

## NORD - OPS

NORD-OPS is a batch operating system based on the SINTRAN real time monitor. (cfr. SINTRAN Monitor System Users Guide).

NORD-OPS is organized as a set of tasks running under SINTRAN providing the user with the possibility to run batch jobs while they use SINTRAN for real time applications.

The basic task is the Batch Monitor (BM). BM reads the control cards, loads the task called for as an overlay from mass storage and runs it as a subroutine. The batch jobs will have access to most of the functions in SINTRAN, specially the input/output system.

### 1 Buffering of standard input/output

Two tasks running in SINTRAN, system input processor (SIP) and system output processor (SOP) belong to NORD-OPS.

SIP transfers the job decks from the card reader to the system-input file (SIF). The job reads the input cardimage from SIF. The jobs are run on a first in first serve base. Similar, the jobs put their printer output in the system-output file (SOF). After the jobs are finished, their printer output is transferred to the printer by SOP. The output from the jobs is processed on a first in first serve base.

### 2 Security

The design objectives of NORD-OPS have been to make it impossible for a batch job to destroy the rest of the system, including the operating system. This is possible due to the hardware protection system (cfr. NORD-1 Reference Manual).

Normally, the batch jobs are running in restricted mode, i. e. with the rest of the system protected from them. The system is then said to be in "USER MODE".

However, special tasks in a job can run without the protection system on, for instance the FILE system, which need access to central tables (FAM). The system is then said to be in "SYSTEM MODE".

### 3 Communication between the tasks in a job and the system

The jobs are normally running in restricted mode and do all their communication with the system by jumping to monitor routines outside their bounds. This will cause protection violation interrupt.

An interrupt routine in SINTRAN will then pick up a code from the job using the address in the P-register and route control to the

adequate routine, for instance BM or the input/output system. Job tasks running without memory protection will make direct subroutine jumps the proper routine. BM has a dedicated area into which it puts the control card before calling a job task. The task may then pick up the parameter string from this area, which is called the task parameter area.

#### 4 Mass storage

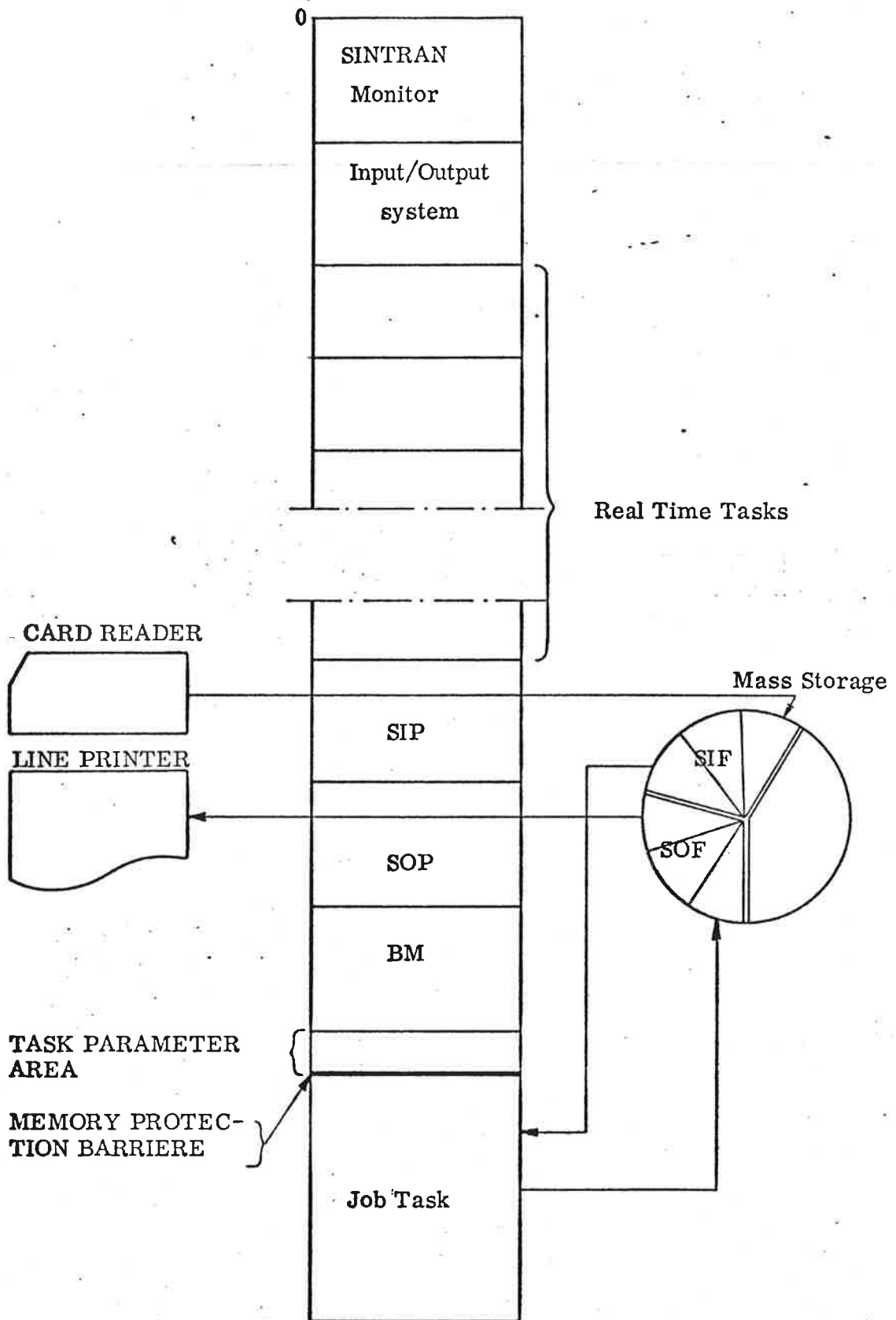
NORD-OPS is a mass storage oriented system. All features provided with the NORD FILE SYSTEM will be available.

