Title:

RC BASIC, Operating Guide

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Keywords:

RC BASIC, DOMUS, MUS, Logical Disc, Flexible Disc.

Abstract:

This manual describes how to use the RC BASIC system
under the DOMUS/MUS operating system. The creation
and use of logical discs are shortly described.

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1.   PREFACE.   1.

This manual describes how to use the RC BASIC system operating on
the RC3600 and RC7000 minicomputers under the DOMUS or MUS opera-
ting system.

The start up and closing down procedures are described as well as
the creation of logical discs on moving head - or flexible disc.

Chapter 1-5 contains information about the use of RC BASIC on mo-
ving-head-disc installations, while chapter 6-7 describes the use
of the system on installations without moving-head-disc. Users of
flexible-disc-installations might read chapter 2-4 with profit, as
the logical disc devices (LDDV-files) described here may be con-
sidered as being discettes.

2.   HOW TO LOAD RC BASIC FROM A DOMUS-DISC.

When an RC BASIC system have been installed on a disc containing the DOMUS operating system, the system can be loaded and started in the following way:

a) The DOMUS-system is bootstrapped according to the description in ref. [1].

b) A suitable number of area processes are loaded, i.e. one of the commands

LOAD CAP4   or

LOAD CAP8   is issued (CAP4: 4 area processes, CAP8: 8 area-processes). (See app. C).

c) The command

INT BASIC

is issued to load the processes which makes up the RC BASIC system. It is important that a file named COPSP exists on the disc before the command is issued, see ref. [5].

e) After approximately 15 seconds, the following transcript appears on the MASTERTERMINAL (see app. B).

DATE (YY.MM.DD) =

TIME (HH.MM.SS) =

The two questions are answered either by just striking the RETURN-key (in this case date and time will be initialized to zero by the system) or the current date and time may be typed in. Please notice the format - two digits for each number. When the questions have been answered, the transcript

YY.MM.DD, HH.MM.SS: TERMINAL XX IDLE.

will appear on the terminals which are supported by the actual software-configuration.

A terminal can be activated by pressing the ESC-key. The system writes

ATT

and the user may answer BASIC (or COMAL) if the terminal should be used for BASIC, or TIME if the date and time is to be changed. Please note that date and time may only be changed from the MASTERTERMINAL.

3. CREATION AND USE OF LOGICAL DISCS. 3.

3.1. Introduction. 3.1.

By means of the DOMUS-operating system it is possible to create files on the disc. In the present version of RC BASIC these files can not be used directly from BASIC-programs.

The files may however be divided into a number of logical discs. This means, that a logical disc is a part of a disc file. From the point of view of a BASIC-program a logical disc may be thought of as a subcatalog. This means that it is possible from a BASIC-program to operate on files which are contained in a logical disc. In ref. [3], chapter 7, the logical disc concept is described in details.

In the following it will be described how to create DOMUS-discfiles, how these can be divided into logical discs and how one can communicate with a logical disc from an RC BASIC-program.

3.2. Creation of DOMUS-discfiles. 3.2.

The RC BASIC system can at any time use up to 5 DOMUS-files, each of which are divided into a number of logical discs. The files may be placed on any disc-unit, and the names of the files must be LDDV1, LDDV2, ... , LDDV5, (LDDV is an abbreviation for Logical Disc DeVice). The files may be created by means of the DOMUS-utility-program CREATE (see ref. [2]).

3.3. Creation of Logical Discs. 3.3.

A DOMUS-discfile can be divided into a number of logical discs by means of the program LDF00 (Logical Disc Formatting Program). This program is delivered with the RC BASIC system and the detailed use of it is described in ref. [4].

One should not create several logical discs with the same name, as only one of these will be accessable at a time.

3.4. Using a Logical Disc from an RC BASIC Program.

In order to be able to use a logical disc from the RC BASIC system two things must be fulfilled:

1) The logical disc device that contains the actual logical disc must be initialized. This is done by means of the BASIC-command INIT:

INIT "LDDVx<y>", where x is one of the digits 1 through 5, and y is the number of the unit, where the LDDV-file is placed. (Default value of y is 0).

