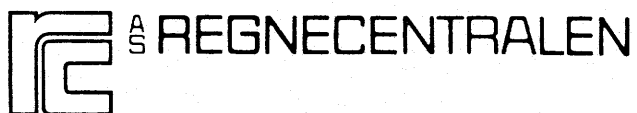

Title:

RC8000 Testprogram System
User's Manual



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Abstract:

User oriented description of the OPCOM-
operator communication program - which is
the RC3600 part of the RC8000 testsystem.

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System layout

The RC8000 testsystem is based on the RC8000 itself, a RC8301 frontend computer (RC3600) and some input/output equipment.

The RC8301 frontend is loaded with a system called OPCOM (operator communication) which interpretes operator commands, loads the RC8000 and controls input/output.

The RC8000 is loaded with a monitor called testadm which can communicate with OPCOM and execute commands concerning loading and start/stop of testprogram. Testadm also passes errormessages from the running program via OPCOM to printer or console.

Configuration requirements

The minimum system parts for running the RC8000 testsystem is :

RC8005 CPU

RC8301 Frontend (consisting of RC3600 64 kb memory + FPA link)

The RC8301 must further be equipped with an operators console (display, teletype or silent printer), (for operator communication),

a tapestation (800 or 1600 bpi) or

a RC3652 (Diablo) disc or

a paper tape reader or

a RC3751 (Flex) disc

(for inputting the testsystem).

Preferably, also a lineprinter should be available to enable fast output of errormessages.

It is required, that RC8401 (RC8000/FPA 801) has devicenumber 2, that is, the autoloading is expected to take place from this channel.

Layout of OPCOM

OPCOM is a MUSIL coded system consisting of 10 coroutines. These routines are

dual	used during autoload of the RC8000
input	used for loading program from tape, disc or reader
opout	outputs messages on operators console
output	outputs test-error messages on console or printer
opinput	reads commands from operators console
fpaout	administrates transmissions to RC8000 via FPA
fpain	administrates reception from the RC8000 via FPA
tstou	receives messages and test output from RC8000 and directs them to opout or output routines
tstin	transmits testprograms and commands to the RC8000 via fpaout.
supvis	checks the FPA-line.

These coroutines are loaded and operated under the name of OPCOM (in the RC3600).

"Opinput" always reads from the operators console. If this is "dead", i.e. does not take input this will be an indication of a system break down.

During output on the console, opinput may be notified by tapping quickly on the NL if the output is caused by "list" or "help" commands. Otherwise the "control" and "bell" keys must be stroken simultaneously and the text "OPCOM" typed followed by NL and a legal command, e.g. "BREAK".

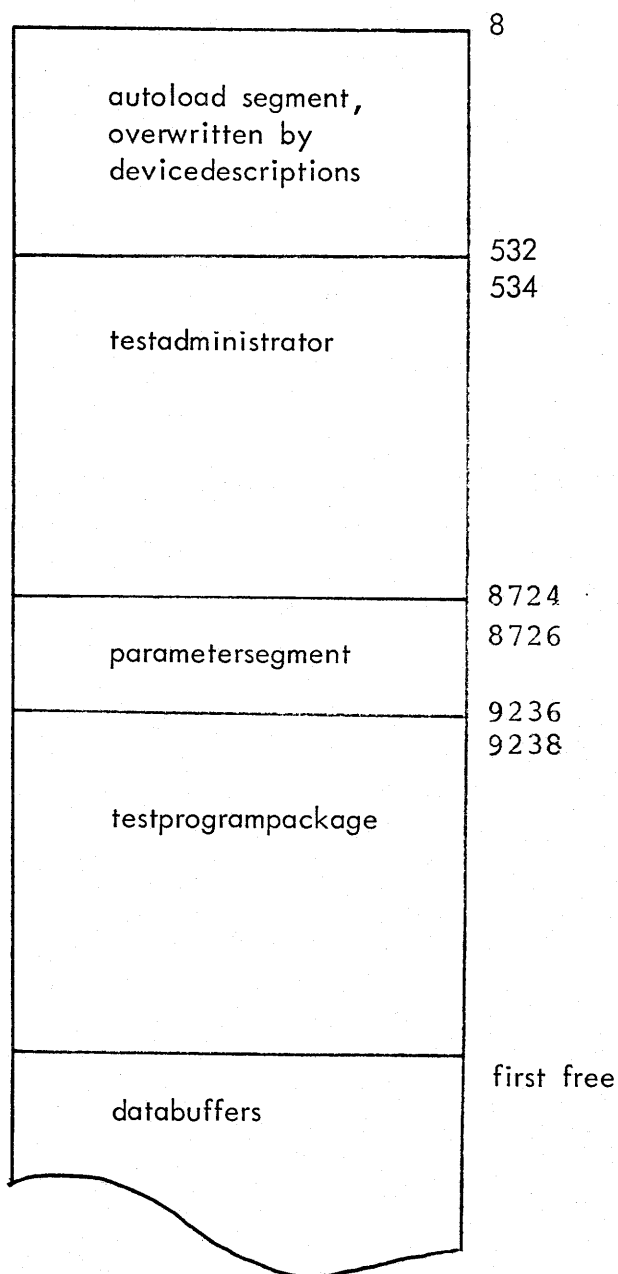
Layout of Testadm.

Testadm is loaded by the initial loader from cell $22 + 512 = 534$. The current version has a size of 16 segments, that is, the first free cell is $22 + 512 \times 17 = 8726$.

From this cell the parametersegment belonging to the actual testprogram is stored. Following this is located the testprogram itself, having a size of usually 4 - 20 segments. The first free word for databuffers will then vary from 10774 to app. 14000.

The bottom area from cell 8 to 22 + 512 is used by the autoloader. When the autoloader has been completed, this area is used for devicedescriptions. The contents of cell 8 (the description base) is set to 12. Thus, the first relevant devicedescription, (which is used for the FPA receiver, deviceno 2), is located in cell 28 ($=12 + 2 \times 8$). The highest devicenumber allowable is thus 64, the devicedescription of which will occupy cell $12 + 64 \times 8 = 524$ to 530.

RC8000 core layout



Working cycle of the RC8000 testsystem.

