address 20	Binary load from 1600	Binary load from 1600
9		Start in address 20		
8		Start in address 20		
7	100000	Stop	Stop	Nothing
6	101560	Binary load from 1560	Binary load from 1560	Binary load from 1560
5	120500	Mass storage from 500	Mass storage from 500	Mass storage from 500
4	121540	Mass storage from 1540	Mass storage from 1540	Mass storage from 1540
3	100400	Binary load from 400	Binary load from 400	Binary load from 400
2	101600	Binary load from 1600	Binary load from 1600	Binary load from 1600

J.2.2.1.4 General Load

Binary load is started by typing:

<physical device address> & or <physical device address> \$

Loading will take place from the specified device. This device must conform with the programming specifications of either Teletype or tape reader. The device address is the lowest address associated with the device. Binary load will be performed if & or \$ is written (or the LOAD button is pressed) and the switch selected ALD has bit 13 equal to "0".

J.2.2.1.5 Leave MOPC

ESCAPE

If the ESCAPE key is pressed and the CPU is running, MOPC will be left, and subsequent input from the terminal will be routed to main memory programs. MOPC will be entered again by pushing the OPCOM button on the panel, or by executing the instruction 150400 (OPCOM).

J.2.2.2 PROGRAM EXECUTION

J.2.2.2.1 Start Program

Format:

xxxxxx !

The machine is started in the address given by the octal number. The address will be physical or virtual depending on whether the paging system is on or off.

J.2.2.2.2 Continue a Program

If the octal number is omitted, the P register is used as start address, i.e., this is a "continue function". The program level will be the same as when the computer was stopped (if Master Clear has not been pushed or the MACL command typed).

J.2.2.2.3 Single Instruction

xxxxxxZ

A single Z character will cause one main memory instruction (or one interrupt level change) to be executed. If an octal argument is specified, the specified number of instructions are executed, after which stop mode is entered again. Page faults, protect violations and interrupt level changes are executed correctly, but are counted as extra instructions. An extra overhead of approximately 3 μ s is introduced between each instruction when the CPU is in this semi-RUN mode.

J.2.2.2.4 Instruction Breakpoint

xxxxxx.

This command starts execution in the same semi-RUN mode as described in Section J.2.2.2.3. When the program address xxxxxx is reached, execution stops before that address is executed, and a "." is printed. If the specific address is never reached, the semi-RUN mode continues until a character other than 0-7 or A-Y is typed.

J.2.2.2.5 Manual Instruction

xxxxxx''

This command starts continuous execution of the instruction specified as argument. The execution stops when a character other than 0-7 or A-Y is typed.

Example:

150410'' is an easy way to turn on the paging system.

J.2.2.2.6 Single I/O Instruction Function

xxxxxxIO/

This function executes an IOX instruction with xxxxxx as device number. The output data is taken from the OPR register (see Section J.2.3.3.5). Returned data is printed after the slash and not stored anywhere. No working registers are affected.

J.2.2.3 MISCELLANEOUS FUNCTIONS

J.2.2.3.1 Internal Memory Test

xxx#

When the # character is typed, memory test of the addresses between the B register (lower limit) and the X register (upper limit) is performed in segment xxx. If the test is successful, # is typed when finished. If the test is unsuccessful, ? is typed and the test stops at the failing address. The registers then contain the following information:

T: Failing bits
 P: Failing address
 D: Error pattern
 L: Test pattern
 B: Start address
 X: Stop address

J.2.2.3.2 Delete Entry

When @ or ␣ (space) is typed, all characters written before this character are ignored.

J.2.2.3.3 Current Location Counter

When * is typed, an octal number is printed indicating the current physical or virtual address on which a memory examine or memory deposit will take place. The current location counter is set by the examine command /, and it is incremented for each time carriage return is typed afterwards.

J.2.3 *MONITOR FUNCTIONS (Also shown on Display)*

J.2.3.1 MEMORY FUNCTIONS

J.2.3.1.1 Physical Examine Mode

E ɹ

Subsequent examine will be in physical memory with a 24 bit address. Default mode after master clear.

J.2.3.1.2 Virtual Examine Mode

nE ɹ

This command will change the examine mode for subsequent memory examine functions. n is in the range 0-3 and specifies the page table via which the examine address shall be mapped. Page fault and memory protect violation are ignored, and physical page 0 used instead.

J.2.3.1.3 Memory Examine

Format:

xxxxxx /

The octal number before the character "/" specifies the memory address.

When the "/" is typed, the contents of the specified memory cell are printed out as an octal number.

If a \square (carriage return) is given, the contents of the next memory cell are printed out.

If the paging system is used, examine mode may be selected by an E command (see Section J.2.3.2). If virtual examine is specified page faults and protect violations are ignored. In this case, <octal number> specifies a virtual address. If physical examine is specified, <octal number> may contain up to 24 bits of physical address.

Example:

717/003456	% Examine address 717
717/003456 \square	% Examine address 717
003450 \square	% and 720
000013	% and 721

J.2.3.1.4 Memory Deposit

Format:

xxxxxx \square

After a memory examine, the contents of the memory cell may be changed by typing an octal number terminated by CR. If the CPU is running, "DEP" must be written between the number and CR.

Example:

717/003456 3475 \square	% The contents of
003450 1700 \square	% address 717 is changed
000123 \square	% From 3456 to 3475 and 720
123456	% is changed from 3450 to 1700.
	% 721 contains 123 and remains
	% unchanged.

J.2.3.1.5 DEPOSIT RULES

Content is only changed by zzzzzz \square in STOP mode and by zzzzzzDEP \square in STOP or RUN mode.

Content is unchanged by \square in STOP or RUN mode and zzzzzz \square in RUN mode (? is answered).

J.2.3.1.6 Memory Dump

xxxxxx < yyyyyy \square

The contents of the memory addresses between xxxxxx and yyyyyy are printed out, with 8 addresses per line. The dump is taken from the 64K area last addressed by a preceding memory examine function. A memory examine function should always be done before a memory dump. The dumping will stop if any key is pressed.