The INIT command can only be issued from the MASTERTERMINAL.

2) The user who wants to access the logical disc must connect his terminal to this, using the BASIC command CONNECT:

CONNECT "<ldname>", <key>

<ldname> is the name of a logical disc which is contained in a LDDVx-file that has been initialized. <key> is a protection key.

This command will under certain conditions which are described in ref. [3], allow the user to maintian files placed in the logical disc.

When a logical disc is not to be used anymore, it can be released by means of the command RELEASE.

4.   CHANGING DISC-PACKS.   4.

On installations with more than one disc-unit, a disc-pack must
always be mounted in unit 0 (the master drive).

In the other units disc-packs may be changed while the system is
operating. Before changing a disc-pack the user should make sure
that no terminal are connected to logical discs placed on the
disc-pack to be removed. This means that all the LDDV-files pla-
ced on the disc-pack must be locked by means of the BASIC-command
LOCK:

    LOCK "LDDVx"

No unit-number should be specified in the LOCK-command, as for
any x only one LDDVx-file can be initialized at any time. (This
means, that if for instance LDDV1 on unit 0 has been initiali-
zed, it is not possible to initialize LDDV1 on unit 1).

Once a LDDV-file has been locked, no terminal can be connected
to a logical disc on that LDDV-file. When the LOCK-command is
issued, the system will type the number of users that are con-
nected to logical discs placed in the file which was locked.
The disc-pack should not be removed until the number of users
of all LDDVx-files on that disc is zero. A user disconnects from
a logical disc by means of one of the two commands RELEASE or
BYE.

When a new disc-pack is mounted, files on this disc cannot be
accessed until the S-command INIT (see ref. [1]) has been is-
sued.

5.   CLOSING DOWN RC BASIC.

Before closing down the system the user should make sure, that no terminals are connected to logical discs. This is done by means of the BASIC-command LOCK, as described in chapter 4.

The system should not be closed down until the number of users of all LDDVx-files is zero. If the system is closed down, or a disc-pack is removed while a user is connected to a logical disc, the LDDVx-file cannot be initialized again unless it has been reset by means of the RESET-function in the Logical Disc Formatting Program (see ref. [4]) or by means of the utility-program LDRESET.

The BASIC-interpreter (with the processname COPS) can be removed from the internal core by means of the S-command BREAK COPS.

This command will remove two processes:

BASPA which is a process containing information about the actual installation. This process can be loaded from the file BPAR.

COPS which is a process containing the BASIC-interpreter. The process can be loaded from the file COPS.