Autoload

The first to be done is loading the RC8301 (RC3600). If autoload from magnetic tape, flex.disc or RC3600 disc is actual, then proceed as follows:

1. Mount diskkit or tapereel, set "on line", set the density.
2. Set deviceno on RC3600 CPU switch panel + bit 0.
3. Set "autoload enable" switches on RC3695 (FPA 702) and the RC8401 (FPA 801)
4. Press the autoload button.

In case of a disc-system the console now types " DOMUS REV: XX", and in all systems, the "base system ready"-message (> s) will appear.

Now the operator types:

INT SYSA (selects ASCII printer driver)
INT SYSS (selects standard drum printer driver)
INT SYSC (selects latin-cyrillic printer driver)
INT SYSSP (selects serial printer driver).

and the autoload proceeds.

You may append a 2, 3 or 4 to the names SYSA, SYSS, SYSC, to select a possible second, third or fourth FPA702 in systems with more RC8000's, with device no's 74 + 75, 44 + 45, or

e.g. INT SYSS2

During the autoloading various checkmessages are output, ending up with the messages:

5. Select output:
which is answered by either LPT or TTY, and
6. Select function:

If the machine is to be autoloading from paper tape, the corresponding autoloader ROM's must be present in the RC3600 CPU, otherwise the bootstrap loader must be put into the memory from the switch panel, and the binary loader read in.

The reader must be loaded with the base system tape. The beginning of this contains the binary loader, which must be bypassed if binary loader is used.

The MUS-base system (first part of tape) will cause transfer of all the necessary driver processes + OPCOM from the remaining papertape to core.

By now the RC3600 is loaded, the RC8000 has been auto-loaded, the testadm is running, and the output selected will be used for bulk output of error messages, whereas operator messages always will be output on the console.

Before the output has to be selected, the testadm outputs the following message on the console:

```
testadm version <version date>
memory size = <size> words
```

The coresize is measured by the testadm by writing from max. possible address until bus time out does not appear.

After selection of output device, the OPCOM asks:

Select function:

and the operator may type one or more commands.

Operating the OPCOM, Control Commands.

In general, the OPCOM is always ready for interpreting input typed on the console. If at least one unanswered question:

Select function:

has been printed, OPCOM will accept one or more legal commands. If the operator wants to give a command while error messages are printing out, it might be necessary to strike the "CNTRL G"-key followed by "OPCOM". The output will now be delayed a few seconds with possibility to get a command through.

Normally, the first command after autoload will be:

NEW (/<filename>).

If the command is used with "/<filename>"-notation, then the testpackage specified in filename will be fetched from the autoload device (MT, FD or DKPØ). The <filename> has to be one of the five names listed below:

If the NEW command is not followed by a slash, the program will ask for an inputfile in this way:

Select inputfile (MEM/CPU/DISC/FPA/PTR) :

Now the operator has to answer one of the five shown possibilities, if he wants to run a testprogram included in the standard-packages.

Answering PTR will cause the message:

LOAD READER, TYPE NL

to appear.

If you want to load a testpackage different from the four included in the system, you have two possibilities:

- A) Load it from PTR.
- B) Place it on mag.tape or flex.disc by use of the program

TFGEN, and fetch it to OPCOM by selecting an input-file in this way:

MT: <number>

or

FD: <number>

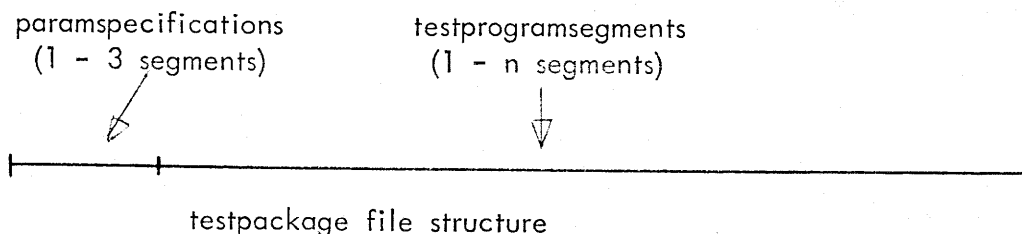
or

DKPØ:<filename>

Where "number" refers to the ones used in TFGEN. The "filename" refers to the name used when the program was copied, e.g. from PTR.

These numbers and names have to be different from the ones used for standard testpackages to prohibit destruction.

A testpackage will occupy one magtape file, one discarea, or one papertape.