J.2.3.2 REGISTER FUNCTIONS

J.2.3.2.1 Register Examine

Format:

xx Ry/

The first octal (xx) number specifies the program level (0-17). If this number is omitted, program level zero is assumed.

The second octal number (y) specifies which register to examine on that level. The following codes apply:

- 0 Status register, bits 0-7
- 1 D register
- 2 P register
- 3 B register
- 4 L register
- 5 A register
- 6 T register
- 7 X register

After the "/" is typed, the contents of the register are printed out.

Example:

R5/ A register level 0
7R2/ P register level 7

Instead of the notation 'Ry, it is possible to address registers by their names. The names are single letter names, namely: S, D, P, B, L, A, T, X corresponding to R0-R7 respectively.

J.2.3.2.2 Register Deposit

Format:

xxxxxx ␣

After a register examine, the contents of the register may be changed by typing an octal number terminated by CR. If the CPU is running, "DEP" must be written between the number and CR.

Examples:

A/ 123456 54321 ␣

% Contents of A register on level 0
% is changed to 054321

7P/ 000044 55 ␣

% Contents of P register on level 7
% is changed to 000055

J.2.3.2.3 Register Dump

xx < yy RD ␣

The contents of the working registers in register blocks xx to yy are printed out, with one register block per line. The registers are printed in the following order: STS, D, P, B, L, A, T, X.

If only one register block should be printed, xx must be equal to yy.

Note the case: <RD ␣ dump register block on level 0.

J.2.3.2.4 User Register

U/

The last value written by TRR LMP, is selected as display source.

J.2.3.2.5 Operator Panel "Switches"

OPR/

This selects a scratch register where a code to be read by TRA OPR can be deposited. Content of OPR can be read and changed from the console.

J.2.3.3 INTERNAL REGISTER FUNCTIONS

J.2.3.3.1 Internal Register Examine

Format:

I xx /

The octal number (xx) specifies which internal register is examined. The following codes apply:

0	PANS	Operator's Panel Status, used by operator's panel micro-program.
1	STS	Status register.
2	OPR	Operator's panel switch register, simulated by a scratch register.
3	PSR	Paging status register.
4	PVL	Previous program level.
5	IIC	Internal interrupt code.
6	PID	Priority interrupt detect.
7	PIE	Priority interrupt enable.
10	CSR	Cache status register, for maintenance only.
11	ACTL	Current level, decoded.
12	ALD	Automatic load descriptor.
13	PES	Memory error status.
14	PCR	Paging control register. The examined register belongs to the program level controlled by bits 3-6 of the A register.
15	PEA	Memory error address.
16	Spare	Do not use.
17	Spare	Do not use.

Examples:

17/ 030013 % Present content of PIE is 030013

J.2.3.3.2 Internal Register Deposit

Format:

xxxxx 3

After an internal register examine the contents of the internal register with the same internal register code may be changed by typing an octal number terminated by CR. If the CPU is running, "DEP" must be written between the number and CR. For deposit, the following internal register codes apply:

0	PANC	Operator's panel control, used by operator's panel microprogram.
1	STS	Status register. Only bits 0-7 will be changed.
2	LMP	Writes into a scratch register that may be displayed by writing U/ to MOPC.
3	PCR	Paging control register.
4	Spare	Do not use.
5	IIE	Internal interrupt enable.
6	PID	Priority interrupt detect.
7	PIE	Priority interrupt enable.
10	CCLR	Cache Clear.
11	LCILR	Lower cache inhibit limit register.
12	UCILR	Upper cache inhibit limit register.
13	Spare	Do not use.
14	Spare	Do not use.
15	ECCR	Error correction control register.
16	Spare	Do not use.
17	Spare	Do not use.

Examples:

I7/ 030013 0 3	% Examine PIE and change to 000000
I12/ 021540 20044 3	% Examine ALD and change UCILR % to 020044

J.2.3.3.3 Internal Register Dump

IRD \downarrow

The 16 internal registers are printed out. This function is only allowed when the CPU is in STOP mode. This restriction avoids the unintentional unlocking of PEA, PES and IIC when the CPU is running.

J.2.3.3.4 Scratch Register Dump

xx < yy RDE \downarrow

The contents of the 8 scratch registers (only microprogram accessible) in the register blocks xx to yy are printed out, with one register block per line. This function is useful for microprogram debugging only.

J.2.4 *Display Functions (Affects Only Display)*

J.2.4.1 DISPLAYED FORMAT (AFFECTS ONLY DISPLAY)

uuzzyx F ␣

This command will define the display format when the optional display unit is included in the system. uuzzyx are octal digits and define the chosen format. F, without argument, (or with argument equal to zero) will set the default display format which is octal format. The parts of the argument have the following effect:

- x Number representation code.
- x = 0 Displayed data is in octal representation. zz have no effect.
- x = 1 Displayed data is in unary representation, i.e., 4 of the bits in the displayed data are used to light one out of 16 indicators. zz indicates which 4 bits to decode.
- x = 2 Displayed data is in binary representation. zz has no effect.
- y Afterglow code.
- y = 0 no afterglow in display
- y = 1 zeros are stretched.
- y = 2 ones are stretched.
- y = 3 zeros and ones are stretched.
- zz lower start bit for unary display.
- zz = 0-24₈ Position of lowest bit position to be represented in unary representation.
- uu Display processor maintenance codes (4 bits).
- uu = 1 Display year and month.
- uu = 2 Inhibit message.
- uu = 4 Initialize panel processor.
- uu = 10 Abort message.

Example:

1421F ␣

After this format specification, bits 14₈ - 17₈ will be shown in unary representation with afterglow on ones. (If the display shows an address, this is equivalent to push the DECODE ADDRESS button on NORD-10/S.)

