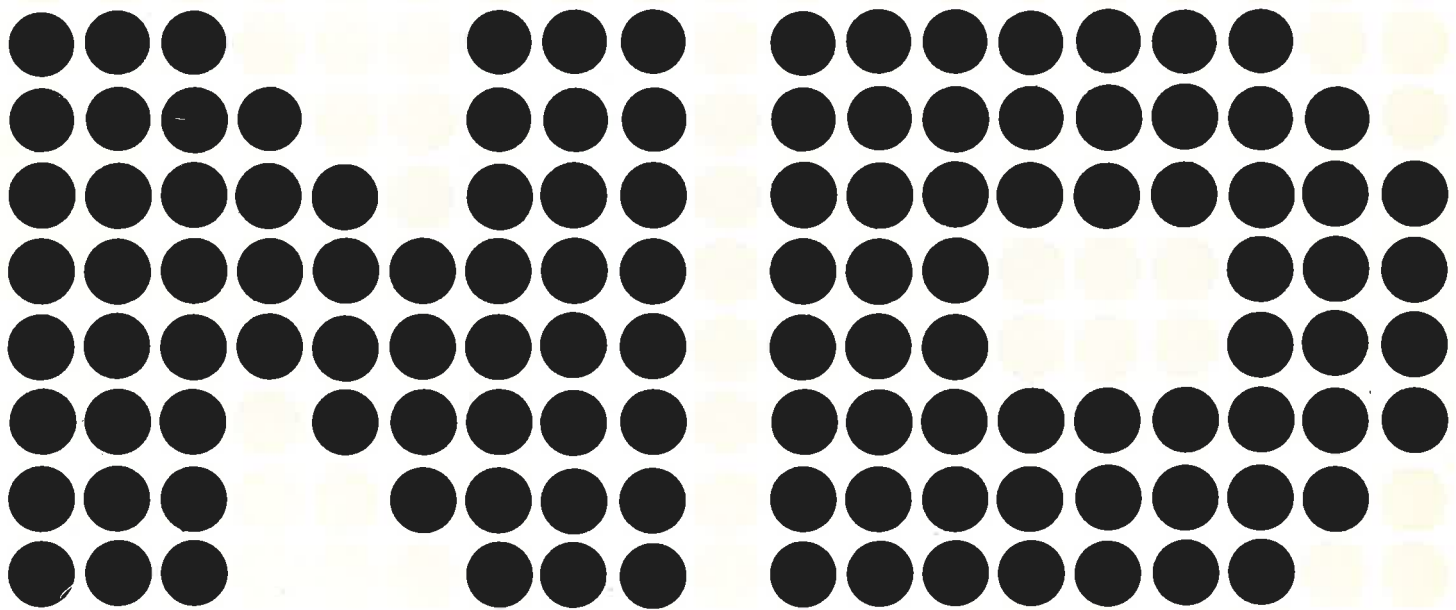


SINTRAN III
Real Time Loader

A/S NORSK DATA-ELEKTRONIKK



SINTRAN III

Real Time Loader

Publ. No.
ND-60. 051.03
February 1976

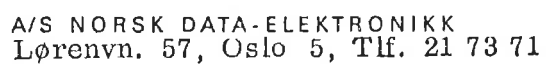


TABLE OF CONTENTS

+ + +

Section:		Page:
1	GENERAL REMARKS AND DEFINITIONS	1-1
1.1	The RT Loader's Tables	1-2
1.2	How to Start the RT Loader	1-2
2	COMMANDS	2-1
2.1	Allocate Area on a Segment	2-2
2.2	Update an Alternative SINTRAN III System	2-3
2.3	Binary Dump of a Segment on a File	2-4
2.4	Change Content of One of the New Segments	2-5
2.5	Change RT Description Table Element	2-6
2.6	Clear an Existing Segment	2-7
2.7	Compare a Segment with a File	2-8
2.8	Allocation of an RT Description	2-9
2.9	Name an Existing RT Description	2-10
2.10	Define Name of a Segment File	2-10
2.11	Define a Symbol	2-11
2.12	Delete a Common Label	2-11
2.13	Delete Names of Non-Reentrant Routines	2-12
2.14	Delete an RT Program	2-13
2.15	Delete a Symbol in the RTFIL	2-14
2.16	Remove a Symbol from the Linking Table	2-15
2.17	Dump Segment Files' Bit Map	2-16
2.18	End a Load Operation	2-17
2.19	Exit from RT Loader	2-17
2.20	List Available Commands	2-18
2.21	Load a SINTRAN III Core Only System	2-20
2.22	List Free Segment Numbers	2-21
2.23	List Reference Addresses of Undefined Symbol	2-21
2.24	Load BRF Code onto a Segment	2-22
2.25	Specify New Segment	2-23
2.26	Load into Current Load-Segment	2-24
2.27	Octal Dump of a Segment	2-25
2.28	Delete Symbols in RTFIL	2-26
2.29	Remove Symbols from the Linking Table	2-27
2.30	Load Binary Code onto a Specified Segment	2-28
2.31	Load Reentrant Programs onto a Segment	2-29
2.32	Release Segment Table Entry	2-30

Section:		Page:
2.33	Make a Symbol Undefined in the Linking Table	2-31
2.34	Change Symbol Name in the Linking Table	2-31
2.35	Reorganize Segment File	2-32
2.36	Reset RT Loader	2-33
2.37	Reset "New-Page" Mode	2-33
2.38	Allocate Common Area in Resident Core	2-33
2.39	Set Load Address of a Segment	2-34
2.40	Start Each Load on a New Page	2-34
2.41	Specify Page Index Table	2-36
2.42	Allocate Common Area on Second New Segment	2-36
2.43	Specify Segment File for New Segment(s)	2-37
2.44	Print Information about Specified Symbol	2-37
2.45	List Common Label Names in Linking Table	2-37
2.46	Write Address Limits and Load Address	2-38
2.47	List Non-Reentrant Runtime Routines in Linking Table	2-38
2.48	List RT Program Names	2-39
2.49	List Undefined Symbols	2-40
2.50	List Symbols in RTFIL	2-40
2.51	List Information about Segment	2-41
2.52	List Defined Symbols in the Linking Table	2-42
2.53	List Information about Symbols in the Linking Table	2-43
2.54	Load Library BRF Units	2-44
3	EXAMPLES	3-1

HOW TO USE THIS MANUAL

--ooOoo--

It is assumed that the reader has a good knowledge of the SINTRAN III system. The necessary background information is given in the manual SINTRAN III Users Guide, especially chapters 1, 4, 5 and 7.

--ooOoo--

1 GENERAL REMARKS AND DEFINITIONS

The Real Time Loader (hereafter called the RT Loader) is a subsystem included in all versions of SINTRAN III mass storage. The RT Loader's main function is to load real time programs (hereafter called RT programs) in an active SINTRAN III system. An RT program is a program which has its own RT description and which has been loaded into the SINTRAN III system by the RT Loader. Some RT programs (the timer program, the error message program, the file system programs and one program for each batch process and each timesharing terminal, and a few others) are included in the SINTRAN III system when the system is generated.

A SEGMENT is a continuous limited area on a mass storage device containing executable code or data for RT programs or for the SINTRAN III system itself. When an RT program is started, its segment or segments or part of them are copied from their place on mass storage into memory, and when a segment or part of segment has to be removed, it will be transferred to its original location on the mass storage device. The logical pages of which a segment consists will in general be scattered about in main memory because of hardware paging. An RT program's virtual address space may be divided into two parts (segments) each consisting of a number of 1K word pages, and an RT program cannot use more than two segments simultaneously.

A segment is specified by its segment number, of which a limited number are available in a SINTRAN III system.

All segments in a SINTRAN III system are kept on continuous files, SEGMENT FILES, on a mass storage device. There may be from one to four SEGMENT FILES in a SINTRAN III system. The SEGMENT FILES are numbered from zero to three. A SEGMENT FILE may be defined in any file directory in a SINTRAN III system.

1.1 The RT Loader's Tables

There are two tables in the RT Loader with which users of the RT Loader should be familiar. These are the Linking table and the RTFIL table.

The linking table is a linked table containing all symbols available for the current load operation. Available symbols are symbols defined or referred to in the current load operation, symbols defined in the segment currently used as linking segment, all RT program names, all core common labels and all symbols defined in resident memory, segment 0. When a load operation is terminated by an END-LOAD command, all defined symbols in the linking table which do not exist in the RTFIL table are transferred to the RTFIL table, and only RT program names, core common labels and symbols defined in segment 0 (resident memory) will remain in the linking table (these symbols will also be present in the RTFIL table).