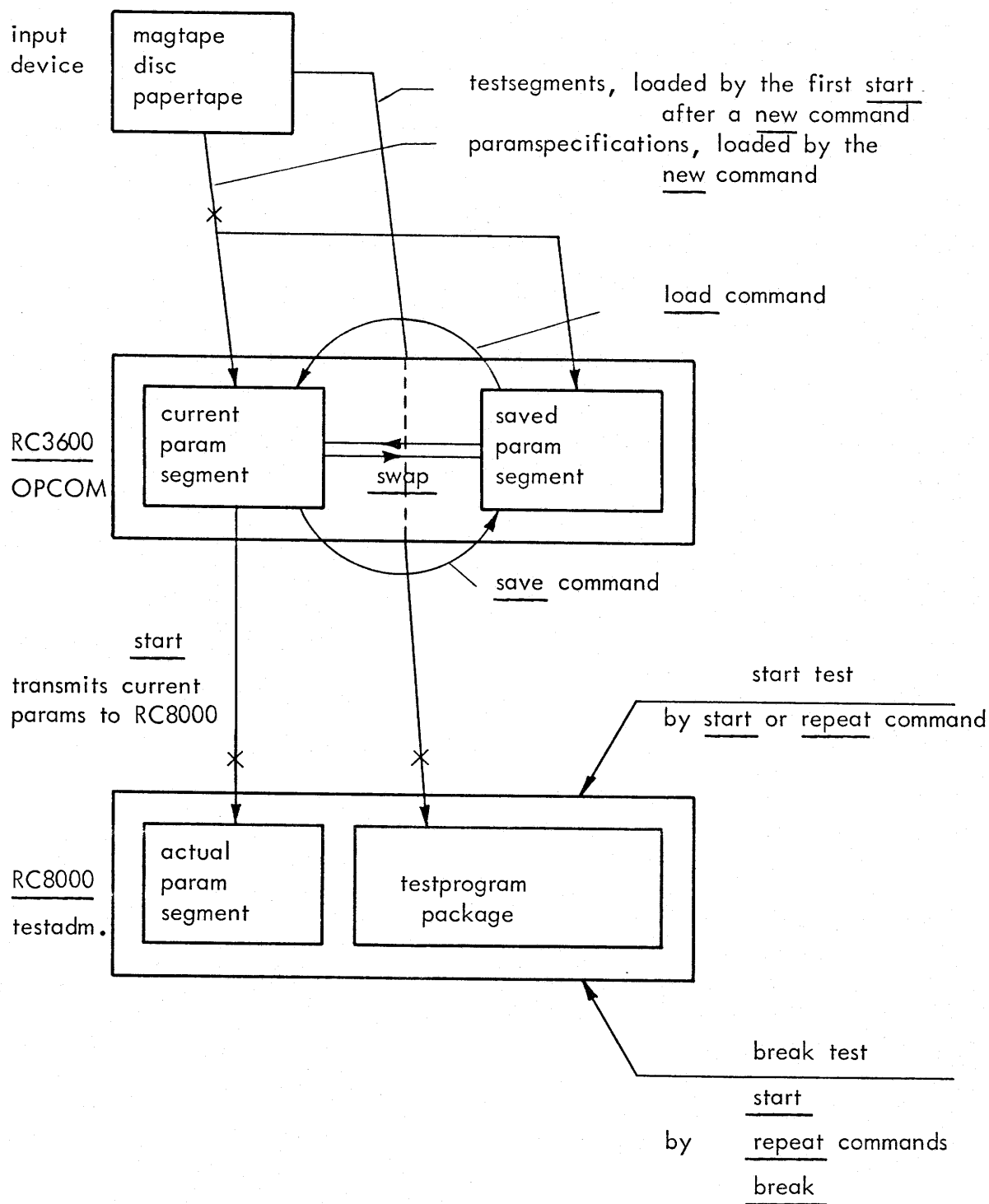
A testpackage file consists of 1 - 3 segments of parameterspecifications followed by one or more testprogramsegments (1 segment = 256 24 bit words).

When the package file desired has been selected, the parameterspecifications are loaded, and text describing the package kind and version is output. The operator can now manipulate the parameters. However, an already running program will not be affected, but current and saved param segment have been changed.

The parameterspecifications holds information about the parameter types, the questions to be asked, default and limit values for the answer.

When the parameterspecifications have been loaded (by a new command), OPCOM extracts a set of parametervalues, which is stored in an area of 1 segment called current param segment. A copy is stored in saved param segment.

The paramspecificationsegments are equipped with a checksum, which is checked after loading by OPCOM. If the checksum fails, the new command is terminated, a checkmessage is output, and another new command is expected.



X indicate sumcheck points

program and parameter routine in the RC8000
test system.

After new, A

start

Command may be executed. This will cause

1. A possible running testprogram to be terminated.
2. Current param segment will be transferred to the RC8000, now loaded as actual param segment.
3. If this is the first start following a new the rest of the package file containing the testprograms will be transferred to the RC8000.
4. A testprogram are initialized and started, taking control information from actual paramsegment.

A similar effect has the command

repeat

However, no parameter segment is transferred to the RC8000, before starting. This means, that the actual (last used) parameter segment will remain unchanged, independent on any changes in current param segment (even changes caused by the new command). No transfer of testprogram can take place on this command, that is, at least one start command must have appeared since autoload.

The paramsegment transferred from the RC3600 to the RC8000 is sumchecked. If a sumerror occurs, the testadm outputs an errormessage and rejects the start command.

This checksum is generated by OPCOM and has nothing to do with the checksum of the parameterspecifications. Thus a checksumerror in the current parameter segment indicates a serious hardware error.

The testprogram segments has another checksum. This checksum is generated during the initial program assembly and stored on the inputfile. This checksum is not checked by OPCOM, but is checked by testadm when a start is executed. A sumfail causes immediately termination of the run.

A sumfail on the testsegments may be due to a bad input file or a serious failure. Reload with a new command or autoload.

The command

break

will terminate a running testprogram.

Parameter manipulation

When the current and saved parameter areas have been initialized by a new command, the parameter values may be changed in several ways.

The

list

command will cause the parameters of the current param segment to be listed with number, name, and the last value assigned. If no value has yet been assigned by the operator, the default value found in the parameter specifications is displayed.

Example of list :

```
000  select testprogram: a
001  number of runs = 19
002  first track = 0
004  number of tracks = 1000
```

the first parameter always will be the testprogram selection, whereas the rest may be totally dependent on the actual testprogram.

For a given package containing more testprograms, the current param segment list may vary according to the testprogram selected (param 000) because only a few parameters are common to all programs in the package.

The list example just mentioned might have looked like this

```
000  select testprogram: b
001  number of runs = 19
003  first segment = 0
005  number of segments = 21000
019  datacheck? Yes
```

if the last assignment (or default) of param 000 had been b.

The

param

command scans the param segment like list does, but after each line the operator is expected to type a new value of the parameter displayed. If no change is desired, a "NL" is typed.

Three types of parameters occur,

1. integer param
parameter must be assigned decimal integer which may be negative. Integer must be within certain limits (found in the corresponding package discription).
2. boolean param
parameter must be assigned either the value "yes" or the value "no" (y or n may be used for convenience).
3. text param
a text must be typed according to corresponding package description.

The select testprogram param (000) is special in more ways : a testprogram always must be selected (typing a,b,c....). A NL will cause listing of the testprograms included in the package.

If an integer param is answered with an off-limits value, a boolean param with neither y or n, or a text param with too many characters, the input is ignored and the question repeated.

If only a single or a few parameters are to be changed, the command
POXX (/YYY)

may be used, making access to the parameter no. XX.

Using the slash notation, will simply cause a substitution of the current value of param. XX by the new value YYY, without any listing.

More commands may be concatenated.