J.2.4.2 DISPLAY MEMORY BUS

xy BUS/

This command is only useful when the optional display is included in the system. The memory bus is displayed, and depending on the argument xy, various types of bus information can be sampled and displayed. Read from cache is not displayed.

x = 0 = CD	CPU Data is displayed
x = 1 = DD	DMA Data is displayed
x = 2 = CA	CPU Address is displayed
x = 3 = DA	DMA Address is displayed

y = 0	nothing is displayed
y = 1 = R	only read accesses are displayed
y = 2 = W	only write accesses are displayed
y = 3 = WR	both read and write accesses are displayed

Example:

23 BUS/

All addresses sent from the CPU to memory will be displayed in the DATA field and "CAWR" is shown in the FUNCTION field.

J.2.4.3 DISPLAY ACTIVITY

ACT/

With this display mode active levels, clock and indicator functions are displayed.

J.2.5 *Bootstrap Loaders*

The NORD-100 has bootstrap loaders for both mass storage and character oriented devices. There are two different load formats:

- Binary format load
- Mass storage load

Octal load is not implemented in NORD-100.

J.2.5.1 BINARY FORMAT LOAD

Binary load is started by typing:

<physical device address> & or <physical device address> \$

Loading will take place from the specified device. This device must conform with the programming specifications of either Teletype or tape reader. The device address is the lowest address associated with the device. Binary load will be performed if & or \$ is written (or the LOAD button is pressed) and the switch selected ALD has bit 13 equal to "0".

The binary information must obey the following format:



- A Any characters not including ! (ASCII 41₈).
- B (Optional) octal number (any number of digits) terminated with a CR (line feed is ignored).
- C (Optional) octal number terminated with the character ! (see below).
- ! Indicates start of binary information (ASCII 41₈).
- E Block start address. Presented as two bytes (16 bits), most significant byte first.
- F Word count. Presented as two bytes (16 bits), most significant byte first (E, F and H are not included in F).
- G Binary information. Each word (16 bits) presented as two bytes, most significant byte first.
- H Checksum. Presented as two bytes (16 bits), most significant byte first. The checksum is the 16 bit arithmetic sum of all words in G.
- I Action code. If I is a blank (zero), then the program is started in the address previously found in the octal number (see above). If I is not a blank, then control is returned to the operator's communication. (The number B will be found in the P register.)

If no device address precedes the & command, then the & is equivalent to pushing the LOAD button on the operator's panel.

If a checksum error is detected, "?" is typed on the console and control is returned to the operator's communication.

Note that the binary loader does not require any of the main memory.

The binary load will change the registers on level 0.

The binary load format is compatible with the format dumped by the)BPUN command in the MAC assembler.

J.2.5.2 MASS STORAGE LOAD

Mass storage load is started in the same way as binary format load, except that bit 13 in the device address should be a "1".

When loading from mass storage, 1K words will be read from mass storage address 0 into main memory starting in address 0. After a successful load, the CPU is started in main memory address 0.

The mass storage device must conform with either drum or disk programming specifications.

J.2.5.3 AUTOMATIC LOAD DESCRIPTOR

The NORD-100 has a thumbwheel switch called the Automatic Load Descriptor (ALD) (CPU card). This switch selects a 16 bit value to use when the LOAD button is pushed or when a single \$ or & is typed.

The 16 bit value has the following meaning:

15	14	13	12	11												0
0	0	M	0		Address											

M Mass Storage Load

If this bit (bit 13) is 1, mass storage load is taken from the device whose (lowest) address is found in bits 0-10 (unit 0).

If bit 13 is 0, binary load is taken from the device whose (lowest) address is found in bits 0-10.

J.3 *THE DISPLAY*

J.3.1 *General*

The optional display part of the panel is present if the machine has the memory management module installed. This module contains, in addition to the memory management system and cache memory, a display processor. The display processor controls the activity on the display.

There is one button on the display part, the "OPCOM" button. This button has the same function as the other "OPCOM" button on the operator's panel. The display part of the panel may be placed outside the cabinet (in another room, etc.). Therefore, it is practical to have an "OPCOM" button on this part of the panel.

J.3.2 *The Different Display Functions*

Figure J.3.1 shows the normal activity on the display when the machine is running.

The DATA Field displays information in binary or octal format (See Section J.2.4.1) possible contents are:

Active Levels (Only Binary)

The active levels in the computer will be shown. There are 16 positions (0-15), one for each level. A one () is set in one of these positions, indicating the active level. The display is provided with afterglow so that it is possible to observe a single instruction on a program level.

Register Contents

If a register examine is done, the content of the register is shown here.

Memory Contents

When a memory examine is done, the content of the examined cell will be shown here.

Bus Information

If the BUS command is given to display memory accesses on the NORD-100 bus, the data present on the bus will be shown here and updated continually. When binary format is selected the address field is used as extension for bit 16-23.

The ADDRESS Field:

Calendar Clock

The clock that tracks the operating system clock is shown here displaying day, hour, minute and second. This clock is adjusted by the "UPDATE" command under SINTRAN III. Under the load procedure this clock will be read by the operating system and taken as system clock. The clock is also connected to the stand-by power (refer to the section on Power Supply), and will stay correct even in case of a power failure.

Year and Month

Year and month from the system clock is also shown here by giving a specific F command to MOPC (See Section J.2.4.1). For example 1979:10 means October 1979.

Current Program Counter

During a register examine, the current program counter is shown here. For example, PC:10153.

Memory Address

If a memory examine is done, the address of the memory location examined is shown here.

The FUNCTION Field:

Indicator Functions

UTIL, utility of the machine, is shown here. That is, how much time the machine does not spend on level 0 (idle). The more utility, the less the time spent on level 0 and more segments on the display is lit up.

Example:



No Activity.

HIT, tells the hit rate in cache memory. The more hit in cache, the more segments are lit up on the display.

Example:



RING, indicates the user ring taken from PCR.

Example:



Paging Off

Ring 1

Ring 2

Ring 3

MODE, tells if the interrupt system and/or the paging system is turned on.