#### 5 Software

Most software made for NORD-1 will be available under NORD-OPS.

Specially: FORTRAN, MAC, EDITOR, NORD FILE SYSTEM.

NORD-OPS System Layout



NOSTRA/JV/1.7.70

## NORD-OPS Control Cards

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## 1 GENERAL

The control cards are divided in two groups:

A External control cards

B Internal control cards

A The external control cards give the operating system a description of the job, such as maximum run time, the maximum core requirements, priority etc.

The external control cards are processed when the job is presented to the operating system, not when it is running.

B The internal control cards are processed when the job is running and specify what the job wants to do, for instance calling the FORTRAN compiler, calling the FILE system, put object deck of a compilation into execution etc.

The following characters are reserved when using control cards:

@, \$, (, ) = , ,

## 2 EXTERNAL CONTROL CARDS

## 2.1 Job card

@JOB, accno, name, maxsec, maxlines, maxcore

accno: account number, 1-8 characters

name: name identifying the job

maxsec: maximum number of lines which the job may print

maxcore: maximum number of core locations the job can use  
(Unit 1024 words)

The job card has to be the first one in the deck.

## 2.2 End of Job Card

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The end of job card has to be the last one in the job deck.

## 2.3 The Schedule Card

On the schedule card (s), the user specifies the resources he needs from the system to do his job. He also gives the system a description of his job.

ω SCD, resource<sub>1</sub> = n<sub>1</sub>, . . . . ., resource<sub>i</sub> = n<sub>i</sub>

resource: Code representing a resource

for

instance: Compute moduls needed, peripheral equipment needed by job, priority of job etc.

n: Integer, or character - specifying the number of resource units needed or the type of job.

- All parameters on the schedule card have a default value. Even the SCH card is optional.
- There may be several schedule cards in a job.

## 3 INTERNAL CONTROL CARDS

### 3.1 General

The internal control cards have the following structure:

§ name, fdn (parameter string)

name: name of an internal task in the job

fdn: file device number of the file containing the task.  
If fdn is omitted, the task will be searched for at the central program library.

(parameter string):

the character string between the paranthesis is transferred to the task parameter area.

### 3.2 Standard Control Cards

The following control cards have standard function:

#### 3.2.1 Call file system

§FILE (parameters)

Refer the NORD FILE SYSTEM Reference Manual.

**3.2.2** Call FORTRAN compiler

§FTN (ifdn, lfdn, ofdn)

ifdn: fdn of file containing the FORTRAN source deck.

lfdn: fdn of file to receive the listing.

ofdn: fdn of file to receive the FORTRAN object deck.

The default values for the fdns will normally be:  
standard input, standard output and a scratch file  
with fdn = 70.

Example: §FTN           Source deck from card reader, listing  
                          to printer, and object deck to scratch  
                          file with fdn = 70.

§FTN (17,,18)

Source deck from file with fdn = 17, listing to  
printer and object deck to file with fdn = 18.

**3.2.3** Call MAC assembler

§MAC (ifdn, lfdn, ofdn)

Interpretation of the parameter string is the same as for §FTN.

**3.2.4** Call relocatable loader

§LDR (ifdn, lfdn, ofdn)

The BRF loader will be called. If one will load a program in BRF from  
ifdn, search the undefined symbols at lfdn and put an absolute task  
into ofdn.

**3.2.5** Call Editor

§EDIT (ifdn, cfdn, ofdn)

The editor will read source input from ifdn, edit commands from cfdn  
and put edited output on ofdn.

**3.2.6** Call FORTRAN for NORD-5

§FTCM (ifdn, lfdn, ofdn)

Parameter string same as for §FTN.

**3.2.7** Call MAC-5

§MAC5 (ifdn, lfdn, ofdn)

Parameter string same as for §MAC.

### 3.2.8 Call relocatable loader for NORD-5

§LDCM (ifdn, lfdn, ofdn)

Parameter string same as for §LDR.

## 4 EXAMPLE OF A JOB DECK

Example of a deck setup for a FORTRAN compilation and execution of the object deck.

ωJOB, 014022, JVIK, 10, 1000

§FTN

PROGRAM NOISE

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END

§NOISE, 70

data cards

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