Example: P000/C P002 P005 START LIST

The current parameter segment, may be copied to the saved param area by the command
save

likewise, the saved params may be copied to current param segment by the command
load

The saved and current param segments may be exchanged by this command:

swap

The new command initialize both the current and the saved param segments to the default (standard) values.

Example 1 :

After some manipulation by means of param or p0xx current param segment contains a lot of strange values. These may be reset by the load command.

Example 2 :

After new some basic parameters, like devicenumber, density, etc. is changed according to the one specific device to be tested. These changes are stored by the save command.

Example 3 :

The operator wants to alternate between to different testprograms (of the same package), with different parameters. He saves one parameter set, defines the other and starts by means of the start command. The other set of parameters may be activated by typing :

swap start

Notice, that any parameter manipulation may take place simultaneously with a running testprogram.

Example 4 :

If the operator has changed the current paramsegment, and the testprogram run meanwhile is terminated, is may restarted on the same parameters by typing

repeatOther commands to OPCOM

Dumping of selected parts of the core memory of the RC8000 may be activated by the command

dabs

which asks for first address and number of words.

The dump is output on selected output medium. Every word is output in a line consisting of

```

    core address, octal form
    "      "      , decimal form
    contents, instruction form
    "      , decimal form
    "      , octal form
    "      , binary form

```

If dump of a program with address base ≤ 0 is wanted, the command

dbrel

is to be used. The line format will then be :

```

physical coreaddress, octal form
logical coreaddress, decimal form
contents, instruction form
    "      , decimal form
    "      , octal form
    "      , binary form.

```

Notice, that the dbrel command will only work correct on a corearea containing a testprogram, which has been started at least once.

If the selected output medium is to be redefined, the

close

command will cause the question

output device =

to be output. It must be answered by either TTY or LPT.

By function STAT it is possible to get the FPA-receiver and -transmitter statistic printed out on current output. This statistic is placed inside the testadministrator and is updated after each activity on the channel.

The FPA-statistic counters are cleared by function: CLEAR.

If the input medium is disc or mag tape and something goes wrong during the autoloader procedure or the FPA - communication, the

AUTO

function may be helpful. (As regards PTR-reautoloader look appendix D)

This command will cause a re-autoloader of the RC 8000 and a re-installation of the autoloader - and testadm, together with an initializing of the OPCOM-program.

After FPA errors or other communication-errors it may be possible to re-initialize both TESTADM and OPCOM by use of command:

INIT

With the schedule function:

SDULX

it is possible to fetch a commandstring from any input device:

X = P means paper tape reader

X = 0-9 means one of ten schedulefiles on current
inputmedium (MT or disc).

The schedulefiles contain a commandstring to OPCOM, and has to be generated previously, as described in the last chapter of this manual.

After fetching the string, it will be stored, and executed step by step by OPCOM, as if it was sequentially inputted operator-commands.

SDULXL

Adding a "L" to the schedule command will cause OPCOM to list the content of the specified schedule file on TTY. No execution will start.

The function

WAIT

may be inserted any place in a commandstring. It will cause a delay of the following command(s) until the running testprogram is terminated.

e.g. NEW/MEM START WAIT P000/E START.

This commandstring will cause a load and start of the memorytest A, and when this test is terminated, a start of the memory test E.

For on-line use, a shorthand of guidance is available by the

HELP

command.

Interruption of output.

If the operator regrets the output caused by the "list" or the "help" command this may be skipped by tapping the NL key until the output stops. If the console has been selected as outputmedium for the testprograms, and the operator is drowned in errormessages the OPCOM may be notified by striking the "control" and "bell" keys at the same time and type: OPCOM <NL> BREAK:

```
>OPCOM
BREAK
```

Any other command, e.g. start or repeat may be used instead of break if desired.

Check and errormessages.

Messages from OPCOM.

xxx test terminated.

The current run of a testprogram has been terminated for some reason.

"ILLEGAL PARAM." means that an error was detected in the type-indication of a parameter.

"ILL. OUTPUTSPEC. RECEIVED", communication error between testadm. and OPCOM. Outputspecification <> 128, 129, 0, 255 was received.

"ILLEGAL FILENAME: XXXX"

means, that the answer (XXXX) to the question "select inputfile" was not legal. The question will be repeated.

"SUMCHECK ERROR IN PARAM.BLOCK(s)!"

This message will be outputted when a checksum-error is detected after loading of the parameter-blocks from inputdevice.

Try to read from inputfile again by use of function "NEW". If still erroneous a hardware-failure in inputdevice must be the reason.

"ILLEGAL COMMAND: XXXX"

Answering a not allowed function (XXXX) to the question "select function" will result in the message, followed by a repetition of the question.

"REPEAT PROHIBITED!"

Trying to say "REPEAT" before "START" will cause this message, and reasking of "SELECT FUNCTION".

"UNDEFINED PARAMETERSEGMENT!"

Typing a function which will use the current parameter segment, e.g. "START", "LIST" before having loaded any segments by use of "NEW" will cause this message.

"SCHEDULESTRING TOO LONG!"

During the read of a schedulestring, it was found out, that the string contained more than 768 characters. Produce a new (and shorter) string.

"REJECTED"

Trying to execute an operator-function different from "BREAK", "INIT" or "AUTO", while a function-string is under execution.

"TESTADM NOT INTACT"

In the case where the operator tries to communicate with TESTADM, even if some load-error was detected, this message appears.

"SYSTEM RESET ERROR"

The system reset (Master clear header-master clear accept header) dictated from either TESTADM or OPCOM was not successful. It may be necessary to re-autoload the system.

Status error received by OPCOM from FPA 702, OUT-device and IN-device:

During Autoload:

Autoload error!

After transferring the autoload-command to FPA 702, an error status was received.

Autosegm. load error!

During the transfer of the RC 8000 autoloader, the FPA 702 transmitter detected an error.

Testadm load error!

During the transfer of the RC 8000 testadministrator, the FPA 702 transmitter either received a statusbyte $\langle \rangle \emptyset$ or delivered a statusword $\langle \rangle \emptyset$ to OPCOM.

All the above shown error messages are followed by either:

FPAX-Status: xxxxxx

or Received Statusbyte: xxxxxx

and No. of retries:

To understand this messages and the retries-questions, you may consult the "general error"-chapter on the following page.