Example:



Both the interrupt system and the paging system is on.

Only the interrupt system is on.

Register Name

If a register examine is done, the name of the register, eventually also the level for the register, is shown.

Example:

5A, OPR, etc.

Memory Examine Mode

When a memory examine is done, the examine mode; virtual or physical, will be shown.

Example:

PEXM — physical examine

2EXM — virtual examine mapped through page table 2.

Bus Examine Type

What kind of bus information to be sampled and displayed by the BUS command is displayed here.

Example:

DC R — data under a CPU read from memory operation.

J.4

SUMMARY OF CONTROL AND MONITOR FUNCTIONS

CONTROL FUNCTIONS (Does not affect DISPLAY)

System Control

OPCOM		Enter Operator's Communication mode
	ESC key	Leave Operator's Communication mode
MCL	MACL ⌵	Generate Master Clear
STOP	STOP ⌵	Stop Program and enter OPCOM Mode
LOAD	& or \$	Load according to ALD code (read by I12/)
	xxxxxx& or xxxxxx\$	Load from device x

Program Control

	!	Continue Program from address of program counter
xxxxxx!		Start Program from address x
	Z	Execute a Single Instruction according to program counter
xxxxxxZ		Execute x Instructions from address of program counter
xxxxxx.		Execute Program until program counter = x and stop
xxxxxx"		Execute Instruction Code x repeatedly
xxxxxxIO/nnnnnn		Execute IOX instruction with device number x
		OPR = Output Data; n = Returned Data

Miscellaneous Functions

xxx#	Do Memory Test in segment x from address of B register to address of X register. P = Fail Address, T = Fail Bits, D = Fail Pattern, L = Test Pattern.
space or @	Delete entry
*nnnnnn	Current Location of memory examine is n (16 least sign. bits)
OPR/nnnnnn zzzzzz ⌵	Change Operators Panel "Switches" from n to z

DISPLAY FUNCTIONS (Affects only DISPLAY)

uuzzyxF ⌵	Define Format of Displayed Information (F ⌵ is default)
x (3 bits):	0 = Octal 1 = Decoded according to z
	2 = Binary
y (3 bits):	0 = Normal 1 = Stretch Zeros
	2 = Stretch Ones 3 = Stretch Zeros and Ones
z (6 bits):	Decode the 4 bits z to z+3 to a ONE among ZEROS.
u (4 bits):	for Display Processor Maintenance
	1 = Display Year and Month
	2 = Inhibit message
	4 = Initialize panel processor
	10 = Abort message
yxBUS/	Display Memory Accesses on NORD-100 Bus
x (3 bits):	0 = Undefined 1 = Read Access
	2 = Write Access 3 = Write or Read Access
y (3 bits):	0 = CPU Data 1 = DMA Data
	2 = CPU Address 3 = DMA Address
ACT/	Display Computer Activity (default after MACL)

MONITOR FUNCTIONS (Also shown on DISPLAY)

Memory

E ␣ Set Physical Examine mode (default after MACL)
 xE ␣ Set Virtual Examine mode. Map via page table x.
 xxxxxxxx/ nnnnnn zzzzzz ␣ Examine and Change Content of memory address x from n to z. x is 24 bits at Physical and 16 bits at Virtual Examine.
 xxxxxx < yyyyyy ␣ Dump Content of memory from address x to address y. Select 64K area of last Examine.

Registers

xxRy/ nnnnnn zzzzzz ␣ Examine and Change Content of register Ry on level xx from n to z. Ry may be written as R0=S, R1=D, R2=P, R3=B, R4=L, R5=A, R6=T, R7=X.
 xx < yyRD ␣ Dump Registers R0 to R7 from level x to level y.
 U/ nnnnnn Content of User Register is n
 OPR/nnnnnn zzzzzz ␣ Change Operators Panel "Switches" from n to z

Internal Registers

lxx/ nnnnnn Content of Internal Register No. x is n
 x (4 bits): 0 = PANS 1 = STS 2 = OPR
 3 = PGS 4 = PVL 5 = IIC
 6 = PID 7 = PIE 10 = CSR
 11 = ACTL 12 = ALD 13 = PES
 14 = PGC 15 = PEA
 lyy/ nnnnnn zzzzzz ␣ Deposit z in Internal Registers No. y (n is dummy)
 y (4 bits): 0 = PANC 1 = STS 2 = LMP
 3 = PCR 5 = IIE 6 = PID
 7 = PIE 10 = CCLR 11 = LCILR
 12 = UCILR 15 = ECCR
 IRD ␣ Dump Internal Registers 0 - 15 (only in STOP)
 xx < yyRDE ␣ Dump Scratch Registers from level x to level y

Deposit Rules

Content is only changed by zzzzzz ␣ in STOP mode and by zzzzzzDEP ␣ in STOP or RUN mode.

Content is unchanged by ␣ in STOP or RUN mode and by zzzzzz ␣ IN RUN mode (? is answered).

Explanations:

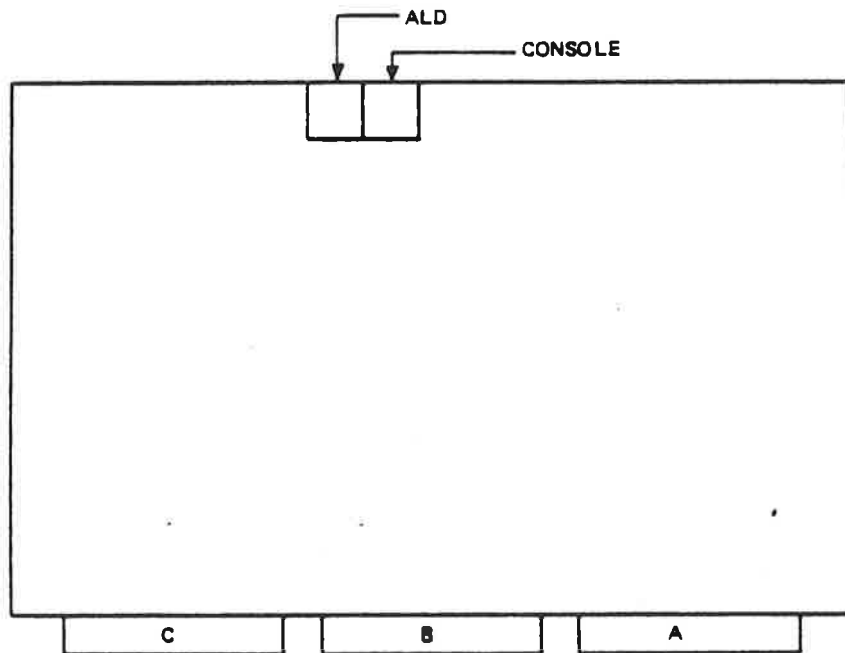
= Control Panel Button
 ␣ = Carriage Return
 n = computer answer

All other characters are typed by Operator.

APPENDIX K

N-100 SWITCH SETTINGS

322602 CPU



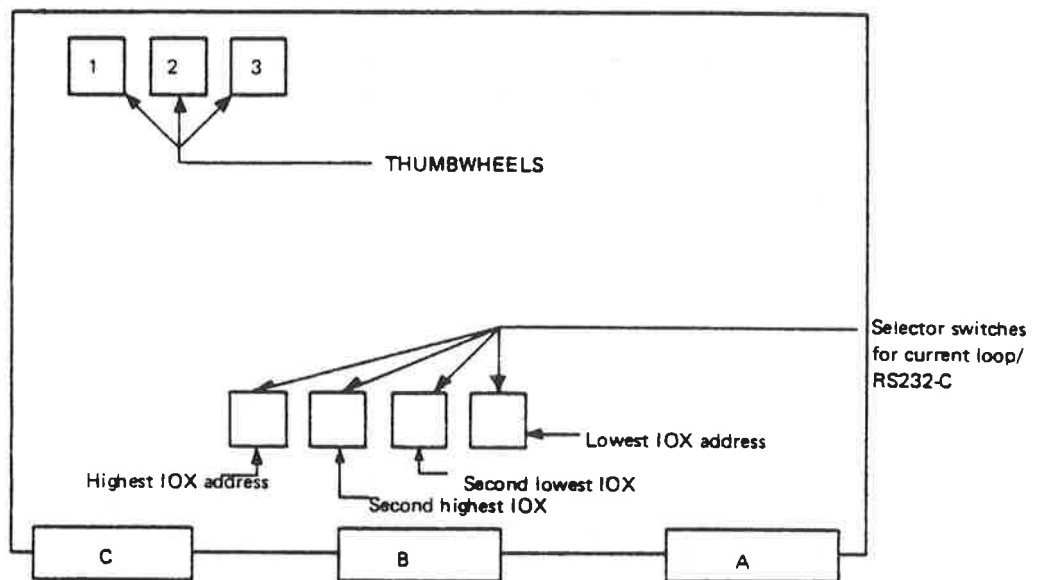
ALD: Automatic Load Descriptor

ALD	112	LOCK and Standby Power OK	LOCK and UNLOCK Standby Power not OK and Load
2	101600	Binary load from 1600	Binary load from 1600
3	100400	Binary load from 400	Binary load from 400
4	121540	Mass load from 1540	Mass load from 1540
5	120500	Mass load from 500	Mass load from 500
6	101560	Binary load from 1560	Binary load from 1560
7	100000	STOP	STOP
8			
9			
10	1600	Start in address 20	Binary load from 1600
11	400	Start in address 20	Binary load from 400
12	21540	Start in address 20	Mass load from 1540
13	20500	Start in address 20	Mass load from 500
14	1560	Start in address 20	Mass load from 1560
15	0	Start in address 20	STOP

Console: Speed setting for console terminal.

0	110 baud
1	150 baud
2	300 baud
3	2400 baud
4	1200 baud
5	1800 baud
6	4800 baud
7	9600 baud
8	2400 baud
9	600 baud
10	200 baud
11	134.5 baud
12	75 baud
13	50 baud
14	—
15	—

Switches on Floppy and 4 terminals module (3010):



- 1 = Floppy disk system
- 2 = terminal group
- 3 = initial band rate for terminals

1 Floppy disk system:

0 = floppy system no. 1 (10X 1560 - 1567, IDENT = 21)

1 = floppy system no. 2 (10X 1570 - 1577, IDENT = 22)

2-15 are unused, will answer on 10X 0-7.

2 Terminal Group

Each group consists of 4 terminals with consecutive 10X addresses and ident codes.

- 0 = terminals 1-4 (10X 300 - 340, IDENT 120-123)
- 1 = terminals 5-8 (10X 340 - 370, IDENT 44-47)
- 2 = terminals 9-12 (10X 1300 - 1330, IDENT 50-53)
- 3 = terminals 13-16 (10X 1340 - 1370, IDENT 54-57)
- 4 = terminals 33-36 (10X 640 - 670, IDENT 124-127)
- 5 = terminals 37-40 (10X 1100 - 1130, IDENT 130-133)
- 6 = terminals 41-44 (10X 1140 - 1170, IDENT 134-137)
- 7 = terminals 45-48 (10X 1400 - 1430, IDENT 140-143)
- 8 = terminals 49-52 (10X 1500 - 1530, IDENT 144-147)
- 9 = terminals 53-56 (10X 1640 - 1670, IDENT 150-153)
- 10 = terminals 57-60 (10X 1700 - 1730, IDENT 154-157)
- 11 = terminals 61-63 (10X 1704 - 1770, IDENT 160-163)
- 12 = async. modem 1-4 (10X 200 - 230, IDENT 60-63)
- 13 = async. modem 5-8 (10X 240 - 270, IDENT 64-67)
- 14 = async. modem 9-12 (10X 1200 - 1230, IDENT 70-73)
- 15 = async. modem 13-16 (10X 1240 - 1270, IDNET 74-77)

3 Initial baud rate for terminals:

- 0 = 110 baud
- 1 = 150 baud
- 2 = 300 baud
- 3 = 2400 baud
- 4 = 1200 baud
- 5 = 1800 baud
- 6 = 4800 baud
- 7 = 9600 baud
- 8 = 2400 baud
- 9 = 600 baud
- 10 = 200 baud
- 11 = 134.5 baud
- 12 = 75 baud
- 13 = 50 baud
- 14 = unused
- 15 = unused

Selector switches for current loop/RS232-C.