6.   EXAMPLE.   6.

The example on the following pages shows how logical disc devices
can be created and formatted, and how they are used from RC BASIC.

```
SYSTEM:                          ; Type 'RETURN' if disc-device code
DOMUS REV 02.01                  ; is 73₈ and S7000 if device code is
                                 ; 33₈
>S


LOAD CAP8                        ; load area processes
INIT 1                           ; initialize disc unit 1 (if present)


CREATE LDDV4 150                 ; LDDV4 on unit 0
FINIS CREAT

CREATE LDDV5:1 300               ; LDDV5 on unit 1
FINIS CREAT


LDF00                            ; load logical disc formatting program


>LDF00
LOGICAL DISC FORMATTING PROGRAM. REV. 02.01

SELECT FUNCTION: NEW/LIST/RESET/COPY ? NEW
DEVICE NAME: LDDV4
DEVICE ID: LIBRARY 78.05.22
DEVICE SIZE: 148
LD NAME: LIB
LD SIZE: 146
PROTECTION KEY: 3247
LD NAME:                         ; strike 'RETURN'
```

```
SELECT FUNCTION: NEW/LIST/RESET/COPY ? NEW
DEVICE NAME: LDDV5:1
DEVICE ID: DEPARTMENT 1 - 3 78.05.22
DEVICE SIZE: 298
LD NAME: DEPARTM1
LD SIZE: 50
PROTECTION KEY: 234
LD NAME: DEPARTM2
LD SIZE: 150
PROTECTION KEY: 4732
LD NAME: DEPARTM3
LD SIZE: 96
PROTECTION KEY: 3256
LD NAME:                          ; strike 'RETURN'
SELECT FUNCTION: NEW/LIST/RESET/COPY ? LIST
DEVICE NAME: LDDV4
LIST OF DEVICE: LDDV4
DEVICE SIZE: 00148
DEVICE ID: LIBRARY 78.05.22


LD NAME        SIZE        KEY
LIB            00146       03247
```

```
SELECT FUNCTION: NEW/LIST/RESET/COPY ? LIST
DEVICE NAME: LDDV5:1
LIST OF DEVICE: LDDV5
DEVICE SIZE: 00298
DEVICE ID: DEPARTMENT 1 - 3 78.05.22

LD NAME        SIZE       KEY
DEPARTM1       00050      00234
DEPARTM2       00150      04732
DEPARTM3       00096      03256

SELECT FUNCTION: NEW/LIST/RESET/COPY ?
                              ; strike CTRL and G simultaneously

>S
CLEAR                         ; remove all processes

INT BASIC

>COPS

DATE (YY.MM.DD) = 78.05.22
TIME (HH.MM.SS) = 13.17.00    ; appearing on the masterterminal

78.05.22,  13.17.00: TERMINAL 32 IDLE  ; strike 'ESC'
ATT BASIC
 REV. 01.10
READY
* INIT "LDDV4"
LDLIBRARY 78.05.22

* INIT "LDDV5<1>"
LDDEPARTMENT 1 - 3 78.05.22

* CONNECT "DEPARTM1"
* LOOKUP
$FREE        00000  00000  00049

* RELEASE
* LOCK"LDDV4
0000
* LOCK"LDDV5
0000
*

>S                            ; strike CTRL and G simultaneously
BREAK COPS
```

7.   HOW TO LOAD RC BASIC IN NON-DOMUS SYSTEMS.

If an installation is not equipped with a moving-head-disc, RC BASIC runs under the MUS-operating system. In this case the initializing of RC BASIC is done as follows:

Each time the system is loaded from the autoload-device, (flexible disc, magtape station, card reader or papertape reader) the available amount of core should be divided on the terminals supported by the system. When the system is input, the following transcript will appear on the MASTER-TERMINAL (see app. B):

> COPS
CORE: XXXXX, TERM YY:

XXXXX indicates how much core is available and YY indicates a terminalnumber. The console has number 32 and terminals, which are on a multiplexor, have a number corresponding to the number of the multiplexor-line, where the terminal is connected. The first line has number 0. If there are more consoles on the machine they have the numbers 33, 34 and 35.

The user can key-in now for each terminal the amount of words, which should be assigned to the terminal. Each time a number has been keyed (followed by RETURN) the system will calculate the new remaining core and ask for a core-size for the next terminal.

The first terminal given core is the MASTERTERMINAL. If you have a system with flexible-discs, this terminal should be given at least 175 words, as otherwise it will not be possible to use the flexible-discs (the INIT and LOCK-commands can only be executed from the MASTERTERMINAL).

If a terminal is given exactly 175 words, it can be used as a table-calculator.

If the user in stead of keying a number only uses the RETURN-key, the remaining core will be divided equally between the terminals, which have not yet been given core.

The last terminal automatically gets the remaining core.

When the division of the core is finished the following transcript will appear on the MASTERTERMINAL:

DATE (YY.MM.DD) =

You answer by keying todays date in the form of year - month - date. You finish with the RETURN-key.

The system writes now:

TIME (HH.MM.SS) =

Then you write the actual time in form of hour - minute - second.

As the system does not control what has been written, it is important that the indicated format is followed.

If you do not wish to key-in date and time, you can answer the two questions by pressing the RETURN-key. Then the system will insert the values: 00.00.00.

When date and time have been initialized the following transcript will appear

YY.MM.DD., HH.MM.SS: TERMINAL ZZ IDLE

on all the connected terminals. ZZ indicates the number of the terminal.