Testadm sum error!

After transfer of the RC 8000 testadministrator, a sumcheck error in the prog. segments was discovered.

Autoloads = xx

After a successful termination of the autoloadfunction, the number of retries will be announced if > 1 .

During test:

FPA702-parity error

A character with bad parity was received
by FPA702 - receiver.

FPA702-blocklength error

A header with length $\neq 6$ or a data-block with
length $\neq 768$ was received by FPA 702.

GENERAL ERRORS:

General driver status table:

The errormessages:

FPA702 - status:

FPA702 - status:

IN - status:

OUT - status:

are followed by an octal number, where a bit $\neq 0$ indicates the following errors:

100000	: device is disconnected
040000	: device is off-line (if FRAX then: FPA801 is not ready)
001000	: illegal drivercommand, device reserved
000200	: Block error, (if LPT then: paper fault)
000100	: data late (if LPT: printer not ready)
000040	: parity error
000020	: end of medium
000002	: time out (FRAX: statusbyte not received, LPT: paper run away)

General statusbyte table

The errormessage: Received Statusbyte:

is followed by the octal byte received by FPA702 transmitter after a block-transfer. A bit set in the number has following meaning:

000020	: Illegal command code (only after header)
000004	: FPA801 receiver eventstatus < > 0
000002	: FPA801 receiver current status < > 0
000001	: FPA801 receiver remaining char. status < > 0

After announcing the general errors, OPCOM gives the question:

No. of retries:

By typing a number between 0 and 32767 you are able to let OPCOM repeat the error-operation an arbitrary number of times (until it's successful).

By typing a "*", the operation will be repeated an infinite number of times, until it is successful.

While OPCOM is repeating an error-operation it's possible to break this situation by typing the "BREAK"-command.

Messages from testadm.

xxx test terminated

The current run of a testprogram has been terminated for some reason.

run no. < runno.>

When a test is started, the message

runno 1.

is always output. For every run (total cycle of the testprogram) a runcounter is increased until the desired number of runs is reached. The current runnumber is output on the operators console if

1. The current runnumber is an integer multiple of (total no. of runs) //10, i.e. for app. every 10% of the total no. of runs.
2. If more than 5 minutes has elapsed since any message (operator or testoutput) has been output. Notice! This output depends on the RC8000 CPU timer to be running.

testadm idle

No testprogram is running and nothing has happened in the last 5 minutes.

Errorsituations in testadm.

xxx sumerror on paramsegment

Current paramsegment has a wrong checksum when received in the RC8000. Should be caused by serious hardware fault (sum generated by OPCOM).

xxx sumerror on testsegments

The testprogram just loaded cannot be started because of sumcheck-fail. Can be caused by a bad package file (checksum neither generated nor checked by OPCOM), or by a serious hardware fault.

xxx illegal test itr no <cause> ic = <ic> , SB = <SB>

xxx illegal monitor itr no <cause> ic = <ic> , SB = <SB>

An unexpected interrupt is detected in either the testprogram or the testadministrator (monitor). The current values of instruction counter and SB register are output. If the <cause> is a bus error (<cause> = 4 or 5) the exception register also is output :

ex(21) = bus parity

ex(22) = bus time out

ex(23) = bus nack

The meaning of < cause> is

cause = 0	internal interrupt (instruction interrupt)
3	monitorfault : limit violation during some interrupt or escape processing
4	buserror during operand transfer (rl,rs)
5	buserror during instruction transfer (prefetch)
6	power failure
7	timer interrupt
> 7	device interrupts

If cause = 0 or cause = 5 the testprogram is terminated.

If cause = 4 the interrupt often will be due to an unsuccessful core memory read operation of the type

rl wo ----

In this case the contents of the wreg will be unchanged thus causing misleading error messages e.g. in the memory test. This is remedied automatically by a special testadm procedure which "picks" the bad word by means of a "di" instruction (which bypasses the bus failure condition) and loads the wreg specified. The procedure works for rl and dl instructions with any wreg specification.

xxx text overflow

overflow in the text output buffer of testadm; should be a software bug.

RC8000 systemfault

In case of multiple (10 times) busexceptions when starting or resetting the FPA801, the testadm. goes into systemfault.

Following registers are of interest:

SB	W2	Comment
8.77777702	EXCEPTION REG.	10 busexceptions when start the FPA receiver
8.77777703	do.	10 busexceptions when start the FPA transmitter
8.77777710	do.	10 busexceptions when reset the FPA receiver
8.77777730	do.	10 busexceptions when reset the FPA transmitter.

Power break and restart

The testsystem handles power-failures in the following way:

Power-failure in RC8000:

Just after discovering a power fall-out in the RC8000, OPCOM will write:

```
*** RC8000 DISCONNECTED
```

on the TTY.

When the power appears again, the programs (TESTADM and OPCOM) will be initialized, and writes:

```
*** OPCOM reinitialized
```

```
*** Testadm. reinitialized
```

The running testprogram (if any) will now automatically be restarted.

Power-failure in RC3600:

Nothing visible will happen when the power falls out, but when it appears again the messages:

```
POWER
```

```
*** OPCOM reinitialized
```

```
*** Testadm. reinitialized
```

will be written on TTY.

Detailed description of the autoloading procedure. (in errorsituations)

In appendix C the autoloading-procedure is described from a programming point of view.

Many serious hardware failures cause the autoloading procedure to deteriorate before it is finished. To obtain maximum diagnostic information, check messages are given by each step in the procedure.

RC3600 autoloader (only valid for magtape load)

action	effect
1. push autoloader key on the RC3600	magtape moves to fetch autoloader segment
2. type: int syss (or sysa or sysc)	console writes: >s magtape rewinds
3. Prog pulls autoloader line to the RC8000	run-lamp lit on the RC8000
4. RC8000 returns an empty byte by means of an initialize command to the FPA801 receiver	RC8000 is left in a waiting cycle (j1.+0) in cell 532 RC3600 writes: AUTOLOADER OK
5. RC3600 transmits the RC8000 autoloader segment. It is received by a read-command following the previously mentioned initialize command in the FPA801 channel program.	cell 532 in RC8000 is overwritten by the last word in the autoloader, which causes entry jump to the code loaded.
6. The autoloader checks status, sumchecks itself and returns a statusbyte, empty if ok nonempty otherwise.	RC3600 writes: AUTOSEGMENT OK and fetches the testadm. and transmits it.