The RTFIL table contains all defined symbols (RT program names, names of entry points, etc.) in all the existing segments (including resident memory) built by the RT Loader. The RTFIL table is copied to a mass storage file named (SYSTEM) RTFIL: DATA after each load operation which changes the content of the RTFIL table. The SINTRAN III operator communication uses this file to find symbolic RT program names.

1.2 How to Start the RT Loader

Only the user SYSTEM and the user RT may use the RT Loader. The user RT must be defined as a friend of the user SYSTEM to be allowed to update (write on) the segment files and the RTFIL file. Only one user at a time may use the RT Loader. The RT Loader is started by the command @RT-LOADER.

If the RT Loader is free to use, it will print a version number and go into command input mode, otherwise the error message ALREADY IN USE will be given. The break characters "Escape" and "Break" will stop the execution of the RT Loader and give control to the operator communication, except in sequences where the RT Loader is updating the RTFIL table, the segment table or the RT description table. The command @CONTINUE cannot be used to restart the RT Loader.

2

COMMANDS

The RT Loader is ready to accept a command when an asterisk (*) is printed on the terminal. All RT Loader commands may be abbreviated in the same way as the SINTRAN III and file system commands. Missing parameters will be asked for by the RT Loader. Parameter delimiters are space, comma or carriage return. Parameter default values may be specified by giving two commas or carriage return. The character "control L" (octal 14) given in a command (or parameter) line, will terminate and cancel the command, and the RT Loader will be ready to accept a new command. The line editing characters "control Q" for deleting the current line and "control A" for deleting one character on the current line, are available in the RT Loader. Parameter types used by the RT Loader are:

- Octal numbers, the six last digits will count.
- File names.
- Octal logical device (file) numbers.
- Symbolic names, up to seven characters.

Decimal numbers cannot be used as parameter values, and all numbers written by the RT Loader are octal numbers.

All questions that the RT Loader may ask must be answered with Y for yes or N for no; other alphabetical characters will result in the question being repeated. All non-alphabetical characters will give an error message.

In the following sections a parameter surrounded by parantheses has default value, whereas parameters not surrounded by parantheses do not.

Example:

DEFINE-SYMBOL <symbol>(<segment no.>)

The parameter <symbol> has no default value, but the parameter (<segment no.>) has a default value.

Note:

In the examples given in this manual user input is underlined to distinguish it clearly from the computer output. (On the terminal no underlining occurs.)

2.3 Binary Dump of a Segment on a File

*BINARY-DUMP <output file><segment no.> (<lower addr>)
(<upper addr>)

This command will dump the segment <segment no.> in binary format on the file <output file>. The parameter <segment no> must refer to closed segment, i.e. a segment on the segment file, or it can have the value zero meaning core common. <output file> may be a file number or a file name. Default file type for <output file> is SYMB. The parameters (<lower addr>) and (<upper addr>) are respectively the lower and upper addresses of the area to be dumped. Default value for (<lower addr>) is the first address of the segment and default value for (<upper addr>) is the last address of the segment. There will be no bootstrap in front of the binary dump. The output from the BINARY-DUMP command may be read by the various MAC assemblers or by the RT Loader commands READ-BINARY and COMPARE.

Example of dumping segment no. 33 on the output file BIN-DUMP:SYMB:

```
*NREENTRANT-LOAD
INPUT FILE: 200-USER
LINKING-SEGMENT NO.:
NEW SEGMENT NO: 33
*END-LOAD
*WRITE-SEGMENT
SEGMENT NO: 33
OUTPUT FILE:
```

```
33      0  13777  1300  0  0  1 RFW NON DEMAND
*BINARY-DUMP
OUTPUT FILE: BIN-DUMP
SEGMENT NO: 33
LOWER ADDRESS:
UPPER ADDRESS:
*
```

2.4 Change Content of One of the New Segments

*CHANGE-LOCATION <segment no.>

The CHANGE-LOCATION command is used to look at or to change locations on the segment <segment no>. The <segment no.> must be one of the segments currently being built.

The syntax is an address followed by a slash (/). The content of the location addressed will be printed out. If a new value is wanted in the location, the new value followed by a carriage return is typed. The content of the next location is then printed. If no change is wanted, just type carriage return and the content of the next location will be printed. This command must be terminated with the point (.) character.

The syntax of the CHANGE-LOCATION command is the same as the LOOK-AT command in SINTRAN III.

Example:

```
*NREENTRANT-LOAD 200-USER,,
NEW SEGMENT NO: 32
*WRITE-LOAD-ADDRESS 32

L.ADR:      0  U.ADR: 13776  C.LADR: 13776
*CHANGE-LOCATION
SEGMENT NO: 32
0/ 125005
125005
125005 10/    6614 1
   6427 2
177777 3
177777 10/    1 1
      2
      3 .
*
```

2.5 Change RT Description Table Element

*CHANGE-RT-DESCRIPTION <rt prog>(<prior>)(<segno 1>)
(<segno 2>)(<stadr>)

This command changes an already created RT description. Thus the parameter <rt prog> must be the name of a defined or declared RT program, and the RT program may not be active when this command is executed. The parameter (<prior>) is the new priority of the RT program, (<segno 1>) is the first segment (right byte in the SEGM word in the RT description table) and (<segno 2>) is the second segment (left byte) of the RT program. The parameter (<stadr>) is the start address of the RT program. The default values of the parameters are their old (current) values.

Example:

*WRITE-PROGRAMS,,

CDC4	24517	35	0
CDC3	24473	35	0
CDC2	24447	35	0
CDC1	24423	35	0
CDC0	24377	35	0

*CHANGE-RT-DESCRIPTION

RT-PROGRAM: CDC0

PRIORITY: 100

SEGMENT ONE: 35

SEGMENT TWO:

START ADDRESS: 200

*END-LOAD

*

2.6 Clear an Existing Segment

***CLEAR-SEGMENT** <segment no>

The segment <segment no> will be cleared, i.e. the space on the segment file occupied by the segment <segment no> will be released, and the segment number <segment no> will be free again. The segment cannot be one of the segments initially present in the SINTRAN III system. The segment will not be cleared if it is one of the segments of an existing RT program, or if the segment is currently being used by an RT program, or if it has been fixed using the FIX or FIXC command.

If the parameter <segment no> is given the value zero, which is equivalent to core common, and the question "CLEARING CORE COMMON?" will be printed. If the answer Y for yes is given, the core common pointers will be reset to their initial values, and all core common labels will be deleted from the linking table and the RTFIL.

When clearing a segment, all symbols defined on this segment will be deleted from RTFIL and the linking table.

Example:

```
*CLEAR-SEGMENT  
SEGMENT NO: 35
```

```
ERROR - RT-PROGRAMS ON SEGMENT:
```

```
    CDC4  
    CDC3  
    CDC2  
    CDC1  
    CDC0
```

```
*DELETE-PROGRAM CDC4  
*DELETE-PROGRAM CDC3  
*DELETE-PROGRAM CDC2  
*DELETE-PROGRAM CDC1  
*DELETE-PROGRAM CDC0  
*CLEAR-SEGMENT  
SEGMENT NO: 35  
*
```

2.7 Compare a Segment with a File

```
*COMPARE <segment no><file> (<output file>)<lower addr>
      (<upper addr>)
```

The content of the segment <segment no> will be compared with the content of the file <file>. The segment <segment no> must be a closed segment and the content of the file <file> must be in binary format (produced by a)BPUN or a BINARY-DUMP command). The parameters (<lower addr>) and (<upper addr>) set the limits of the area to be compared. If there are any differences between the content of the <file> and the segment <segment no>, the addresses where the differences are, and the contents of those addresses for the segment and the file will be printed out on the (<output file>).

Default values for the parameters (<lower addr>) and (<upper addr>) are the first and the last address of the specified segment. The default value of the parameter (<output file>) is the communication device (the terminal). This command is useful for debugging RT programs. After loading the segments, they may be dumped with the BINARY-DUMP command. If anything goes wrong during execution of the RT programs using these segments, the COMPARE command may be used to see if anything in the original segments has been destroyed.

Example:

```
*NREENTRANT-LOAD 200-USER,,
NEW SEGMENT NO: 36
*END-LOAD
*BINARY-DUMP BIN-DUMP:SYMB 36,,,
*EXIT-LOADER
```

```
@LOOK-AT SEGMENT 36
READY:
0/ 125005 1
 125005 1000/      0 2
      0 5000/ 124010 3
 170401 10000/ 50771 4
 142006 .
- END
@RT-L
```

```
REAL-TIME LOADER 76.02.06
```

```

*COMPARE
SEGMENT NO: 36
BINARY FILE: BIN-DUMP:SYMB
LOWER ADDRESS:
UPPER ADDRESS:
OUTPUT FILE:

```

ADR	SEGMENT	FILE
0	1	125005
1000	2	0
5000	3	124010
10000	4	50771

*

2.8 Allocation of an RT Description

*DECLARE-PROGRAM <rt-program name>

The symbol <rt-program name> is the name of an RT program to be loaded at a later time, and an entry in the RT description table will be allocated. This command must be used when loading RT programs which have other as yet undefined or undeclared RT programs as "externals". All such "external RT programs" must be declared using the DECLARE-PROGRAM command before the loading process can be completed.