A terminal can be activated now by pressing the ESC-key. The system writes

> ATT

and the answer should be BASIC or COMAL followed by RETURN. (If the user answers TIME, which is only allowed on the MASTERTERMINAL, then the date and time may be changed).

Then the following transcript will appear

> COMAL REV. XX.XX
> READY
> *

and the terminal is ready.

The following examples will demonstrate the initialization of a 3-user system. The terminals have the numbers 32, 00 and 01.

Example 1

```
> COPS
CORE: 09424, TERM 32: 3000          Terminal 32 and 00
CORE: 06424, TERM 00: 3000          is given 3000 words,
                                    terminal 01 gets the
DATE (YY.MM.DD) = 77.12.01          rest (= 3424).
TIME (HH.MM.SS) = 19.32.00

77.12.01, 10.32.00: TERMINAL 32 IDLE  (strike 'ESC')
ATT COMAL
     REV. 01.01
READY
*
```

Example 2

```
> COPS
CORE: 09424, TERM 32: 175
CORE: 09249, TERM 00:

DATE (YY.MM.DD) =
TIME (HH.MM.SS) =

00.00.00, 00.00.00: TERMINAL 32 IDLE
ATT BASIC
    REV. 01.01
READY
* ; SIN (45*SYS(14)/180)
    . 707107
* ; SQR (2) * 3/2.34
    1.8131
* SIZE
00350 BYTES USED
00000 BYTES LEFT

* A=12


ERR: 0014
PROGRAM TOO LARGE
*
```

Terminal 32 gets 175 words, 00 and 01 gets $9249//2 = 4624$.

Terminal 32 can be used as a table-calculator.

There is no room for variable- or program statements.

Example 2

Example 3

```
> COPS
CORE: 09424, TERM 32: 0
CORE: 09424, TERM 00: 0

DATE (YY.MM.DD) =
TIME (HH.MM.SS) =

00.00.00, 00.00.00: TERMINAL 32 IDLE
ATT COMAL

ERR: 0003
NO CORE

TERMINAL 32 LOGGED OFF
TIME USED:  00.00.02

00.00.00, 00.00.08: TERMINAL 32 IDLE
```

Terminal 32 and 00 does not get any core.

Example 4

```
> COPS
CORE: 09424, TERM 32: 9425
CORE: 09424, TERM 32: 174
CORE: 09424, TERM 32:

DATE (YY.MM.DD) =
TIME (HH.MM.SS) =

00.00.00, 00.00.00: TERMINAL 32 IDLE
ATT COMAL
      REL. 01.01
READY
*   SIZE
00.00 WORDS USED
05000 WORDS LEFT
*
```

If an illegal number is keyed in, the question is repeated concerning the same terminal.

8.   THE USE OF FLEXIBLE DISCS (DISCETTES).

A flexible disc cannot be used by the RC BASIC system until it has been formatted (i.e. divided into a number of logical discs). The formatting is done by means of a program: Logical Disc Formatting Program. This program is usually delivered in absolute binary format on a seperate discette.

When a discette is to be formatted, the formatting program must be loaded into the computer (i.e. the discette containing the program is mounted in flexible disc unit 0, and the computer is autoloaded). Once the program has been loaded, empty discettes can be mounted in the flexible disc units and formatted. Ref. [4] describes in details how the formatting program is used.

When the RC BASIC system has been loaded, the formatted discettes can be made "known" to RC BASIC by means of the INIT-command (i.e. INIT "$FD0", INIT "$FD1"). When a discette in this way has been initialized, the users can CONNECT to the logical discs on the discettes.

Before a discette is removed, or the system is closed down, one should make sure, that no users are connected to logical discs on the discette(s). This means that the discette(s) must be locked by means of the LOCK-command (i.e. LOCK "$FD0", LOCK "$FD1"). When a discette is locked, the number of users of that discette will be printed on the terminal. A discette should not be removed if this number is greater than zero.

If a discette is removed while someone is using it, it will not be possible to initialize the discette again, until it has been reset. A discette can be reset by means of the RESET-function in the logical disc formatting program.

If your installation is equipped with two or more flexible disc units, you should regularly make copies of your discettes (by means of the COPY-function in the formatting program). These copies can be kept as back-up discettes.

A detailed description of the use of files on flexible discs can be found in ref. [3].

APPENDIX A - REFERENCES.

[1] : DOMUS, User's Guide, Part I

Keywords: DOMUS, MUS, Operating System, Loader, Disc.
Abstract: This manual describes the disc operating system DOMUS for the RC3600 line of computers.

[2] : DOMUS, User's Guide, Part II

Keywords: DOMUS, MUS, Operating System, Guide.
Abstract: This manual describes the utility system for the disc operating system DOMUS for RC3600 line of computers

[3] : RC BASIC, Programming Guide

Keywords: RC3600, RC7000, MUS, DOMUS, RC BASIC, Programming Guide.
Abstract: This guide describes the RC BASIC language implemented for RC3600 and RC7000 minicomputers.

[4] : LOGICAL DISC FORMATTING PROGRAM, Operating Guide

Keywords: RC BASIC, Formatting Program, Logical Disc, MUS, DOMUS, RC3600 Catalog System.
Abstract: Flexible discs and catalog-system files used for secondary storage by RC BASIC requires a special format. This publication tells how to operate the Logical Disc Formatting Program, which provides facilities for formatting, listing, resetting and copying such discs/files.

[5] :   RC BASIC, System Installation

Keywords: RC BASIC, DOMUS, Installation.
Abstract: This document describes how to install an
            RC BASIC system on a DOMUS-disc kit.

APPENDIX B - THE MASTERTERMINAL.

The MASTERTERMINAL in the RC BASIC system differs from the other terminals in the following two points:

1) The two RC BASIC-commands INIT and LOCK can only be executed from this terminal.

2) System date and time can only be changed form this terminal.

If the RC BASIC system has been configurated in a way which makes it possible to use the system-console as a BASIC-terminal, this terminal will also be the MASTERTERMINAL. Otherwise the MASTERTER-MINAL will usually be the lowest numbered multiplexor terminal.

APPENDIX C - AREA PROCESSES USED BY THE RC BASIC SYSTEM.
(DOMUS SYSTEM ONLY).

The RC BASIC system demands, in order to be able to communicate
with disc-files, that a number of areaprocesses is present in
the internal core. The maximum number of such areaprocesses nee-
ded is 6: one for each of the LDDV-files and one for the file
used for virtual storage (COPSP). Area processes can be loaded
from one of the disc-files CAP4 (4 processes) or CAP8 (8 pro-
cesses). When the DOMUS-system is bootstrapped one area process
is included in the system.

It should be noticed, that the S-command CLEAR does not remove
any area processes.

The command to load area processes can be part of the SSYSI-file
(see ref. [1]). The user should not include the loading of area
processes in the BASIC commandfile as this will imply that a new
pool of processes is loaded each time the command-file is used.

APPENDIX D - THE BASIC COMMANDFILE (DOMUS SYSTEMS ONLY).

When an RC BASIC system is delivered, there will be a file called BASIC, which can be used as a command file to S, when the RC BASIC system is to be loaded from the disc.

The command file contains one or more load-commands which will make S load all the processes that must be included in the RC BASIC system from the discfiles specified in the command.

Some processes must always be present:

CMON   (file: CMBxx):   Coroutine monitor.
AMX   (file: AMXx or TMXx): Multiplexor driver.
BASPA   (file: BPAR):   Parameters used during initializa-
                             tion of the BASIC-interpreter.
COPS   (file: COPS):   RC BASIC interpreter.

Furthermore one or more drivers may be loaded depending on the actual installation (PTP, PTR, LPT).

The command file may also contain commands which will provoke the execution of some utility-programs (for instance AMXIN for initialization of the multiplexor driver or STACO for connection of a conversion table to a line printer driver).

The system usually is delivered with one command file. The user may of course produce other command-files by means of the text-editor. It is important, that COPS always is loaded as the last process, as it will reserve the rest of the internal core, when it is loaded.