Switch set to 0 selects current loop.

Switch set to 1 selects RS232-C.

Switch settings under Terminal Group and Initial baud rate for terminals are also valid for the 8 terminal modules (3013).

APPENDIX L

LOGICAL DEVICE NUMBERS USED IN SINTRAN III

<i>Octal Logical Device No.:</i>	<i>Decimal Logical Device No.:</i>	<i>Device Name:</i>
0-77	0-63	Character devices
100-177	64-127	Mass-storage files
200-277	128-191	Non Internal devices
300-377	192-255	User Semaphores
400-477	256-319	Process Control Devices/Connect Devices
500-577	320-383	System devices
600-677	384-447	[SINTRAN III/SINTRAN III] Communication Devices] [ND-NET]
700-777		NORDCOM devices and other special devices
1000-1077		Extension of character devices
1100-1177		System devices
1200-1277		System devices
1300-1377		System devices
1400-1472		System devices
1500-1577		System devices
1600-1677		System devices
1700-1777		System devices

<i>Octal Logical Device No.:</i>	<i>Decimal Logical Device No.:</i>	<i>Device Name:</i>
0	0	INBT;INCH (background): edited input, else: dummy
1	1	Background: "own terminal" RT: Terminal 1
2	2	Tape reader 1 (Console)
3	3	Tape punch 1
4	4	Card reader 1
5	5	Line printer 1
6	6	Synchronous modem 1
7	7	Terminal 17
10	8	Plotter 1
11	9	Terminal 2
12	10	Tape reader 2
13	11	Tape punch 2
14	12	Bus switch device
15	13	Line printer 2
16	14	Synchronous modem 2
17	15	Terminal 18
20	16	Cassette drive 1
21	17	Cassette drive 2
22	18	Versatec on DMA printer/plotter 1
23	19	Versatec on DMA printer/plotter 2
24	20	Tektronix display
25	21	Magnetic tape 1 unit 2
26	22	Synchronous modem 5
27	23	Synchronous modem 6
30	24	Synchronous modem 3
31	25	Synchronous modem 4
32	26	Magnetic tape 2 unit 0
33	27	Magnetic tape 1 unit 3
34	28	Magnetic tape 2 unit 1
35	29	Card Punch 3
36	30	CDC link
37	31	Not used
40	32	Magnetic tape 1 unit 0
41	33	Magnetic tape 1 unit 1
42-47	34-39	Terminals 3-8
50	40	Card punch 1
51	41	Card punch 2
52-57	42-47	Terminals 19-24
60-67	48-55	Terminals 9-16
70-77	56-63	Terminals 25-32

Logical Device Numbers 400-477:

400-437	CAMAC interrupts or special process interface
440	Direct task level 6
441	Direct task level 7
442	Direct task level 8
443	Direct task level 9
450-467	CONNECT devices
470	ND 23 — programmed clock

Logical Device Numbers 500-577:

500	Internal device for error message RT program
501	Semaphore for segment transfer
502	Disk 10Mb 1 datafield
503	RT loader command lock
504	General lock for file system
505	User-file-buffer lock
506	Object-file-buffer lock
507	RT-open-file-table lock
511	Disk 10Mb 1, unit 0, R-bit-file-buffer lock
512	Disk 10Mb 1, unit 0, F-bit-file-buffer lock
513	Disk 10Mb 1, unit 0, R-directory lock
514	Disk 10Mb 1, unit 0, F-directory lock
515	DF1, file-transfer for RT lock for disk 1, disk 2, disk3 and disk 4
516	DF2, for open-file monitor call from RT program datafield
517	RTFIL semaphore
520	Grafs NOTIS—IR semaphore 2
521	Get device buffer lock
522	Disk 10Mb 1, unit 1, R-directory lock
523	Disk 10Mb 1, unit 1, F-directory lock
524	Disk 10Mb 1, unit 1, R-bit-file-buffer lock
525	Disk 10Mb 1, unit 1, F-bit-file-buffer lock
526	DF3, transfer lock for magnetic tape 1
527	Spooling queue semaphore
530	Accounting semaphore
531	CDC link monitor call datafield
532	Semaphore for spooling device 4
533	Semaphore for spooling device 4
534	Semaphore for spooling device 5
535	Semaphore for spooling device 5
536	Semaphore for spooling device 6
537	Semaphore for spooling device 6
540	Internal Device Remote Batch IBM
541	Internal Device Remote Batch UNIVAC
542	Internal Device Remote Batch Honeywell Bull
543	Internal Device Remote Batch CDC
544	(544) Big disc 3, Unit 0 directory lock
545	(545) Big disc 3, Unit 0 bitfile buffer lock
546	(546) Unit 1

550	(547) Unit 1
551	(550) Unit 2
552	(551) Unit 2
554	Disk 10Mb 1, unit 3, R-bit-file-buffer lock (552) Unit 3
555	Disk 10Mb 1, unit 3, F-bit-file-buffer lock (553) Unit 3
556	Disk 10Mb 1, unit 3, R-directory lock
557	Disk 10Mb 1, unit 3, F-directory lock
560	Magnetic tape 1, datafield
561	All magnetic tapes, directory lock
562	
564	
565	Big disc 3, datafield
567	CDC link data field
570	Disk 10Mb 1, unit 2, R-directory lock
571	Disk 10Mb 1, unit 2, F-directory lock
572	Disk 10Mb 1, unit 2, R-bit-file-buffer lock 563 Magnetic tape 2, unit 2, I/O datafield
573	Disk 10Mb 1, unit 2, F-bit-file-buffer lock
574	Monitor call datafield for cassette
575	Cassette data field 564 Magnetic tape 2, unit 3 I/O datafield
576	DF5, monitor call data field for Versatec 1
577	Versatec data field