7. The testadm is loaded segment by segment, acknowledged by the statusbytes. At last the testadm is sum-checked and end load is signalled by bit 0 in the statusbyte, bit 1 signals sumcheck error.

if successful the RC3600 writes:

TESTADM. OK

If sumcheck error of testadm, a checkmessage is output, and the autoload must be repeated.

Comments

Steps 1-3 are entirely RC3600 matters, that is, failures here must be located in this part of the system.

(1-3)

If the "run" lamp fails to light there may be more reasons:

1. the FPA801 autoloader enable switch is "off"
2. autoloader signal is not issued because of failure in the FPA702 (eventually FPA801)
3. RC8000 is started, but goes into systemfault immediately after the autoloader microprogram has been executed.

In this case cells 8-20 have been initialized, check for example cell 8 containing the number -4.

(4)

If it is the first autoloader -try after a systemload, the autoloader only will be executed once, but if it is caused by function "AUTO" and if no statusbyte is returned from the RC8000 the autoloader line is pulled over and over again, and a counter is increased accordingly.

If, for example, the autoloader is successful after 100 attempts the message will be:

autoloads = 100

(5)

If the autoloader detects any statuserror or sumcheckerror on itself, it puts the machine into systemfault, announced by "Autoloaderblock load-error". The cause of this may be found in the SB register:

SB = -1	channelprogramcounter wrong
SB = -2	remaining chars < > 0
SB = -4	current status < 0
SB = -8	event status < > 0
SB = -16	checksum error

The status words are found in cells 20-26.

(6) and (7)

Stops here will be identified by the appropriate error messages.

Errors here will usually be located in the RC8000 CPU. However, checksumerror on the testadm may be caused by errors in the storage-file (tape, disc) or anywhere in the RC3600 system.

The Schedule Facility.

In the schedule files you have the possibility of storing a complete commandstring to OPCOM. After generating such a string you may, by use of OPCOM function SDLUX, cause an execution of the functions in the schedulestring without further operator involvement.

The schedulestring may either reside on a papertape as ASCII-source (generated by EDITOR) or on the test-system load medium, generated by TFGEN (Test File GENERator) in case of mag.tape/flex.disc, or by EDITOR in case of disc cartridge.

On mag.tape and flex.disc schedule-files may be generated in this way:

```

S                                = operator input
CLEAR

LOAD INT PTR TFGEN              ; INT is not loaded
                                in flex.disc systems.

RC8000 Testfilegenerator program
SELECT OUTDEVICE (MT/FD): MT    ; answer MT or FD
SELECT MODE (PROG/SCHEDULE):    SCHEDULE
SELECT INPUTDEVICE (PTR/TTY):   TTY
                                ; after selecting TTY
                                as inputdevice you
                                have to type in the
                                commandstring. Read-
                                ing the string from
                                papertape is possible
                                by answering PTR.

SELECT FUNCTION (START/PARAM):  START

```

OUTFILE NUMBER:

XX

; XX is the filename
in which you want to
store commandstring.
It has to fulfill the
conditions:

MT: 46 < XX < 56

FD: 56 < XX < 64.

If input is taken from PTR, the program will now read
the tape, if it is taken from TTI, the message

TYPE STRING, TERMINATED BY "FINIS"

will indicate that a legal commandstring may now be
typed in.

In disc-cartridge systems the schedulefiles simply are
generated by the EDITOR. They have to be named SDUL0,
SDUL1, and so on.

In schedule strings only a part of the OPCOM-functions
are allowed. These are:

HELP

WAIT

START

REPEAT

LIST

NEW/ZZZZ

POXX/YYY

SDULX

FINIS (indicates end of schedule-string).

The slash-notation has always to be used for faultless
execution.

An example of a legal schedulestring is shown in appen-
dix B.

During generating of a schedulestring you have to notice the following connections:

- 1) The total no. of characters in the string may never exceed 768.
- 2) The max. no. of characters between to NL's may never exceed 80.
- 3) The string has to be terminated by "FINIS".
- 4) Spaces and NL's may be used to separate different functions.
- 5) After having made a string you can load the usual testsystem by typing:
>S
INT SYSS (or SYSA, SYSC).

EXAMPLE:

 = typed by operator

> S

 INT SYSS

> OPCOM

RC 8000 TEST-OPERATOR COMMUNICATION PROGRAM (VERS. YY.MM.DD)

AUTOLOAD OK

AUTOSEGM. OK

TESTADM. OK

Testadm version: YY.MM.DD

Memory size = xxxxx words

OUTPUT DEVICE = LPTSELECT FUNCTION : NEWSELECT INPUT-FILE (MEM/CPU/DISC/FPA//PTR) : CPU

RC 8000 CPU test

SELECT FUNCTION: LIST START

RC 8000 CPU test

000 select testprogram: A

001 number of runs : 10000

SELECT FUNCTION:

run no. 1

run no. 1001 BREAK

*** Test terminated

SELECT FUNCTION:

Example of a legal schedule-string:

```
NEW/MEM  P001/999  LIST  START  WAIT
NEW/DISC  P015/NO   LIST  START  WAIT
NEW/CPU   P000/A    P001/1000 LIST  START
FINIS
```

Appendix C

AUTOLOAD PROCEDURE

By pressing the TCP autoloader switch or the control panel autoloader button on the RC8000 the internal autoloader procedure is initiated by a jump to MAR = 1 (micro address register).

By pressing the TCP autoloader switch or the control panel autoloader button on the RC3600 the external autoloader procedure is initiated by a jump to MAR = 3.

The autoloading device is determined by the switch setting on the RC3600.

The RC8000 disc is selected by setting the switches to the FPA702 receiver device number.

device = paper tape reader	switch setting = 12
= diablo disc	= 73 + switch 0
= FPA 702	= 46 + - -

INTERNAL AUTOLOAD

It is examined if the disc is available. If so, 1 segment = 256 words from the disc (devicenumber = 4, cylinder = 0, head = 0, segment = 0) is read into the 8000 memory, where it is executed.

If the disc is not available the autoloading device is expected to be a RC3600 device and an autoloader signal is sent to the RC3600 via the FPA-transmitter (deviceno = 3) by means of a control command. Hereby the external autoloader sequence is started.

EXTERNAL AUTOLOAD

The RC3600 memory is loaded with 32 words and an autoload signal is send to the RC8000 by means of a RC3600 instruction

DOCP AC, FPA 702 TRMNO (AC (5) = 1)

to the FPA 702 receiver. Hereafter the RC3600 transmits 1 segment = 256 words (FPA702 TRM-FPA 801 REC) to the RC8000 memory.

DETAILED RC8000 MICROPROGRAM AUTOLOAD SEQUENCE DESCRIPTION

The autoload sequence executes a system reset and loads the RC8000 memory:

ADDR(HW-DECIMAL)		= 12 - 4 * 8 if disc
		= 12 - 2 * 8 if fparec
8:	; base of device description	= 12 - 3 * 8 if fpatrm
10:	-1<12+6<8 ; power up address	; { control
12:	10 ; { channelprogramaddress	; { irrelevant
14:	20 ; { statusareaaddress	; { irrelevant
16:	256(1<8) ; { itr destination	; { read
18:	22 ; { itr level	; { bufferaddress = 22
20:	768 ;	; { character count = 768
22:		; next command in the channelprogram
510+22:	JL. O ;	

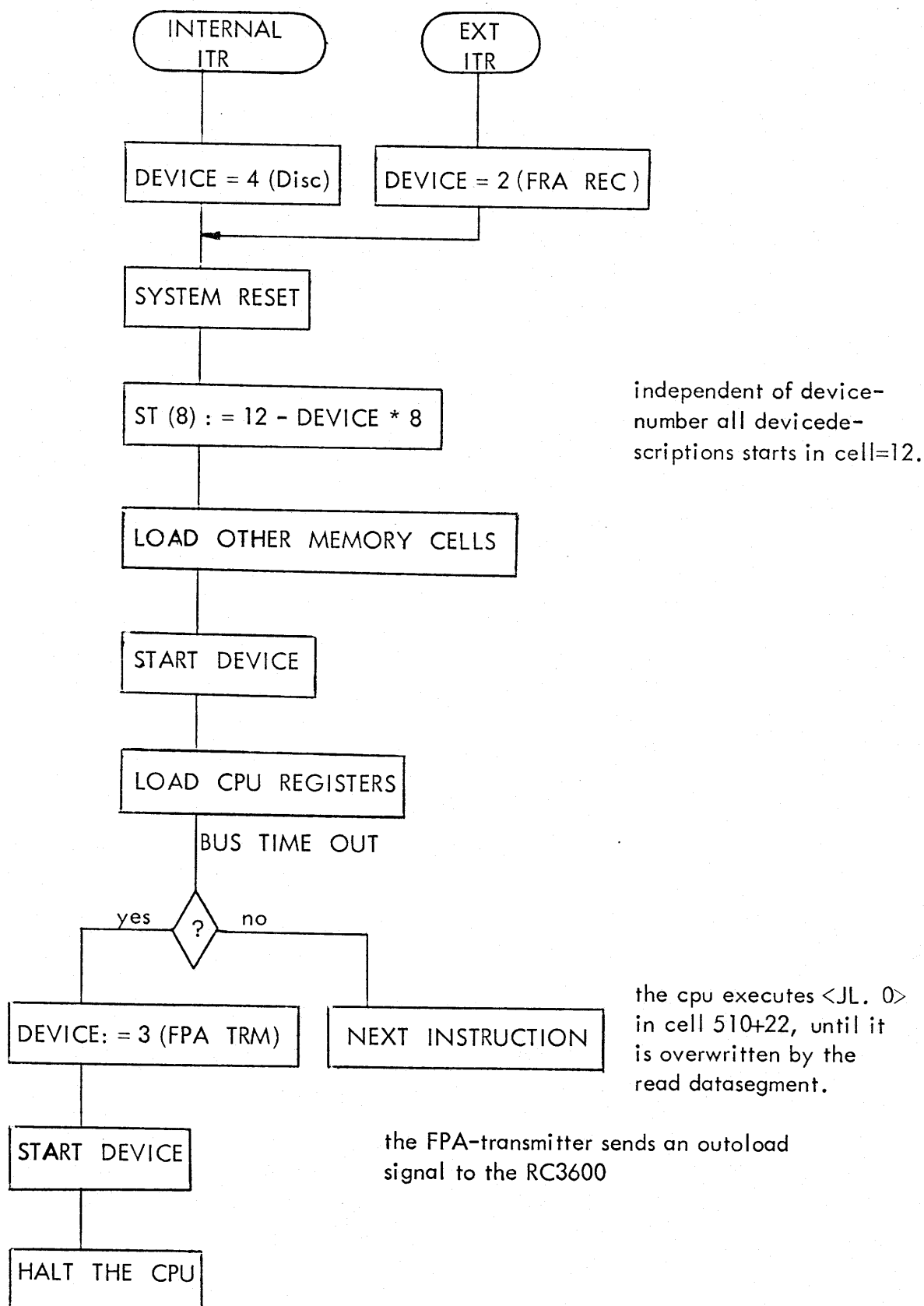


Fig. The Autoload Sequence in the microprogram.

The cpu registers are initialized as follows:

STATUS	0	
IC	510 + 22	
CPA	512 + 22	
BASE	0	
ILEVC	0	
INF	525	
SIZE	0 3777 0000	size = max
MONTOP	0 3777	JD -1 < 11 + 0 allowed
ZERO	0	
CPUST	0	normal mode
PRIC	510 + 22	
UL	512 + 22	
LL	512 + 22	
ILEV	0	interrupt disable
IR	6	clear power interrupt

PRIR is loaded with the content of 510 + 22 i.e. a JL. 0 slang instruction. Having started the device the CPU executes this instruction until it is overwritten by the autosegment.