Example:

```

*DECLARE-PROGRAM
RT-PROGRAM: PROGR1
*DECLARE-PROGRAM PROGR2
*WRITE-PROGRAMS,,

```

PROGR2	24567	??????	
PROGR1	24543	??????	
CDC4	24517	36	0
CDC3	24473	36	0
CDC2	24447	36	0
CDC1	24423	36	0
CDC0	24377	36	0

*

2.9 Name an Existing RT Description

*DEFINE-PROGRAM <rt-program name> <rt-description address>

The DEFINE-PROGRAM command may be used to give a name to RT programs which are not loaded by the RT Loader. <rt-program name> is the name of the RT program and <rt-description address> is the address of the RT program's RT description.

Example:

```
*DEFINE-PROGRAM
RT-PROGRAM: TERM1
RT-DESCRIPTION ADDRESS: 23153
*DEFINE-PROGRAM TERM2 23177
*WRITE-PROGRAMS,,
```

```
TERM2 23177 3 13
TERM1 23153 3 11
```

*

2.10 Define Name of a Segment File

*DEFINE-SEGMENT-FILE <segment file name> <segment file no>

Define the segment file number <segment file no>. The parameter <segment file name> will be the name of the segment file. If the segment file number <segment file no> is already defined, then this segment file's name and the question REDEFINE SEGMENT FILE? will be printed out, the answer Y for yes will result in the segment file's name being changed to <segment file name>.

Before using the DEFINE-SEGMENT-FILE command, the specified segment file must have been defined with the ALLOCATE-FILE command and the mass storage address of the segment file must have been inserted in the "BLST" array in the SINTRAN III system.

Example:

```
*DEFINE-SEGMENT-FILE
SEGMENT FILE NAME: (FIXED-PACK:SYSTEM)SEGFIL1:DATA
SEGMENT FILE NO.: 1
*
```

2.11 Define a Symbol

*DEFINE-SYMBOL <symbol><value>(<segment no>)

Define the symbol <symbol> on the segment (<segment no>) and give it the value <value>. The parameter (<segment no>) must be an existing segment or one of the segments currently being built. The default value of the parameter (<segment no>) is the current "load segment", the segment last loaded into the current load operation.

Example:

```
*NEW-SEGMENT,,,
NEW SEGMENT NO: 31
*DEFINE-SYMBOL
SYMBOL NAME: SYMB1
VALUE: 0
SEGMENT NO: 31
*DEFINE-SYMBOL SYMB2 1 31
*
```

2.12 Delete a Common Label

*DELETE-COMMON-LABEL <common label>

The common label <common label> will be deleted from the linking table.

Example:

```
*WRITE-COMMON-LABELS,,
COMLAB3      31      454
COMLAB2      31      454
COMLAB1      31      454

*DELETE-COMMON-LABEL
COMMON LABEL: COMLAB2
*DELETE-COMMON-LABEL COMLAB3
*WRITE-COMMON-LABELS,,
COMLAB1      31      454
*
```

2.13 Delete Names of Non-Reentrant Routines

***DELETE-NOT-REENTRANT**

The names of the non-reentrant routines in the reentrant FORTRAN library will be deleted. This command is useful when building a reentrant system with more than one RT program on the same segment. After each RT program is loaded: define the end of the stack, delete the names of the non-reentrant routines, set the new load address (equals end of stack plus one), load the next RT program etc.

The names of the non-reentrant routines in the "reentrant" FORTRAN Library are:

8DXI, DEXP, DLOG, DLOG10, DSIN, DCOS, DSQRT,
 DATAN, DTAN2, DMOD, 8DIV, 8STAC, STPNT, STBEG,
 STEND, 8RTEN, 8ENTR, 8STKI

Example:

***WRITE-SYMBOLS,,**

STBEG	5741	31
STPNT	5740	31
OUTBT	5677	31
INBT	5674	31
8RLDN	5254	31
ERR9	5250	31
ERR8	5242	31
8DMU	5521	31
8DSB	5260	31
8DAD	5256	31
8ENTR	100	31
8STAC	5704	31
8STKI	5733	31
8LEAV	255	31
8FIO	306	31
WAITF	50	31
RESRV	52	31
8RTEN	54	31

*DELETE-NOT-REENTRANT

*WRITE-SYMBOLS,,

OUTBT	5677	31
INBT	5674	31
8RLDN	5254	31
ERR9	5250	31
ERR8	5242	31
8DMU	5521	31
8DSB	5260	31
8DAD	5256	31
8LEAV	255	31
8FIO	306	31
WAITF	50	31
RESRV	52	31

*

2.14 Delete an RT Program

*DELETE-PROGRAM <rt-program name>

The RT program named <rt-program name> will be deleted from RTFIL and from the linking table, and the RT program's entry in the RT description table will be free again. When the RT program <rt-program name> is active, the DELETE-PROGRAM command is illegal.

Example:

*WRITE-PROGRAMS,,

CDC4	23723	31	0
CDC3	23677	31	0
CDC2	23653	31	0
CDC1	23627	31	0
CDC0	23603	31	0

*DELETE-PROGRAM

RT-PROGRAM: CDC2

*DELETE-PROGRAM CDC0

*WRITE-PROGRAMS,,

CDC4	23723	31	0
CDC3	23677	31	0
CDC1	23627	31	0

*

2.15 Delete a Symbol in the RTFIL

*DELETE-RTFIL-SYMBOL <symbol name> <segment no>

The symbol <symbol name> defined on the segment <segment no> will be deleted from the RTFIL.

Example:

*WRITE-RTFIL,,

TW2	23603	32	0
8RTEN	54	32	
RESRV	52	32	
WAITF	50	32	
8FIO	306	32	
8LEAV	255	32	
8STKI	5733	32	
8STAC	5704	32	
8ENTR	100	32	
8DAD	5256	32	
8DSB	5260	32	
8DMU	5521	32	
ERR8	5242	32	
ERR9	5250	32	
8RLDN	5254	32	
INBT	5674	32	
OUTBT	5677	32	
STPNT	5740	32	
STEND	5000	32	
STBEG	5741	32	

*DELETE-RTFIL-SYMBOL

SYMBOL NAME: OUTBT

SEGMENT NO: 32

*DELETE-RTFIL-SYMBOL WAITF 32

*WRITE-RTFIL,,

TW2	23603	32	0
8RTEN	54	32	
RESRV	52	32	
8FIO	306	32	
8LEAV	255	32	
8STKI	5733	32	
8STAC	5704	32	
8ENTR	100	32	
8DAD	5256	32	
8DSB	5260	32	
8DMU	5521	32	
ERR8	5242	32	
ERR9	5250	32	
8RLDN	5254	32	
INBT	5674	32	
STPNT	5740	32	
STEND	5000	32	
STBEG	5741	32	

2.16 Remove a Symbol from the Linking Table

***DELETE-SYMBOL <symbol>**

The symbol named <symbol> will be deleted from the linking table. The symbol <symbol> must not be a common label or an RT program.

Example:

***WRITE-SYMBOLS,,**

TABP6	6575	33
IOINI	6310	33
8RLDN	5605	33
ERR8	5475	33
ERR9	5473	33
OUTBT	6330	33
INBT	6313	33
8DMU	6134	33
8DSB	5673	33
8DAD	5671	33
8CONV	6624	33
8LIB	254	33
8ENTR	124	33
8LEAV	255	33
8FIO	266	33
WAITF	111	33
RESRV	113	33
8RTEN	115	33

***DELETE-SYMBOL**

SYMBOL NAME: 8CONV

***DELETE-SYMBOL OUTBT**

***DELETE-SYMBOL 8RTEN**

***WRITE-SYMBOLS,,**

TABP6	6575	33
IOINI	6310	33
8RLDN	5605	33
ERR8	5475	33
ERR9	5473	33
INBT	6313	33
8DMU	6134	33
8DSB	5673	33
8DAD	5671	33
8LIB	254	33
8ENTR	124	33
8LEAV	255	33
8FIO	266	33
WAITF	111	33
RESRV	113	33

*

2.17 Dump Segment Files' Bit Map

*DUMP-SEGFILE-BITMAP (<segment file no>(<output file >)

The bit map of the segment file (<segment no>) will be dumped on the (<output file>). There will be one bit for each page of the segment file. A bit with value one means that the corresponding page on the segment file is used, and a bit with value zero means that the corresponding page on the segment file is free. The default value for the parameter (<segment file no>) is all 4 segment files, and the default value for (<output file>) is the terminal.