Logical Device Numbers 1000 - 1077:

1000	Floppy disk 1, unit 0, I/O datafield
1001	Floppy disk 1, unit 1, I/O datafield
1002	Floppy disk 1, unit 2, I/O datafield
1003	Floppy disk 2, unit 0, I/O datafield
1004	Floppy disk 2, unit 1, I/O datafield
1005	Floppy disk 2, unit 2, I/O datafield
1006	Hasp DMA 1, I/O datafield
1007	Hasp DMA 2, I/O datafield
1010	Hasp DMA 3, I/O datafield
1011	Hasp DMA 4, I/O datafield
1012	Hasp DMA 5, I/O datafield
1013	Hasp DMA 6, I/O datafield
1014	Line printer 3, I/O datafield
1015	Line printer 4, I/O datafield
1040 - 1077	Terminals 33 - 64

Logical Device Numbers 1100-1177:

1100	Big disk/big cartridge disk 1, datafield
1101	Big disk/big cartridge disk 1, unit 0, directory lock
1102	Big disk/big cartridge disk 1, unit 0, bit-file-buffer lock
1103	NORD-50 datafield
1104	Disk 10Mb 2, datafield
1105	Disk 10Mb 2, unit 0, R-directory lock
1106	Disk 10Mb 2, unit 0, F-directory lock
1107	Disk 10Mb 2, unit 0, R-bit-file-buffer lock
1110	Disk 10Mb 2, unit 0, F-bit-file-buffer lock
1111	Magnetic tape 2 datafield
1112	Big disc 4, unit 0, directory lock
1113	Floppy disk 1, unit 3, I/O datafield
1114	Big disc 4, unit 0, bitfile-buffer lock
1115	Floppy disk 2, unit 3, I/O datafield
1116	Dr 7, transfer lock for magnetic tape 2
1117	Big disk/big cartridge disk 1, unit 1, directory lock
1120	Big disk/big cartridge disk 1, unit 1, bit-file-buffer lock
1121	Big disk/big cartridge disk 1, unit 2, directory lock
1122	Big disk/big cartridge disk 1, unit 2, bit-file-buffer lock
1123	Big disk/big cartridge disk 1, unit 3, directory lock
1124	Big disk/big cartridge disk 1, unit 3, bit-file-buffer lock
1125	Versatec controller 2
1126	Monitor call datafield for Versatec controller 2
1127	DF 39, magnetic tape 3 monitor call datafield
1130	Disk 10Mb 2, unit 1, R-directory lock
1131	Disk 10Mb 2, unit 1, F-directory lock
1132	Disk 10Mb 2, unit 1, R-bit-file lock
1133	Disk 10Mb 2, unit 1, F-bit-file lock
1134	Floppy disk 1, unit 3, directory table lock
1135	Floppy disk 1, unit 3, bit-file-buffer lock
1136	Semaphore for spooling device 1
1137	Semaphore for spooling device 1
1140	Semaphore for spooling device 2
1141	Semaphore for spooling device 2
1142	Spooling system general semaphore
1143	Spooling system wait for used pages semaphore
1144	Spooling system wait for free pages semaphore
1145	Floppy disk 1, datafield
1146	Monitor call datafield for floppy disk 1
1147	Floppy disk 2, unit 3, directory table lock
1150	Floppy disk 1, unit 0, directory table lock
1151	Floppy disk 1, unit 0, bit-file-buffer lock
1152	Floppy disk 1, unit 1, directory table lock
1153	Floppy disk 1, unit 1, bit-file-buffer lock
1154	Floppy disk 1, unit 2, directory table lock
1155	Floppy disk 1, unit 2, bit-file-buffer lock
1156	Floppy disk 2, datafield
1157	Monitor call datafield for floppy disk 2
1160	Floppy disk 2, unit 3, bit-file-buffer lock
1161	Floppy disk 2, unit 0, directory table lock
1162	Floppy disk 2, unit 0, bit-file-buffer lock

1163	Floppy disk 2, unit 1, directory table lock
1164	Floppy disk 2, unit 1, bit-file-buffer lock
1165	Floppy disk 2, unit 2, directory table lock
1166	Floppy disk 2, unit 2, bit-file-buffer lock
1167	Line printer 1, datafield
1170	Monitor call datafield for line printer 1
1171	Big disc 4, unit 2, directory lock
1172	Big disc 4, unit 2, bitfile buffer lock
1173	Semaphore for spooling device 3
1174	Semaphore for spooling device 3
1175	Line printer 2, datafield
1176	Monitor call datafield lock for line printer 2
1177	Spooling semaphore, for id data buffer lock

Logical Device Numbers 1200 - 1277:

1200	NORD TPS system semaphore
1201	DMAC command lock
1202	RT-PROGRAM-LOG semaphore
1203	Histogram commands lock
1204	SINTRAN-SERVICE-PROGRAM command lock
1205	Mail system lock
1206	Terminal 1, datafield
1207	Big disk/big cartridge disk 2, datafield
1210	Internal device 1, datafield
1211	Monitor call datafield for internal device 1
1212	Internal device 2, datafield
1213	Monitor call datafield for internal device 2
1214	Internal device 3, datafield
1215	Monitor call datafield for internal device 3
1216	Internal device 4, datafield
1217	Monitor call datafield for internal device 4
1220	Internal device 5, datafield
1221	Monitor call datafield for internal device 5
1222	Accounting semaphore
1223	GRAFS/NOTIS-IR semaphore
1224	Winchester disk, datafield or STC magtape controller 4
1225	Winchester disk 1, unit 0, directory table lock STC magtape 4, unit 0, I/O datafield
1226	Winchester disk 1, unit 0, bit-file-buffer lock STC magtape 4, unit 1, I/O datafield
1227	Winchester disk 1, unit 1, directory table lock STC magtape 4, unit 2, I/O datafield
1230	Winchester disk, unit 1, bit-file-buffer lock STC magtape 4, unit 3, I/O datafield
1231	Winchester disk 2, datafield or STC magtape controller 3
1232	Winchester disk 2, Unit 0, directory table lock
1233	Winchester disk 2, unit 0, bit-file-buffer lock STC magtape 3, unit 1, I/O datafield
1234	Winchester disk 2, unit 1, directory table lock STC magtape 3, unit 2, I/O datafield