When the device is started, it executes a "control" command followed by a "read 256 words from cell 22 and on" command. The first word read will be the next channelcommand (a stop command).

The effect of executing the control command depends on the device no:

device = 4 (disc) : a return to zero track (init)command is executed
device = 2 (fpa rec) : a zero character is transmitted
device = 3 (fpa trm) : an autoload signal is send to the opposite receiver.

CONTENT OF AUTOLOADING SEGMENT

The content of the overwriting word is a jump to a routine that awaits the reception of $\text{itrlevel} = 22$ in $\text{cell} = 256$ indicating that the channel-commands are executed.

Hereafter the status received from cell 20 (statusareaaddress) to cell 26 is examined. An error will put the machine into systemfault . The cause of this may be found in the SB register:

SB = -1	channelprogramcounter wrong
SB = -2	remaining chars $< > 0$
SB = -4	current status < 0
SB = -8	event status $< > 0$
SB = -16	checksum error

Due to the content of $\text{CPA} = \text{UL} = \text{LL} = 512 + 22$ only read access is allowed in the autosegment.

The autolamp lights until the RC8000 goes into monitormode .

After the statuscheck a $\text{JD } -1 < 11 + 0$ slang instruction is executed.

It will turn off the autoloader lamp and initialize the CPU registers:

EXAMPLE

w1	ST (INF+2) + 16 (top dump area)	316
w2	cause (=4 if dumperror)	0
STATUS	ST (INF), 0	1 < 23
IC		
CAUSE	MON CALL NO / ITR NO	0
BASE	0	0
LLC	8	8
ULC	size	max
ILEVC	0, ST (INF)	6
INF	INF -12	513
EX	0	0
CPUST	ST (INF), 0	1 < 23
PRIC	ST (INF -4)	
UL	size	max
LL	8	8
ILEV	0, ST (INF)	

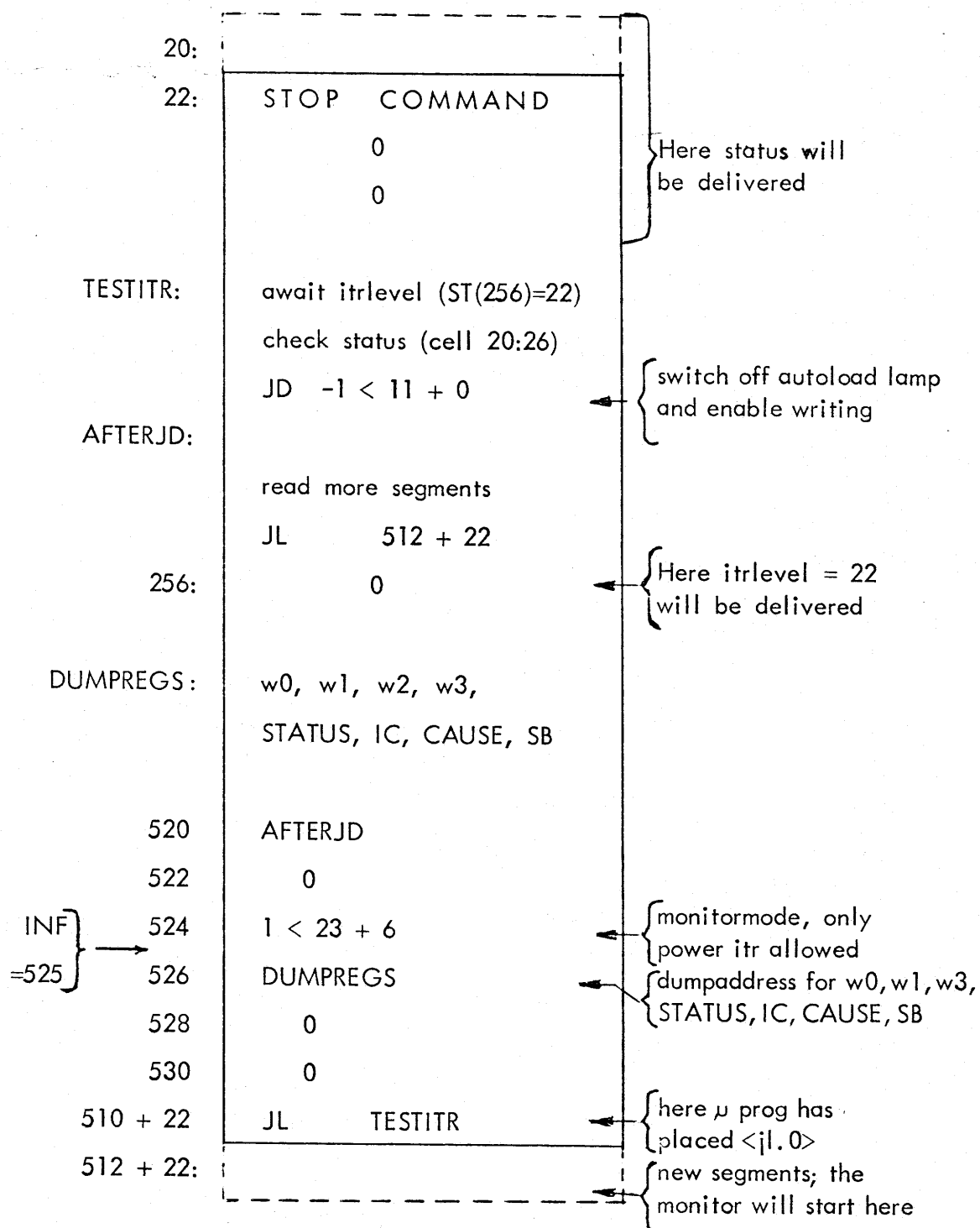
EX OF AUTOSEGMENT CONTENT

Fig. Autoload segment layout.

Now more segments (the monitor) can be read.

Appendix D.

With the present Testsystems, a re-autoload of the RC8000 is possible, even if the inputdevice is a papertape-reader. Giving the command

AUTO

to a papertape-system will cause an autoload of the RC8000, followed by the message:

"Load reader, type NL"

After loading the reader with the Testsystem-Autoloader tape (RCSL: 30M - 217), the Testadministrator is transmitted to the RC8000 and the complete testsystem is initialized.