Example:

*DUMP-SEGFILE-BITMAP

SEGMENT FILE NO.:

OUTPUT FILE:

SEGMENT FILE NO: 0

0	177777	177777	177777	177777	177777	177777	177777	177777	177777
200	177777	177777	177777	177777	177777	177777	177777	177777	177777
400	177777	177777	177777	177777	177777	177777	177777	177777	177777
600	177777	177777	177777	177777	177777	177777	177777	177777	177777
1000	177777	177777	177777	177777	177777	177777	177777	177777	177777
1200	177777	177777	177777	177777	177777	177777	177777	177777	177777
1400	000000	000000	000000	000000	000000	000000	000000	000000	000000

FREE PAGES ON SEGMENT FILE: 176

NUMBER OF CONTINUOUS FREE PAGES: 176

SEGMENT FILE NO: 1

0 037777

FREE PAGES ON SEGMENT FILE: 2

NUMBER OF CONTINUOUS FREE PAGES: 2

SEGMENT FILE NO. 2 NOT DEFINED

SEGMENT FILE NO. 3 NOT DEFINED

*

2.18 End a Load Operation

***END-LOAD**

The END-LOAD command must terminate all load operations. This command will close the segments currently being built. The segments will be moved from the scratch file to the segment file and the RTFIL. The linking table, the segment table and the RT description table will be updated. The RTFIL table will be written to the file RTFIL during the END-LOAD command. If there are undefined symbols in the linking table when an END-LOAD command is typed, the question NEGLECTING REFERENCES? will be printed out; if the answer is Y for yes then the END-LOAD command will continue, otherwise the END-LOAD command is terminated and the load operation may continue.

If the command NREENTRANT-LOAD was the last "load" command, then the file FTNLIBR will be automatically scanned in the END-LOAD command if there are undefined symbols in the linking table.

Example:

```
*NREENTRANT-LOAD 200-USER,,
NEW SEGMENT NO: 33
*END-LOAD
*
```

2.19 Exit from RT Loader

***EXIT-LOADER**

This command will update the file RTFIL and then leave the RT Loader and give control to the SINTRAN III command processor.

Example:

```
@RT-LOADER

REAL-TIME LOADER 76.02.06

*EXIT-LOADER

@
```

2.20 List Available Commands

***HELP (<output file>)**

This command will list all the RT Loader's commands on the (<output file>). The output will be in alphabetic order.

If the terminal is used as (<output file>), the output is divided into three parts, and for each part the RT Loader will give the question NEXT COMMANDS?. If the answer is Y for yes, then the next part is listed, otherwise the command is terminated. The terminal is the default value of the (<output file>) parameter.

Example:

HELP*OUTPUT FILE:**

```

ALLOCATE-AREA <SEGMENT NO.> <AREA SIZE> (<LOW. ADR.>)
BACKUP-LOAD <RTFIL> <SEG.FI. 1> (<CUR.SEG.FI.>) (<SEG.FI.NO.>)
BINARY-DUMP <OUTPUT FILE> <SEGMENT NO.> (<LOWER ADR.>) (<UPPER ADR.>)
CHANGE-LOCATION <SEGMENT NO.>
CHANGE-RT-DESCRIPTION <RT PROG> (<PRIOR>) (<SEGNO1>) (<SEGNO2>) (<STAD
CLEAR-SEGMENT <SEGMENT NO.>
COMPARE <SEGMENT NO.> <FILE> (<LOW.ADR.>) (<UPPER ADR.>) (<OUTPUT FILE
DECLARE-PROGRAM <RT-PROGRAM NAME>
DEFINE-PROGRAM <RT-PROGRAM NAME> <RT-DESCRIPTION ADDRESS>
DEFINE-SEGMENT-FILE <SEGMENT FILE NAME> <SEGMENT FILE NO.>
DEFINE-SYMBOL <SYMBOL> <VALUE> (<SEGMENT NO.>)
DELETE-COMMON-LABEL <COMMON LABEL>
DELETE-NOT-REENTRANT
DELETE-PROGRAM <RT-PROGRAM NAME>
DELETE-RTFIL-SYMBOL <SYMBOL NAME> <SEGMENT NO.>
DELETE-SYMBOL <SYMBOL>
DUMP-SEGFILE-BITMAP (<SEGMENT FILE NO.>) (<OUTPUT FILE>)
END-LOAD
EXIT-LOADER
HELP (<OUTPUT FILE>)

```

NEXT COMMANDS? Y

IMAGE-LOAD <IMAGE-FILE> <OUTPUT FILE> (<BOOTSTRAP START ADR.>)
 LIST-FREE-SEGMENTS (<OUTPUT FILE>)
 LIST-REFERENCES-ADDRESS (<SYMBOL>) (<OUTPUT FILE>)
 LOAD (<INPUT FILE>) (<LOAD-SEGMENT>) (<LINK-SEGMENT>)
 NEW-SEGMENT (<SEGMENT NO.>) (<RING>) (<DEMAND/NON DEM.>) (<PROTECT BITS>)
 REENTRANT-LOAD (<INPUT FILE>) (<LINK-SEGMENT>)
 OCTAL-DUMP (SEGMENT NO.>) (<LOWER ADR.>) (<UPPER ADR.>) (<OUTPUT FILE>)
 PARTIAL-CLEAR-RTFIL <SYMBOL/SEGMENT NO.> (<SEGMENT NO.>)
 PARTIAL-CLEAR-TABLE <SYMBOL>
 READ-BINARY (<INPUT FILE>) (<SEGMENT NO.>)
 REENTRANT-LOAD (<INPUT FILE>) (<LINK-SEGMENT>) (<STACK LENGTH>)
 REFER-SYMBOL <SYMBOL>
 RELEASE-SEGMENT <SEGMENT NO.>
 PENAME-SYMBOL <OLD SYMBOL> <NEW SYMBOL>
 REORGANIZE-SEGMENT-FILE (<SEGMENT FILE NO.>)
 RESET-LOADER
 RESET-NEW-PAGE

NEXT COMMANDS? Y

SET-CORE-COMMON <COMMON LABEL>
 SET-LOAD-ADDRESS <SEGMENT NO.> <LOAD ADDRESS>
 SET-NEW-PAGE
 SET-PAGE-TABLE <PAGE INDEX TABLE NO.>
 SET-SEGMENT-COMMON <COMMON LABEL>
 SET-SEGMENT-FILE <SEGMENT FILE NO.>
 WHAT-IS <SYMBOL>
 WRITE-COMMON-LABELS (<OUTPUT FILE>)
 WRITE-LOAD-ADDRESS <SEGMENT NO.>
 WRITE-NOT-REENTRANT (<OUTPUT FILE>)
 WRITE-PROGRAMS (<OUTPUT FILE>)
 WRITE-REFERENCES (<OUTPUT FILE>)
 WRITE-RTFIL (<SEGMENT NO.>) (<OUTPUT FILE>)
 WRITE-SEGMENTS (<SEGMENT NO.>) (<OUTPUT FILE>)
 WRITE-SYMBOLS (<OUTPUT FILE>)
 WRITE-TABLE (<OUTPUT FILE>)
 X-LOAD (<INPUT FILE>) (<LOAD-SEGMENT>) (<LINK-SEGMENT>)
 *

2.21 Load a SINTRAN III Core Only System

*IMAGE-LOAD <image file><output file> (<bootstrap start addr>)

This command will set the RT Loader in "image load" mode, i.e., loading will be to a file instead of to a segment.

The parameter < image file > is the name of the file where the SINTRAN III C system is resident in binary format. < output file > is the name of the file where the completed SINTRAN III C system will be dumped by the END-LOAD command. The parameter (<bootstrap start addr>) is the address of the bootstrap, i.e. the address where the bootstrap will be placed in memory when the SINTRAN III C system is loaded and started. The default value of (<bootstrap start addr>) is the value of the load address when the load operation is terminated.

The "image load" mode is reset by the END-LOAD and the RESET-LOADER commands.

Example:

```
*IMAGE-LOAD
IMAGE FILE: CORE-SINTRAN:SYMB
OUTPUT FILE: TAPE-PUNCH
BOOTSTRAP START ADDRESS:
*SET-LOAD-ADDRESS 26000
*NREENTRANT-LOAD 200-USER
*END-LOAD
```

2.22 List Free Segment Numbers

*LIST-FREE-SEGMENTS (<output file>)

The unused segment numbers in the system will be listed on the (<output file>). Default value of (<output file>) is the terminal.