1235	Winchester disk 2, unit 1, bit-file-buffer lock STC magtape3, unit 3, I/O datafield
1236	Batch process 1, datafield
1237	Batch process 1, internal device
1240	Batch process 2, datafield
1241	Batch process 2, internal device
1242	Batch process 3, datafield
1243	Batch process 3, internal device
1244	Batch process 4, datafield
1245	Batch process 4, internal device
1246	Batch process 5, datafield
1247	Batch process 5, internal device
1250	Batch process 6, datafield
1251	Batch process 6, internal device
1252	Batch process 7, datafield
1253	Batch process 7, internal device
1254	Batch process 8, datafield
1255	Batch process 8, internal device
1256	Batch process 9, datafield
1257	Batch process 9, internal device
1260	Batch process 10, datafield
1261	Batch process 10, internal device
1262	Spooling device 7, semaphore
1263	Spooling device 7, semaphore
1264	Spooling device 8, semaphore
1265	Spooling device 8, semaphore
1266	Spooling device 9, semaphore
1267	Spooling device 9, semaphore
1270	Spooling device 10, semaphore
1271	Spooling device 10, semaphore
1272	Monitor call datafield for internal device 1
1273	Monitor call datafield for internal device 2
1274	Monitor call datafield for internal device 3
1275	Monitor call datafield for internal device 4
1276	Monitor call datafield for internal device 5
1277	DF 40, magnetic tape 4, monitor monitor call datafield

Logical Device Numbers 1300 - 1377:

1300	Device buffer lock
1301	Device buffer lock
1302	Device buffer lock
1303	Hasp DMA 1, datafield
1304	Hasp DMA 1, datafield 1300 bid disc 4, unit 3, directory lode
1305	Monitor call datafield for Hasp DMA 1 1301 big disc 4, unit 3, bit-file-buffer lock
1306	Monitor call datafield for Hasp DMA 1 1302 not used
1307	Hasp DMA 2, datafield
1310	Hasp DMA 2, datafield
1311	Monitor call datafield for Hasp DMA 2

1312	Monitor call datafield for Hasp DMA 2
1313	Hasp DMA 3, datafield
1314	Hasp DMA 3, datafield
1315	Monitor call datafield for Hasp DMA 3
1316	Monitor call datafield for Hasp DMA 3
1317	Hasp DMA 4, datafield
1320	Hasp DMA 4, datafield
1321	Monitor call datafield for Hasp DMA 4
1322	Monitor call datafield for Hasp DMA 4
1323	Hasp DMA 5, datafield
1324	Hasp DMA 5, datafield
1325	Monitor call datafield for Hasp DMA 5
1326	Monitor call datafield for Hasp DMA 5
1327	Hasp DMA 6, datafield
1330	Hasp DMA 6, datafield
1331	Monitor call datafield for Hasp DMA 6
1332	Monitor call datafield for Hasp DMA 6
1333	Big disk/big cartridge disk 2, unit 0, directory table lock
1334	Big disk/big cartridge disk 2, unit 0, bit-file-buffer lock
1335	Big disk/big cartridge disk 2, unit 1, directory table lock
1336	Big disk/big cartridge disk 2, unit 1, bit-file-buffer lock
1337	Big disk/big cartridge disk 2, unit 2, directory table lock
1340	Big disk/big cartridge disk 2, unit 2, bit-file-buffer lock
1341	Big disk/big cartridge disk 2, unit 3, directory table lock
1342	Big disk/big cartridge disk 2, unit 3, bit-file- buffer lock
1343	Line printer 3, datafield
1344	Monitor call datafield for line printer 3
1345	Line printer 4, datafield
1346	Monitor call datafield for line printer 4
1347	NORD-50 2, datafield
1350	NORD-50 3, datafield
1351	NORD-50 4, datafield
1352	RT-PROGRAM-LOG command lock
1360	HDLC DMA, link 1, input; synchronous modem 1 for HDLC interface input/output
1361	HDLC DMA, link 1, output
1362	HDLC DMA, link 2, input; synchronous modem 2 for HDLC interface input/output
1364	HDLC DMA, link 3, input; synchronous modem 3 for HDLC interface input/output
1366	HDLC DMA, link 4, input; synchronous modem 4 for HDLC interface input/output
1373	HDLC DMA, link 6, output; synchronous modem 6 for HDLC interface output.
1374	X21 logical number 1
1375	X21 logical number 2
1376	X21 logical number 3
1377	X21 logical number 4
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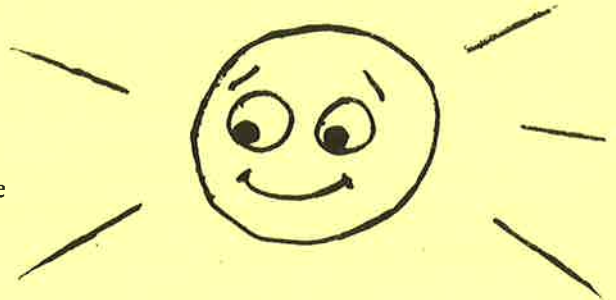


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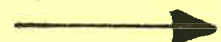
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