Example:

*LIST-FREE-SEGMENTS

OUTPUT FILE:

34	35	36	37	40	41	42	43
44	45	46	47	50	51	52	53
54	55	56	57	60	61	62	63
64	65	66	67				

*

2.23 List Reference Addresses of Undefined Symbol

*LIST-REFERENCES-ADDRESS (<symbol>)(<output file>)

List all addresses where the undefined symbol named (<symbol>) is referred to. If no parameter (<symbol>) is specified, all undefined symbol references will be listed. Default value of the parameter (<output file>) is the terminal.

Example:

*WRITE-REFERENCES,,

8LEAV
8FIO
WAITF
RESRV
8RTEN

*LIST-REFERENCES-ADDRESS

OUTPUT FILE:

SYMBOL NAME:

8LEAV	43
8FIO	32
WAITF	12
RESRV	4
8RTEN	2

*

2.24 Load BRF Code onto a Segment

*LOAD (<input file>)(<load-segment>)(<link-segment>)

Load BRF code from the file (<input file>) into the segment (<load-segment>). The (<load-segment>) must have been specified in a NEW-SEGMENT command before it may be used in the LOAD command. The (<link-segment>) must be an existing segment, or one of the two segments currently being built. Link-segment means that all symbols defined on the link-segment will be available in the load operation. There must be no virtual address overlap between the load-segment and the link-segment. If no (<input file>) parameter is specified, the last input file specified will be used. If no (<load-segment>) is specified, the last segment used as load-segment or the last segment specified in a NEW-SEGMENT command will be used. Default value of the parameter (<link-segment>) is the second segment currently being built, or no link-segment if no "second" segment is specified. The parameter (<link-segment>) may be given the value zero to avoid linking to another segment in a load operation.

Example:

```
*NEW-SEGMENT,,,
NEW SEGMENT NO: 34
*LOAD
INPUT FILE: TW2
LOAD-SEGMENT NO.: 34
LINKING-SEGMENT NO.:
*LOAD WAITF,,
*LOAD FTNLBR,,
*END-LOAD
*
```

2.25 Specify New Segment

*NEW-SEGMENT (<segment no>)(<ring>)(<demand/non demand>)(<protect bits>)

Allocate a segment number to be used in the current load operation. The (<segment no>) must be an available free segment number, and the default value is the first free segment number. The parameter (<ring>) specifies on which protection ring the segment will reside; legal values are 0, 1 and 2, with a default value of 0. The parameter (<demand/non demand>) specifies whether the segment will be a demand segment or non-demand segment, and the default type is non-demand. Legal values of the parameter (<demand/non-demand>) are the characters ND for non-demand and DM for demand. The parameter (<protect bits>) specifies whether the segment is to be fetch permitted, read permitted or write permitted. Legal values for this parameter are F for fetch, R for read and W for write permitted or a combination of these three characters. Default value is RFW.

A maximum of two segments may be specified by the NEW-SEGMENT command in the same load operation.

Example:

```
*NEW-SEGMENT
SEGMENT NO: 40
RING: 2
SEGMENT TYPE: DM
PROTECTION BITS: RF
*NEW-SEGMENT
SEGMENT NO:
RING:
SEGMENT TYPE:
PROTECTION BITS:
NEW SEGMENT NO: 35
*
```

In the first NEW-SEGMENT command in the example, the segment no. 40 is specified to be a demand segment on protect ring 2, and only read and fetch permitted. In the second NEW-SEGMENT command only default parameters are used and the result is that the first free segment, number 35, is allocated. This segment is non-demand, it resides on protection ring 0 and it is read, write and fetch permitted.

2.26 Load into Current Load-Segment

***NREENTRANT-LOAD** (<input file>)(<link-segment>)

Load BRF code from the file (<input file>) into the current load segment, which is the last segment loaded into in the current load operation or the last segment specified in a NEW-SEGMENT command. If no current load segment exists, the first free segment number will be allocated and used as the current load segment. If a new segment is allocated, it will be a non-demand segment residing on protection ring 0 and it will be read, write and fetch permitted. The link segment (<link-segment>) must be one of the two segments currently being built or an already existing segment, or (<link-segment>) can equal zero meaning that no linking is wanted. The default value of the parameter (<link-segment>) is the last segment used as link segment or the "second" segment currently being built. The default value of the parameter (<input file>) is the last file used as (<input file>).

The file FTNLIBR, containing the FORTRAN runtime system, will be scanned (loaded from) in the END-LOAD command if there are undefined symbols, and the last load command is the NREENTRANT-LOAD command.

Example:

```

*NREENTRANT-LOAD
INPUT FILE: TW2
LINKING-SEGMENT NO.:
NEW SEGMENT NO: 35
*NREENTRANT-LOAD WAITF,,
*END-LOAD
*
```

2.27 Octal Dump of a Segment

*OCTAL-DUMP (<segment no>)(<lower addr>)(<upper addr>)
(<output file>)

Dump the specified area of the specified segment (<segment no>) in octal format on the file (<output file>). The parameter (<segment no>) must refer to an already existing segment or one of the segments currently being built or it may have the value zero meaning core common. The default value of the parameter (<segment no>) is the current load segment. (<lower addr>) is the first address and (<upper addr>) is the last address of the area to be dumped. The default value of the parameter (<lower addr>) is the first address of the segment and the default value of the parameter (<upper addr>) is the last address of the segment. The default value of the parameter (<output file>) is the terminal.

Example:

*OCTAL-DUMP
SEGMENT NO: 35
LOWER ADDRESS:
UPPER ADDRESS: 47
OUTPUT FILE:

0:	135002	270	115	135603	113	11003	4037	4036
10:	4036	135603	111	5002	4033	4031	4615	44615
20:	172400	175040	146755	144156	140006	170401	131403	125001
30:	42	135603	266	13000	4011	0	135604	11001
40:	105615	135605	135001	255	124004	1	0	100

*

2.28 Delete Symbols in RTFIL

*PARTIAL-CLEAR-RTFIL <symbol/segment no> (<segment no>)

Delete all symbols in RTFIL defined after the specified symbol <symbol> on segment (<segment no>). If the parameter <symbol/segment no> is a segment number, then all symbols defined on this segment will be deleted from RTFIL.

Example:

*WRITE-RTFIL,,

TW2	24113	35	0
8RTEN	115	35	
RESRV	113	35	
WAITF	111	35	
8FIO	266	35	
8LEAV	255	35	
8ENTR	124	35	
8LIB	254	35	
8CONV	6624	35	
8DAD	5671	35	
8DSB	5673	35	
8DMU	6134	35	
INBT	6313	35	
OUTBT	6330	35	
ERR9	5473	35	
ERR8	5475	35	
8RLDN	5605	35	
IOINI	6310	35	
TABP6	6575	35	

*PARTIAL-CLEAR-RTFIL

SYMBOL NAME/SEGMENT NO.: 8DMU

SEGMENT NO: 35

*WRITE-RTFIL,,

8DMU	6134	35
INBT	6313	35
OUTBT	6330	35
ERR9	5473	35
ERR8	5475	35
8RLDN	5605	35
IOINI	6310	35
TABP6	6575	35

*

2.29 Remove Symbols from the Linking Table

***PARTIAL-CLEAR-TABLE <symbol>**

All symbols defined after the symbol <symbol> will be deleted from the linking table. RT program names will not be deleted by the PARTIAL-CLEAR-TABLE command.

Example:

***WRITE-SYMBOLS,,**

TABP6	6575	36
IOINI	6310	36
8RLDN	5605	36
ERR8	5475	36
ERR9	5473	36
OUTBT	6330	36
INBT	6313	36
8DMU	6134	36
8DSB	5673	36
8DAD	5671	36
8CONV	6624	36
8LIB	254	36
8ENTR	124	36
8LEAV	255	36
8FIO	266	36
WAITF	111	36
RESRV	113	36
8RTEN	115	36

***PARTIAL-CLEAR-TABLE**

SYMBOL NAME: 8DAD

***WRITE-SYMBOLS,,**

8DAD	5671	36
8CONV	6624	36
8LIB	254	36
8ENTR	124	36
8LEAV	255	36
8FIO	266	36
WAITF	111	36
RESRV	113	36
8RTEN	115	36

*

2.30 Load Binary Code onto a Specified Segment

***READ-BINARY (<input file>)(<segment no>)**

Load binary code from the file (<input file>) onto the segment (<segment no>), which may be one of the segments currently being built, or one of the existing segments, or if the parameter (<segment no>) equals zero, core common. When loading into an existing segment the question CHANGING EXISTING SEGMENT? will be printed, and must be answered with Y for yes if the loading is to continue. When loading into core common, the question CHANGING CORE COMMON? will be printed, and this question must be answered with Y for yes before any loading into core common is done. If the specified segment is one of the segments currently being built, then the load address on this segment will be set equal the last address loaded into plus one. The current load address of core common will be affected in the same way when loading into core common. The default value of the parameter (<input file>) is the last file used as (<input file>), and the current load segment or the segment last specified in a NEW-SEGMENT command in the current load operation is the default value of the parameter (<segment no>).

Example:

```

*NREENTRANT-LOAD TW2,,
NEW SEGMENT NO: 36
*END-LOAD
*BINARY-DUMP BIN-DUMP:SYMB 36,,,
*NEW-SEGMENT,,,,
NEW SEGMENT NO: 37
*READ-BINARY
INPUT FILE: BIN-DUMP:SYMB
SEGMENT NO: 37
*END-LOAD
*
```

2.31 Load Reentrant Programs onto a Segment

***REENTRANT-LOAD** (<input file>)(<link-segment>)(<stack length>)

Load BRF code into the current load segment from the file (<input file>). The current load segment is the last segment loaded into in the current load operation, or the last segment specified in a NEW-SEGMENT command. If no current load segment exists, then the first free segment number will be allocated as the current load segment. This segment will be a non-demand segment, residing on protection ring 0 and it will be read, write and fetch permitted.

The (<link-segment>) may refer to one of the segments currently being built, an already existing segment or have the value zero if no linking is wanted. The default value of the parameter (<link-segment>) is the last segment used as link segment in the current load operation. The last file used as (<input file>) is default value of the parameter (<input file>).

After each REENTRANT-LOAD command the file FTNRTLBR, containing the "reentrant" FORTRAN run-time system, is scanned if the symbol STEND (end of stack) is undefined. Then the symbol STEND is defined and the names of the non-reentrant routines are deleted from the linking table. The symbol STEND will receive a value equal to the load address after the file FTNRTLBR is scanned plus the value of the parameter (<stack length>). The load address of the segment will be set equal to STEND plus one. 1K words is the default value of the parameter (<stack length>).

This command is useful when building a system consisting of re-entrant FORTRAN programs on the same segment. The BRF code of the various RT programs should be placed on different files and one then uses a single REENTRANT-LOAD command for each RT program.

Example:

```
*REENTRANT-LOAD
INPUT FILE: REENT-TW2
LINKING-SEGMENT NO.:
STACK LENGTH: 400
NEW SEGMENT NO: 740
*END-LOAD
*
```

2.32 Release Segment Table Entry

***RELEASE-SEGMENT** <segment no>

This command will release the segment <segment no> from the segment table. There will be no check as to whether any RT programs use this segment, but if the segment is currently in memory, an error message will be given, and the segment will not be released. No symbols in RTFIL or in the linking table will be deleted by this command, only the segment table entry and the segment's space on the segment file will be released.

Example:

*NREENTRANT-LOAD 200-USER,,

NEW SEGMENT NO: 41

*END-LOAD

*WRITE-SEGMENT 41,,

41 0 13777 1334 0 0 1 RFW NON DEMAND

*RELEASE-SEGMENT

SEGMENT NO: 41

*WRITE-SEGMENT 41,,

SEGMENT NO. NOT USED

*

2.33 Make a Symbol Undefined in the Linking Table

*REFER-SYMBOL <symbol>

This command will make the symbol <symbol> undefined in the linking table. This command is useful when loading from a file containing library BRF units when the REFER-SYMBOL command may be used to select the BRF units one wishes to load.

Example:

```
*REFER-SYMBOL
SYMBOL NAME: REFSY1
*REFER-SYMBOL REFSY2
*WRITE-REFERENCES,,
```

```
REFSY2
REFSY1
```

*

2.34 Change Symbol Name in the Linking Table

*RENAME-SYMBOL <old symbol> <new symbol>

The symbol named <old symbol> will be renamed <new symbol>.

Example:

```
*DEFINE-SYMBOL DEFSY1 1 0
*DEFINE-SYMBOL DEFSY2 2 0
*WRITE-SYMBOLS,,
```

```
DEFSY2      2      0
DEFSY1      1      0
```

```
*RENAME-SYMBOL
OLD SYMBOL: DEFSY1
NEW SYMBOL: DEFSYM1
*RENAME-SYMBOL DEFSY2 DEFSYM2
*WRITE-SYMBOLS,,
```

```
DEFSYM2      2      0
DEFSYM1      1      0
```

*

2.35 Reorganize Segment File

***REORGANIZE-SEGMENT-FILE (<segment file no>)**

This command will reorganize the segment file (<segment file no>) in order to avoid loss of space on the specified segment file. After this command, the segments will use a continuous area on the segment file. The segments not built by the RT Loader will not be moved, and no segments may be in use by RT programs when executing the REORGANIZE-SEGMENT-FILE command. If no parameter (<segment file no>) is specified, then all segment files used in the system are reorganized.

Example:

*

*DUMP-SEGFILE-BITMAP 0,,

```

      0 177777 177777 177777 177777 177777 177777 177777 177777
    200 177777 177777 177777 177777 177777 177777 177777 177777
    400 177777 177777 177777 177777 177777 177777 177777 177777
    600 177777 177777 177777 177777 177777 177777 177777 177777
   1000 177777 177777 170000 001777 140000 000000 037777 177777
   1200 177777 177777 140000 000000 000000 000000 000000 000000
   1400 000000 000000 000000 000000

```

FREE PAGES ON SEGMENT FILE: 320

NUMBER OF CONTINUOUS FREE PAGES: 236

*REORGANIZE-SEGMENT-FILE

SEGMENT FILE NO.: 0

*DUMP-SEGFILE-BITMAP 0,,

```

      0 177777 177777 177777 177777 177777 177777 177777 177777
    200 177777 177777 177777 177777 177777 177777 177777 177777
    400 177777 177777 177777 177777 177777 177777 177777 177777
    600 177777 177777 177777 177777 177777 177777 177777 177777
   1000 177777 177777 177777 177777 177777 177777 177777 000000
   1200 000000 000000 000000 000000 000000 000000 000000 000000
   1400 000000 000000 000000 000000

```

FREE PAGES ON SEGMENT FILE: 320

NUMBER OF CONTINUOUS FREE PAGES: 320

*

2.36 Reset RT Loader

***RESET-LOADER**

This command will reset the RT Loader to its initial state, which is the state after the last EXIT-LOADER, END-LOAD or RESET-LOADER command.

Example:

```
*
*RESET-LOADER
*
```

2.37 Reset 'New-Page' Mode

***RESET-NEW-PAGE**

The "new page" mode is reset by this command. (See the SET-NEW-PAGE command.)

Example:

```
*
*RESET-NEW-PAGE
*
```

2.38 Allocate Common Area in Resident Core

***SET-CORE-COMMON<common label>**

The common area labeled <common label> will be allocated in resident core. This command must be used before the common area <common label> is loaded.

Example:

```
*NEW-SEGMENT,,,,
NEW SEGMENT NO: 16
*SET-CORE-COMMON
COMMON LABEL: COMLAB1
*SET-CORE-COMMON COMLAB2
*LOAD PROG1,,,
*LOAD PROG2,,,
*LOAD PROG3,,,
*WRITE-COMMON-LABELS,,
```

```
COMLAB3      16      454
COMLAB2       0      454
COMLAB1       0      454
```

```
*
```

2.39 Set Load Address of a Segment

*SET-LOAD-ADDRESS <segment no> <load address>

Set the current load address of the segment <segment no> to the value <load address>. The segment <segment no> must be one of the segments currently being loaded in, or <segment no> can have the value zero meaning core common. When core common is specified, the question CHANGING LOAD ADDRESS OF CORE COMMON? is printed, and this must be answered with Y for yes before any change of core common load address can occur.

Example:

```

*NEW-SEGMENT,,,,
NEW SEGMENT NO: 20
*SET-LOAD-ADDRESS
SEGMENT NO: 20
ADDRESS: 40000
*WRITE-LOAD-ADDRESS
SEGMENT NO: 20

L.ADR: 40000  U.ADR: 40000  C.LADR: 40000
*
```

2.40 Start Each Load on a New Page

*SET-NEW-PAGE

This command will set the RT Loader in "new page" mode, i.e. the current load address will be set to the start of a new page for each new BRF unit loaded. The "new page" mode will be reset by the RESET-LOADER, END-LOAD and the RESET-NEW-PAGE commands.

The following example shows the difference (note the addresses of the symbols) between loading a program with and without using the SET-NEW-PAGE command.

Example:

*SET-NEW-PAGE
*NREENTRANT-LOAD TW2,,
 NEW SEGMENT NO: 16
*LOAD FTNLIBR,,
*WRITE-SYMBOLS,,

TABP6	32004	16
IOINI	26000	16
8RLDN	15320	16
ERR8	15210	16
ERR9	15206	16
OUTBT	26020	16
INBT	26003	16
8DMU	22000	16
8DSB	20002	16
8DAD	20000	16
8CONV	32033	16
8LIB	6137	16
8ENTR	6007	16
8LEAV	6140	16
8FIO	10001	16
WAITF	2000	16
RESRV	4000	16
8RTEN	6000	16

*RESET-LOADER
*NREENTRANT-LOAD TW2,,
 NEW SEGMENT NO: 16
*LOAD FTNLIBR,,
*WRITE-SYMBOLS
 OUTPUT FILE:

TABP6	6575	16
IOINI	6310	16
8RLDN	5605	16
ERR8	5475	16
ERR9	5473	16
OUTBT	6330	16
INBT	6313	16
8DMU	6134	16
8DSB	5673	16
8DAD	5671	16
8CONV	6624	16
8LIB	254	16
8ENTR	124	16
8LEAV	255	16
8FIO	266	16
WAITF	111	16
RESRV	113	16
8RTEN	115	16

*

2.41 Specify Page Index Table

*SET-PAGE-TABLE <page index table no>

This command will specify which page index table the currently loaded segments and RT programs are to use. Usually page index table 1 is used for the RT programs and for core common, and page index table 1 is the default value used if other values are not set by the SET-PAGE-TABLE command. The commands RESET-LOADER and END-LOAD will always reset the page index table to 1.

Example:

```
*
*SET-PAGE-TABLE
PAGE INDEX TABLE NO.: 3
*
```

2.42 Allocate Common Area on Second New Segment

*SET-SEGMENT-COMMON <common label>

The common area labeled <common label> will be allocated on the segment specified in the second NEW-SEGMENT command in a load operation. This command must be used before the common label <common label> is defined.

Example:

```
*NEW-SEGMENT,,,,
NEW SEGMENT NO: 16
*NEW-SEGMENT,,,,
NEW SEGMENT NO: 20
*SET-SEGMENT-COMMON
COMMON LABEL: COMLAB3
*SET-SEGMENT-COMMON COMLAB1
*LOAD PROG1,16,20
*LOAD PROG2,,
*LOAD PROG3,,
*LOAD SUBR,,
*WRITE-COMMON-LABELS,,
```

```
COMLAB2      16      454
COMLAB1      20      454
COMLAB3      20      454
```

*

2.43 Specify Segment File for New Segment(s)

***SET-SEGMENT-FILE <segment file no>**

The segment file where the segments currently being built are to reside is specified by this command. This "current segment file" can only be changed by this command.

Example:

```
*
*SET-SEGMENT-FILE
*SEGMENT FILE NO.: 0
*
```

2.44 Print Information about Specified Symbol

***WHAT-IS <symbol>**

This command will print all information about all symbols in the linking table and the RTFIL, with the name <symbol>.

Example:

```
*
*WHAT-IS
*SYMBOL NAME: CDC1
*
*CDC1 24447 16 20 DEFINED RT-PROGRAM
*
```

2.45 List Common Label Names in Linking Table

***WRITE-COMMON-LABELS (<output file>)**

List the names, addresses and the segment numbers of all the common labels defined or declared in the linking table, on the file (<output file>). The terminal is the default value of the parameter (<output file>).

Example:

```
*WRITE-COMMON-LABELS
*OUTPUT FILE:
*
*COMLAB3          22      454
*COMLAB2          22      454
*COMLAB1          22      454
*
```

2.46 Write Address Limits and Load Address

*WRITE-LOAD-ADDRESS <segment no>

Write the lowest virtual address, the highest virtual address and the current load address of the specified segment <segment no>. This segment must be one of the segments currently being built. When the value zero is given for the parameter <segment no>, the addresses of core common are listed.

Example:

```
*NREENTRANT-LOAD 200-USER,,
NEW SEGMENT NO: 22
*WRITE-LOAD-ADDRESS
SEGMENT NO: 22

L.ADR:      0  U.ADR: 13776  C.LADR: 13776
*
```

2.47 List Non-Reentrant Runtime Routines in Linking Table

*WRITE-NOT-REENTRANT (<output file>)

List the names and the values of the non-reentrant FORTRAN runtime routines defined. This command is useful when loading a reentrant system and should be used before the command DELETE-NOT-REENTRANT in order to see the addresses of the routines which will be deleted by the DELETE-NCT-REENTRANT command.

The default value of the parameter (<output file>), is the terminal.

Example:

```
*
*NEW-SEGMENT,,,,
NEW SEGMENT NO: 22
*LOAD REENT-TW2,,
*LOAD FTNRTLBR,,
*WRITE-LOAD-ADDRESS 22
```

```

L.ADR:      0  U.ADR:  5741  C.LADR:  5742
*DEFINE-SYMBOL STEND 6344,,
*SET-LOAD-ADDRESS 22 6344
*WRITE-NOT-REENTRANT
OUTPUT FILE:

```

```

      8STAC      5704
      STPNT      5740
      STBEG      5741
      STEND      6344
      8RTEN       54
      8ENTR      100
      8STKI      5733

```

*

2.48 List RT Program Names

*WRITE-PROGRAMS (<output file>)

List the names of all the RT programs defined and declared on the file (<output file>).

Each of the RT program's two segment numbers, and the address of each RT program's RT description will also be listed. Declared RT programs will not have segment numbers, so question marks will be written instead of segment numbers.

The default value of the parameter (<output file>) is the terminal.

Example:

```

*WRITE-PROGRAMS
OUTPUT FILE:

PROGR1  24567  ???????
PROGR2  24377  ???????
      TW2  24353   22      0

```

*

2.49 List Undefined Symbols

*WRITE-REFERENCES (<output file>)

All undefined symbols in the linking table will be listed on the (<output file>). The terminal is the default value of the parameter (<output file>).

Example:

*WRITE-REFERENCES
OUTPUT FILE:

8LEAV
8FIO
WAITF
RESRV
8RTEN

*

2.50 List Symbols in RTFIL

*WRITE-RTFIL (<segment no>)(<output file>)

List all the symbols with the segment number (<segment no>) on the file (<output file>). If no (<segment no>) is specified, all the symbols in RTFIL will be listed. The terminal is the default value of the parameter (<output file>).

Example:

*
*WRITE-RTFIL
SEGMENT NO: 22
OUTPUT FILE:

TW2	24353	22	0
8RTEN	115	22	
RESRV	113	22	
WAITF	111	22	
8FIO	266	22	
8LEAV	255	22	
8ENTR	124	22	
8LIB	254	22	
8CONV	6624	22	
8DAD	5671	22	
8DSB	5673	22	
8DMU	6134	22	
INBT	6313	22	
OUTBT	6330	22	
ERR9	5473	22	
ERR8	5475	22	
8RLDN	5605	22	
IOINI	6310	22	
TABP6	6575	22	

*

2.51 List Information about Segment

*WRITE-SEGMENTS (<segment no>)(<output file>)

List all information about the specified segment (<segment no>). The information listed is the segment number, the segment's lower and higher virtual addresses, the mass storage address (in pages) relative to the start of the segment file, the segment file number, the page index table number, on which protect ring the segments reside, the memory protection type (demand/non-demand).

If no parameter (<segment no>) is specified, then all segments are listed. When the value zero is given for the parameter (<segment no>), the address limits of the core common area are listed. The terminal is the default value of the parameter (<output file>).

Example:

*WRITE-SEGMENTS

SEGMENT NO:

OUTPUT FILE:

S.NO. L.ADR U.ADR M.ADR SF PI PT

1	0	173777	0	0	1	0	RFW	NON	DEMAND
2	0	43777	0	0	2	2	RFW	NON	DEMAND
3	52000	75777	25	0	2	0	RFW	DEMAND	
4	50000	147777	37	0	2	0	RFW	DEMAND	
5	44000	47777	22	0	2	0	RFW	NON	DEMAND
6	50000	133777	110	0	2	0	RFW	DEMAND	
7	50000	73777	142	0	2	0	RFW	NON	DEMAND
10	0	77777	154	0	2	2	RFW	NON	DEMAND
11	40000	47777	214	0	2	0	RFW	NON	DEMAND
12	0	177777	220	0	0	2	RFW	DEMAND	
13	40000	47777	320	0	2	0	RFW	NON	DEMAND
14	0	177777	324	0	0	2	RFW	DEMAND	
15	40000	47777	424	0	2	0	RFW	NON	DEMAND
16	0	177777	430	0	0	2	RFW	DEMAND	
17	40000	47777	530	0	2	0	RFW	NON	DEMAND
20	0	177777	534	0	0	2	RFW	DEMAND	
21	40000	47777	634	0	2	0	RFW	NON	DEMAND
22	0	177777	640	0	0	2	RFW	DEMAND	
23	40000	47777	740	0	2	0	RFW	NON	DEMAND
24	0	177777	744	0	0	2	RFW	DEMAND	

CORE COMMON AREA: 174000 177777

*

2.52 List Defined Symbols in the Linking Table

*WRITE-SYMBOLS (<output file>)

List the names, the segments and the values of all defined symbols in the linking table, on the file (<output file>). The terminal is the default value of the parameter (<output file>).

Example:

*WRITE-SYMBOLS
OUTPUT FILE:

TABP6	6575	23
IOINI	6310	23
8RLDN	5605	23
ERR8	5475	23
ERR9	5473	23
OUTBT	6330	23
INBT	6313	23
8DMU	6134	23
8DSB	5673	23
8DAD	5671	23
8CONV	6624	23
8LIB	254	23
8ENTR	124	23
8LEAV	255	23
8FIO	266	23
WAITF	111	23
RESRV	113	23
8RTEN	115	23

*

2.53 List Information about Symbols in Linking Table

*WRITE-TABLE (<output file>)

List on the file (<output file>) all information about all symbols of all types, in the linking table. The default value of the parameter (<output file>) is the terminal.

Example:

*WRITE-TABLE
OUTPUT FILE:

8LEAV		30		REFERENCED SYMBOL
8FIO		30		REFERENCED SYMBOL
WAITF		30		REFERENCED SYMBOL
RESRV		30		REFERENCED SYMBOL
8RTEN		30		REFERENCED SYMBOL
TW2	24707	30	0	DEFINED RT-PROGRAM
CDC4	24663	23	0	DEFINED RT-PROGRAM
CDC3	24637	23	0	DEFINED RT-PROGRAM
CDC2	24613	23	0	DEFINED RT-PROGRAM
CDC1	24567	23	0	DEFINED RT-PROGRAM
CDC0	24377	23	0	DEFINED RT-PROGRAM

*

2.54 Load Library BRF Units

***X-LOAD** (<input file>)(<load-segment>)(<linking-segment>)

When using this command in a load operation, then BRF units with library format will be loaded if the library symbol of the BRF unit is either undefined or does not exist in the linking table. If the library symbol of the BRF unit is defined in the linking table, then the BRF unit will be skipped. Otherwise this command has the same function as the LOAD command.

Example of loading the FORTRAN runtime system FTNLBR (which is in library format) into segment number 26:

```

*NEW-SEGMENT
SEGMENT NO:
RING:
SEGMENT TYPE:
PROTECTION BITS:
NEW SEGMENT NO: 30
*X-LOAD
INPUT FILE: FTNLBR
LOAD-SEGMENT NO.:
LINKING-SEGMENT NO.:
*END-LOAD
*WRITE-SEGMENT 30,,
    30      0  17777  467  0  0  1 RFW NON DEMAND
*
```

3 EXAMPLES

- 3.1 An example of compiling the FORTRAN program PROGA, loading it into a segment and starting the program with the RT command. The RT program PROGA is a program to write the message "THIS IS PROGRAM PROGA CALLING".

•
 @ FTN

NORD FTN
 \$COM PROGA,0,PROGA
 7 STATEMENTS COMPILED
 \$EX
 @ RT-LOADER

REAL-TIME LOADER 76.02.06

*NREENTRANT-LOAD PROGA,,
 NEW SEGMENT NO: 35
 *END-LOAD
 *EXIT-LOADER

@ RT PROGA

@ LOG
 16.21.04 20 FEBRUARY 1976
 --EXIT--

THIS IS PROGRAM PROGA CALLING

- 3.2 An example of loading the reentrant FORTRAN input/output system FIO into a segment, and then loading 2 reentrant RT programs PROGA and PROGB into other segments and linking them to the segment containing FIO. The entry point 8FIO must be referenced to extract FIO from the file FTNRTLBR.

● FTN

NORD FTN

\$RT

\$COM PROGA,0,REENT-PROGA

7 STATEMENTS COMPILED

\$RT

\$COM PROGB,0,REENT-PROGB

7 STATEMENTS COMPILED

\$EX

● RT-LOADER

REAL-TIME LOADER 76.02.06

*NEW-SEGMENT,,,,

NEW SEGMENT NO: 33

*SET-LOAD-ADDRESS 33 150000

*REFER-SYMBOL 8FIO

*LOAD FTNRTLBR,,

*END-LOAD

*REENTRANT-LOAD

INPUT FILE: REENT-PROGA

LINKING-SEGMENT NO.: 33

STACK LENGTH: 1000

NEW SEGMENT NO: 34

*END-LOAD

*REENTRANT-LOAD REENT-PROGB 33 1000

NEW SEGMENT NO: 35

*END-LOAD

*

3.3

An example of loading 3 reentrant RT programs PROG1, PROG2 and PROG3 to 3 different segments. All three RT programs call the reentrant subroutine SUBR, and this subroutine is loaded into a segment which will be common for the three RT programs.

• FTN

```

NORD FTN
$RT
$COM PROG1,0,REENT-PROG1
6 STATEMENTS COMPILED
$RT
$COM PROG2,0,REENT-PROG2
6 STATEMENTS COMPILED
$RT
$COM PROG3,0,REENT-PROG3
6 STATEMENTS COMPILED
$RT
$COM SUBR,0,REENT-SUBR
4 STATEMENTS COMPILED
$EX
• RT-LOADER

```

REAL-TIME LOADER 76.02.06

```

*NEW-SEGMENT,,,,
NEW SEGMENT NO: 36
*SET-LOAD-ADDRESS 36 100000
*LOAD REENT-SUBR,,
*LOAD FTNRTLBR,,
*END-LOAD
*REENTRANT-LOAD REENT-PROG1,36,1000
NEW SEGMENT NO: 37
*END-LOAD
*REENTRANT-LOAD REENT-PROG2,36,1000
NEW SEGMENT NO: 40
*END-LOAD
*REENTRANT-LOAD REENT-PROG3,36,1000
NEW SEGMENT NO: 41
*END-LOAD
*

```

- 3.4 An example of loading the three reentrant RT programs PROG1, PROG2 and PROG3 into the same segment.

•
@FTN

```
NORD FTN
$RT
$COM PROG1,0,REENT-PROG1
6 STATEMENTS COMPILED
$RT
$COM PROG2,0,REENT-PROG2
6 STATEMENTS COMPILED
$RT
$COM PROG3,0,REENT-PROG3
6 STATEMENTS COMPILED
$RT
$COM SUBR,0,REENT-SUBR
4 STATEMENTS COMPILED
$EX
@RT-LOADER
```

REAL-TIME LOADER 76.02.06

```
*REENTRANT-LOAD REENT-SUBR,,,
NEW SEGMENT NO: 42
*REENTRANT-LOAD REENT-PROG1,,1000
*REENTRANT-LOAD REENT-PROG2,,1000
*REENTRANT-LOAD REENT-PROG3,,1000
*END-LOAD
*
```

3.5

An example of loading a common area named COMMLAB to one segment, and then load the two RT-programs COMPRO1 and COMPRO2 into other segments and link these segments to the "COMMON" segment, i.e. the two RT-programs both refer to the COMMON area COMMLAB.

@FTN

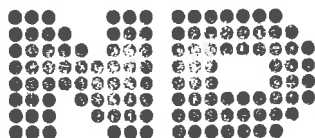
NORD FTN
\$COM COMPRO1,0,COMPRO1
 5 STATEMENTS COMPILED
\$COM COMPRO2,0,COMPRO2
 5 STATEMENTS COMPILED
\$EX
@RT-L

REAL-TIME LOADER 76.01.07

*NEW-SEGMENT,,,,
 NEW SEGMENT NO: 40
*NEW-SEGMENT,,,,
 NEW SEGMENT NO: 41
*SET-SEGMENT-COMMON COMMLAB
*LOAD COMPRO1,40,41
*LOAD FTNLIBR,,,
*END-LOAD
*NEW-SEGMENT,,,,
 NEW SEGMENT NO: 42
*LOAD COMPRO2,42,41
*LOAD FTNLIBR,,,
*WRITE-TABLE,,,

SLIB	217	42	DEFINED SYMBOL	
SENTR	67	42	DEFINED SYMBOL	
8LEAV	220	42	DEFINED SYMBOL	
RESRV	56	42	DEFINED SYMBOL	
8RTEN	60	42	DEFINED SYMBOL	
COMPRO2	21115	42 41	DEFINED RT-PROGRAM	
COMMLAB	100000	41	DEFINED COMMON LABEL	SIZE: 454
COMPRO1	21071	40 41	DEFINED RT-PROGRAM	

*END-LOAD
 *



A/S NORSK DATA-ELEKTRONIKK
Lørenveien 57, Oslo 5 - Tlf. 21 73 71

COMMENT AND EVALUATION SHEET

ND-60.051.03

SINTRAN III
REAL TIME LOADER

In order for this manual to develop to the point where it best suits your needs, we must have your comments, corrections, suggestions for additions, etc. Please write down your comments on this pre-addressed form and post it. Please be specific wherever possible.

FROM:
