Title:

CP/M® for RC855 Work Station

User's Guide

Keywords:

RC855, Work Station, CP/M® operating system, installation, operation.

Abstract:

This manual describes how to install and operate the CP/M-system on the RC855 Work Station.

(48 printed pages)

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1. INTRODUCTION

This document is intended as an introduction to the CP/M micro-
processor operating system available for the RC855 Work Station.

Mainly details specific to the RC855 implementation of CP/M are
covered. For detailed information about the CP/M system, please
refer to appendix A.

The RC855 implementation of CP/M includes in addition to the
RC855 BIOS a number of extra utilities.

2.   SYSTEM OVERVIEW   2.

2.1   What is CP/M?   2.1

CP/M (Control Program/Microprocessors) is a software system de-
signed to record and retrieve programs and data on diskettes.
Like other software systems, it is a collection of interrelated
programs designed to accomplish specific tasks within the system.
CP/M operates with 8080 and Z80 microprocessors and is largely
independent of the design of the computer and diskette system. It
has therefore been adopted for use with most computers using the
8080 and Z80 families of microprocessors. CP/M has become a de
facto "industrial standard" and a large group of high-level lan-
guages and application software have been designed to run under
its control.

CP/M is divided into four major modules:

1) CCP - Command Control Processor

This module is the interface between the user's console and CP/M.
It accepts and executes internal commands that are actually part
of the CCP module. These internal commands, termed "built-in com-
mands", are listed below with a description of their function.

    ERA - Erase specified file
    DIR - List file names in the directory
    REN - Rename the specified file
    SAVE - Save memory contents of a file
    TYPE - Type the contents of a file on the logged disk

See section 4.6 of this manual.

2) BDOS - Basic Disk Operating System

BDOS is a fundamental disk operating system that provides disk and file management capabilities and dynamic file allocation. In addition it executes the following primitives:

SEARCH - Looks for a particular disk file by name

OPEN   - Opens a file for further operations and reads File Control Block into memory

RENAME - Changes the name of a specified file

READ   - Reads a record from a particular file

WRITE   - Writes a record onto the disk

SELECT - Selects a disk drive for further operation

CREATE - Creates a file entry and prepares for OPEN

DELETE - Deletes file name and frees associated blocks

CLOSE   - Writes out File Control Block

See the manual reference in appendix A.

3) TPA - Transient Program Area

The TPA is an area of the memory in which the user's program resides. This area exists between memory address 100(H) and the starting address of the CCP. CP/M provides an "overlay" capability that allows the executing program to use the areas of the memory occupied by other CP/M modules as a data area. The complete CP/M system is reloaded from disk if the user program branches to the bootstrap loader at the end of execution.

4) BIOS - Basic I/O System

This module of CP/M defines the hardware environment in which CP/M will operate and performs logical device mapping. It includes a buffer manager and the primitives necessary to interface standard peripherals such as CRT's, line printers and disk drives.

The CP/M-system supplied by RC is a 56 K CP/M version 2.2 with 50 1/4 KB available for user programs (refer to point 3: TPA-Transient-Program-Area). The system supports one or two diskette drives of the 8" type (capacity 1.124 KB per drive).

The CP/M diskette drives A and B are supported as the RC855 diskette units 1 and 2 respectively. The RC855 Printer Port is supported as the CP/M list output device (LST). The RC855 Line Port is not supported at present.

The system does not support the IOBYTE function or the logical to physical device assignments of the STAT command.

The MOVCPM program is not included.

3. INSTALLATION   3.

The CP/M package for the RC855 Work Station contains the follow-
ing:

   a: This manual "CP/M for RC855 Work Station, User's Guide".

   b: The Digital Research CP/M Manuals:

      CP/M 2.0 User's Guide for CP/M 1.4 Owners.
      An Introduction to CP/M Features and Facilities.
      ED: A Context Editor for the CP/M Disk System.
      CP/M Assembler (ASM) User's Guide.
      CP/M Dynamic Debugging Tool (DDT) User's Guide.
      CP/M 2.0 Interface Guide.
      CP/M 2.0 System Alteration Guide.

   c: An 8" Diskette containing your CP/M System.

   d: License Agreement and Registration Card.

Your copy of the CP/M for the RC855 is provided with a serial
number and is licensed for your use only on a single RC855 Work
Station. Please read the SOFTWARE LICENSE AGREEMENT carefully,
fill in and return the registration card before opening the dis-
kette package.

Do not write on the original distribution diskette as this is the
master copy and will function as last resort backup in the event
of errors. Start by producing a backup copy. It may be advantage-
ous for you to keep an additional backup of the system at a se-
cure place.

3.1   Bringing up the System   3.1

The CP/M system is booted into the RC855 Work Station by the following procedure:

- Power up the RC855 and the diskette drive(s).
- Insert the CP/M diskette in drive A and close the door.
- Wait for the sign-on text to appear:

      56 K CP/M version 2.2

      A>

- The CP/M system is now ready for use.

3.2   Copying of the System Diskette   3.2

Two-Drive System

The following example shows you how to make a copy of your system diskette on a two-drive system:

Start by formatting the new diskette. Insert the system diskette in drive A and the new diskette in drive B and proceed like this:

```
A>FORMAT
RC855 FORMAT VERS.1.0 - 811123

FORMAT: 1=SS/SD 2=DS/DD TYPE (1,2) ? 2
SELECT DRIVE (A/B) ? B
INSERT DISK AND TYPE <RETURN> _
FORMAT DISKETTE IN DRIVE B (Y/N) ? Y ................
.............................................................
.............................................................
.............................................................
.............................................................
FORMATTING COMPLETE
TYPE T TO TERMINATE
TYPE C TO CONTINUE T
INSERT CP/M SYSTEM DISK AND TYPE <RETURN> _
```

Proceed with the BACKUP utility by typing:

```
A>BACKUP
RC855 BACKUP VERS.1.0 - 81.12.17


SOURCE DRIVE (A OR B) ? A


DESTINATION DRIVE (A OR B) ? B


INSERT SOURCE DISK AND TYPE <RETURN> _
INSERT DESTINATION DISK AND TYPE <RETURN> _
BACKUP COMPLETE
INSERT CP/M SYSTEM DISK AND TYPE <RETURN> _
A>
```

Single-Drive System

On a single-drive system the following procedure can be used:

Insert system diskette and type:

```
A>FORMAT
RC855 FORMAT VERS.1.0 - 811123


FORMAT: 1=SS/SD 2=DS/DD TYPE (1,2) ? 2
SELECT DRIVE (A/B) ? A
INSERT DISK AND TYPE <RETURN> _          ;change to new diskette
FORMAT DISKETTE IN DRIVE A (Y/N) ? Y ..................
.........................................................
.........................................................
.........................................................
.........................................................
FORMATTING COMPLETE
TYPE T TO TERMINATE
TYPE C TO CONTINUE T
INSERT CP/M SYSTEM DISK AND TYPE <RETURN> _; change to system
                                                   diskette
A>
```

proceed like this:

A>BACKUP
RC855 BACKUP VERS.1.0 - 81.12.17

SOURCE DRIVE (A OR B) ? A

DESTINATION DRIVE (A OR B) ? A
INSERT SOURCE DISK AND TYPE <RETURN> _   ;source disk = system
INSERT DESTINATION DISK AND TYPE <RETURN> _ disk in this case!
INSERT SOURCE DISK AND TYPE <RETURN> _
INSERT DESTINATION DISK AND TYPE <RETURN> _
INSERT SOURCE DISK AND TYPE <RETURN> _
INSERT DESTINATION DISK AND TYPE <RETURN> _

;continue until the following message occurs:

BACKUP COMPLETE
INSERT CP/M SYSTEM DISK AND TYPE <RETURN>
A>

4.   OPERATING CP/M   4.

The subjects covered by the sections 4.1 - 4.7 are described in detail in ref. [2] and [3].

Below you will find a short description of the syntax used in program descriptions and examples.

Call
- the succeeding lines specify how to activate a command or a program.

;
- the text following a semicolon is the author's comment to a program message. Could e.g. be an instruction to the terminal operator about how to react in a given situation.

_
- underline is used to indicate the text/character to be keyed by the terminal operator in a given example.

fileref
- short for file name and file type. A more precise description of file name and/or type can be stated, normally in a "where"-clause.

where
- a more precise description of the input syntax will succeed the "where"-clause, e.g. exceptions and standard values.

In general:
Whenever the fileref is found in a syntax description, you are allowed to proceed this with one of the drive selection codes "A:" or "B:" indicating the drive on which the file in question resides.

In examples with the construction:

    TYPE <RETURN> _

the operator must press or have been pressing the return-key.

In most programs you can press the CTRL and C key simultaneously
in order to abort the program and perform a "warm boot" or the
CTRL and CLEAR key in order to abort the program and perform a
"cold boot".

4.1   Selecting Disk   4.1

On a two-drive system the operator may switch the currently
logged disk by typing the disk drive name (A or B) followed by a
colon (:) when CCP is waiting for console input.

CP/M indicates the currently logged disk by prompting the drive
name (A or B) followed by a ">".

See ref. [2], chapter 3.

4.2   Resetting the System   4.2

The CP/M-system can be reinitialized in two different ways,
either by performing a "cold boot" or a "warm boot".

A "cold boot" will take place in three situations:

- whenever powering up the system.
- whenever the operator presses the reset button at the back of
  the console (hard reset)
- whenever the operator presses the CTRL-key and the CLEAR key
  simultaneously (soft reset).

The soft reset will only be available as long as the BIOS part of
CP/M is active.

4.3   Command Call   4.3

The CCP program itself contains some commands called "built-in
commands". These commands are called by typing the command name
and the wanted file selection criteria immediately after the
CP/M-prompt. See section 4.6 concerning description of the
"built-in commands".

Example, rename the file TAX.DTA to OLDTAX.DTA:

    A> REN OLDTAX.DTA = TAX.DTA

4.4   Program Call   4.4

A program can be executed (loaded into memory and executed)
simply by typing the program name immediately after the
CP/M-prompt (normally A>).

Example, execute the BACKUP utility:

    A> BACKUP

4.5   Files, Name and Type   4.5

A particular file is identified by a file name and a file type of
the form nnnnnnnn.ttt.

The file name and type can be chosen arbitrarily among all legal
names, see ref. [2], section 2.2.

Below you will find a list of some of the recommended file types
and their use:

COM   Command files (programs) which can
                                       be directly executed.

ASM   Assembly language source files.

BAK   Backup files made by the EDITOR.

HEX   Assembled files that can be used by
                                           the LOAD-program.

PRN   Files that can be printed out.

SYS   Sytem files.

For further details see ref. [2], section 2.2.

4.6   Built-in Commands   4.6

See ref. [2], chapter 6.

4.6.1   ERA   4.6.1

The ERA (erase) is used to remove file(s) from the currently
logged-in disk. The file(s) erased are those which satisfy the
file selection criteria.

Call:

ERA fileref

Example: A> ERA FIL.COM

4.6.2   DIR   4.6.2

The DIR (directory) command causes the names of all files satis-
fying the file selection criteria to be listed at the console
device.

Call:

DIR fileref

As a special case the command

DIR

lists all files on the currenly logged disk.

4.6.3   REN   4.6.3

The REN (rename) command allows the user to change the names of
files on disks. The currently logged disk is assumed to contain
the file to be renamed.

Call:

REN new fileref = old fileref

Example REN X.Y=Q.R

The file Q.R is changed to X.Y.

4.6.4   SAVE   4.6.4

The SAVE command places a number of pages (256-byte blocks) onto
disk from the TPA.

Call:

SAVE no. of pages fileref

Example: SAVE 3 FILN.COM

Copies 100H through 3FFH to a file named FILN.COM.

4.6.5   TYPE   4.6.5

The TYPE command is used to display the contents of an ASCII
source file on the currently logged disk at the console device.

Call:

TYPE fileref

4.7   Transient Commands   4.7

Transient commands are loaded from the currently logged disk and
executed in the TPA. Transient commands are specified in the same
manner as built-in commands. Additionally the transient command
can be preceded by a drive name, which causes the transient to be
loaded from the specified drive. The transient commands defined
for execution under the CCP are briefly described in the follow-
ing subsections. For further details see ref. [2], chapter 6.

4.7.1   STAT   4.7.1

The STAT command provides general statistical information about
file storage and device assignment.

Call:

STAT
STAT drive
STAT fileref

Example: STAT B:

Please note that the STAT command only supports fixed logical de-
vices. There is no possibility of physical to logical assignment.

4.7.2   ASM   4.7.2

The ASM command loads and executes the CP/M 8080 assembler.

Call:

ASM filename

Example: ASM PRG

The assembler produces one file of the type "HEX" and one of the type "PRN".

See ref. [4].

4.7.3   LOAD   4.7.3

The LOAD command reads files of the type "HEX" containing hex-format machine code and produces a memory image file (type "COM") which can be subsequently executed.

Call:

LOAD fileref

Example: LOAD PRG

4.7.4   PIP   4.7.4

The PIP (Peripheral Interchange Program) command is used to transfer a file from one diskette to another and to make copies of files. It can also be used to move disk files to differrent logical devices.

Call:

PIP
PIP command line

where commandline =
destination = source1, source2, ..., sourcen.

Where "destination" is the file or peripheral device which is to
receive the data and source1, ..., sourcen represent a series of
one or more files or devices which will be copied from left to
right to the destination.

Example: PIP A:FIL = A:FIL1, B:FIL2

See ref. [2], section 6.4.

4.7.5   ED   4.7.5

The ED program is the CP/M system text editor, which allows the
operator to create and work on source files organized as a se-
quence of ASCII characters.

Call:

ED fileref

For complete details see ref. [3].

4.7.6   SYSGEN   4.7.6

The SYSGEN command can be used to copy the BDOS and CCP parts of
CP/M to another diskette.

Call:

SYSGEN

See ref. [2].

4.7.7   SUBMIT   4.7.7

The SUBMIT command allows CP/M commands to be batched together
for automatic processing.

Call:

SUBMIT fileref parm1, parm2, ..., parmn.

Where the file must be a file of the type "SUB".

The SUB file contains CP/M prototype commands, with possible par-
ameter substitution. The actual parameters parm1, parm2, ...,
parmn then substitute the formal parameters in the prototype com-
mands and the file will be processed sequentially by CP/M.

See ref. [2], section 6.7.

4.7.8   DUMP   .   4.7.8

The DUMP program types the contents of a disk file at the console
in hexadecimal form.

Call:

DUMP fileref

See ref. [2], section 6.8.

4.8   <u>Utilities</u>   4.8

The CP/M system diskette contains utilities to make backup
copies, format diskettes, change the format assignment of a dis-
kette drive, transfer files to/from other diskettes, patch the
original BIOS and write the patched BIOS onto a system diskette.

This section describes the function of each utility.

4.8.1   <u>BACKUP</u>   4.8.1

The BACKUP utility is used to make backup copies of an entire 8"
maxi-diskette (DS/DD 512 bytes per sector or SS/SD 128 bytes per
sector). 8" maxi-diskettes are usual pre-formatted by the manu-
facturer. However, it may be advantageous to format these disket-
tes, as all data will thus be erased and reliability improved.
This can be done by means of the FORMAT-utility.

Call:

BACKUP

The program will request the necessary input.

Example: Backup of DS/DD diskette in drive A to a DS/DD diskette
        .   in drive B.

<u>BACKUP</u>

RC855 BACKUP VERS.10 - 81.12.17

SOURCE DRIVE (A or B) ? <u>A</u>

DESTINATION DRIVE (A or B) ? <u>B</u>

```
INSERT SOURCE DISK AND TYPE <RETURN> _
INSERT DESTINATION DISK AND TYPE <RETURN> _
BACKUP COMPLETE
INSERT CP/M SYSTEM DISK AND TYPE <RETURN> _
A>
```

Whenever the BACKUP program is requesting input, a warm boot may be performed by depressing CTRL-C.

In case of read or write errors after the usual ten attempted retries, the utility will respond with:

```
BAD SECTOR ON SOURCE DISK
or
BAD SECTOR ON DESTINATION DISK
```

You now have the option of aborting the backup by typing CTRL-C, or continuing the backup by typing any other character. In the latter case the data transferred will most likely be incorrect. It is the responsibility of the user to determine by other means whether the backup copy can be used or not. If you experience problems with the destination diskette, it might help to re-format and then re-run the BACKUP utility.

4.8.2   ASSIGN   4.8.2

The ASSIGN utility is used to change the density assignment of a diskette drive.

The 8" System Diskette is a double-sided, double-density diskette. However, the system will also support the ubiquitous 8" single-sided, single-density diskette as a data diskette for the exchange of files. The ASSIGN utility is able to set the format of an 8" diskette drive to either single-sided, single-density or double-sided, double-density.

Call:

ASSIGN D:=FF

where D is either drive 'A' or 'B' and FF is either 'SS' or 'DD'
according to the type of the diskette.

Example: To set the assignment of drive B to single-sided,
single-density use the command:

ASSIGN B:=SS

To re-set the assignment to double-sided, double-density
use the command:

ASSIGN B:=DD

The utility will set the assignment and prompt:

INSERT DISK AND TYPE <RETURN>

Now insert the diskette in question and type RETURN, whereupon
CP/M will be ready for use with the new assignment.

4.8.3   TRANSFER   4.8.3

The TRANSFER utility is used to transfer files between diskettes
on systems with only one diskette drive.

The TRANSFER program will transfer the file in portions of 32 KB,
i.e. first read up to 32 KB from source file into memory, then
request a diskette change and finally write the memory contents
into the destination file. This is repeated until the transfer is
completed.

For an 8" system the type of both source and destination diskette
must be specified as either single-sided, single-density or
double-sided, double-density. It is possible to transfer files

from the single-sided, single-density format onto the double-sided, double-density diskettes of the CP/M system.

The source file and destination file may have the same name as they normally reside on different diskettes, but if they are transferred to the same diskette, the file is destroyed if it is larger than 32 KB. The file names follow the standard CP/M conventions.

Call:

TRANSFER

The program will request the necessary input.

Each time the transfer program requests input, a warm boot can be performed by depressing CTRL-C.

Exampel 1: Transfer a file named FILETXT.COM from a double-sided, double-density maxi diskette to a single-sided, single-density maxi diskette. The file is less than 32 KB.

TRANSFER
TRANSFER UTILITY VERSION X.X YY.MM.DD
SOURCE DISK TYPE (SS:=1, DD:=2): 2
DESTINATION DISK TYPE (SS:=1, DD:=2): 1
SOURCE FILENAME: FILETXT.COM
DESTINATION FILENAME: FILETXT.COM
INSERT SOURCE DISK AND TYPE <RETURN>
INSERT DESTINATION DISK AND TYPE <RETURN>
INSERT SYSTEM DISK AND TYPE <RETURN>
TRANSFER COMPLETED

A>

The FORMAT utility is used to format diskettes. The diskettes must be either single-sided single-density or double-sided double-density, soft sectored maxi diskettes.

Call:

FORMAT

and the program will request the necessary input.

Note: You choose between the two format types:

    1 = SS/SD, single-sided single-density 128 bytes per sector
    2 = DS/DD, double-sided double-density 512 bytes per sector

    The CP/M system diskettes have format type 2.

You may find it advantegeous to format a batch of diskettes at a time.

Example: FORMAT

RC855 FORMAT VERS.1.0 - YY.MM.DD
FORMAT: 1=SS/SD 2=DS/DD type (1,2)? 2
SELECT DRIVE (A/B) ? B
INSERT DISK AND TYPE <RETURN> _

; insert diskette in drive B and close the door

FORMAT DISKETTE IN DRIVE B (Y/N)? Y

; a point is displayed whenever a track is formatted.

FORMATTING COMPLETE
TYPE T TO TERMINATE
TYPE C TO CONTINUE T

INSERT CP/M SYSTEM DISKETTE AND TYPE <RETURN> _

A>

Note: Whenever the program is requesting input, a warm boot may
      be performed by pressing CTRL-C.

4.8.5   GETBIOS   4.8.5

The GETBIOS utility program is used to make a copy of BIOS in the
TPA. This copy can be saved and later altered by means of the
SAVE command and the DDT utility program.

Call:

GETBIOS

Note: You have to use the SAVE command immediately after the
      GETBIOS program, if you want to save the copy of BIOS in a
      file. The information needed by SAVE will be written on
      your display.

4.8.6   WRTBIOS   4.8.6

WRTBIOS is used either to write a patched version of BIOS onto a
new/old system diskette, or to test a patched version of BIOS.
The patched version must have been created by means of the utili-
ties GETBIOS, DDT and SAVE. The file must exist in the directory
of the diskette with the file type: SYS. Furthermore a system
diskette - with BIOS, CCP and BDOS - must be present in drive A
(unit 1).

Call:

WRTBIOS fileref
where the file type must be SYS.

Examples of how to use the WRTBIOS utility can be found in appendix C.

<u>4.8.7   CONFI</u>

A number of RC855 system configuration parameters are stored in each RC855 Work Station. The operator can change the parameters by using the CONFI program. See appendix G for a detailed description of each parameter.

Call:

CONFI

Operation:
- place the cursor at the currently assigned value (use arrows, tabs or return)
- enter the new value
- repeat until all changes have been made
- finish by pressing the PA1 key. If "***" is displayed anywhere on the screen the operator has entered an illegal value (see appendix G). Correct the value and press PA1 once more

Note: CONFI uses a file CONFI.P80, which must be present on the currently logged drive.

A.   <u>REFERENCES</u>   A.

Note! References [1] - [7] are The Digital Research CP/M Manuals
      which can be ordered by stating
      RCSL No 42-i1610 CP/M User's Guide

[1] CP/M 2.0 User's Guide for CP/M 1.4 owners

[2] An introduction to CP/M Features and Facilities

[3] Ed: A Context Editor for the CP/M Disk System

[4] CP/M Assembler (ASM) User's Guide

[5] CP/M Dynamic Debugging Tool (DDT) User's Guide

[6] CP/M 2.0 Interface Guide

[7] CP/M 2.0 System Alteration Guide

[8] RCSL No 42-i1685:
     RC855 Work Station (Data Sheet)

[9] RCSL No 42-i1685:
     RC855 Installation Manual

[10] RCSL No 42-i1686:
     RC855 Work Station, Operating Guide

[11] RCSL No 42-i1687:
     RC855 Work Station, Reference Manual

B.   DISPLAY HANDLING   B.

This appendix describes the display handling routines supported by the BIOS CONOUT procedure.

B.1   XY-Addressing   B.1

Cursor movements on the display can be controlled by XY-addressing.

The CONOUT procedure requires three characters, one control character and two addressing characters:

6 followed by the vertical position plus 32 (20H) followed by the horizontal position plus 32 (20H).

It is the programmer's responsibility to see to it that the value of the XY-address is kept within the following limits:

$0+32 \leq$ vertical pos. $\leq 24+32$
$0+32 \leq$ horizontal pos. $\leq 79+32$

Note: After issuing the 6-character, the CONOUT procedure will, without exception, handle the two next characters as the XY-address.

The upper left corner of the display has the address (0,0), the lower right the address (24,79).

B.2   Cursor Home   B.2

The cursor can be placed in the upper left corner of the display position (0,0) by sending the 29-character to the CONOUT procedure.

B.3   Clear Screen

A 12-character will cause the CRT-display to be reset - all spaces written - and the currently assigned attributes cleared. Finally the cursor will be placed in "home" position (0,0).

B.4   Tabulation

The cursor can be moved 4 positions forward by sending a 9-character to the CRT.

The cursor can be moved 1 position backwards by sending a 5-character to the CRT via the CONOUT procedure.

B.5   Cursor Control

The five characters below will cause the cursor to move as specified.

8 - one position to the left (back space)

24 - one position to the right (forward space)

10 - one line down (new line)

26 - one line up

13 - return to position 0 - zero on current line (carriage return).

B.6   Erase to End of Line

The character 30 written by the CONOUT procedure will cause the CRT to erase the current line from the cursor position to the end of the line, (from (x,y) to $(x,79)$).

B.7   Erase to End of Screen   B.7

The character 20 will cause the CRT to erase the screen image
from the cursor position to the end of the screen image (from
(x,y) to (24,79)).

B.8   Attributes   B.8

A set of attributes is available for each character position on
the display unit:

- underline
- highlighting
- inverse video
- blink - two frequences
- nondisplay

The attributes are assigned to each character following the "set
attribute" character until the "reset attribute" character oc-
curs.

The "set attribute" character is defined as 128 plus the actual
attribute byte. The "reset attribute" character is defined as
128.

The value of the attribute byte can be found by using the table
below:

Attribute	Value		
	dec.	hex.	bin.
underline	1	1	00000001
highlight	4	4	00000100
nondisplay	8	8	00001000
inverted	16	10	00010000
fast blink*	32	20	00100000
slow blink*	96	60	01100000

*   cannot "stand alone", must be combined with another attribute
     byte.

In order to avoid conflict with the "printer on/off" character
(16), the attribute byte "inverted" should be combined with an-
other byte value. E.g. use 16 + 64 - inverted plus blink fre-
quency.

C.   SYSTEM DISKETTE GENERATION   C.

The creation of a new system diskette normally takes place as
described in chapter 3.

If you want to create a new system diskette containing a patched
version of BIOS or BDOS, the steps below may be followed:

1. Patch BIOS, (see example on next page), BDOS and/or CCP as
    wanted.

2. Format the new system diskette, continue with step 3A or 3B.

3A. Make a copy of the old system diskette by means of BACKUP and
    erase files not wanted.

3B. Transfer the files wanted onto the new system diskette by
    means of either PIP (two-drive system) or TRANSFER (single-
    drive system).

4. Write BDOS and CCP (CPM56.COM) to the new diskette by means
    of SYSGEN, ref. [2].
    Note: SYSGEN does not copy the BIOS part of your CP/M system.

5. Write BIOS (CBIOS.SYS) to the new diskette by means of
    WRTBIOS.

Please note: WRTBIOS only operates on a file containing BIOS
                previously created by GETBIOS and SAVE.

                SYSGEN can operate with or without a previously
                created file containing BDOS and CCP.

                If SYSGEN is going to operate on a file, it must
                have been created by the SYSGEN program itself. See
                ref. [2].

Example, patch a keyboard conversion table in BIOS.

It is possible to change the standard ASCII values produced by
the input conversion routine by means of the utility programs
GETBIOS, WRTBIOS, DDT and SAVE and the patch tables containing
pairs of key position and patch address.

Example: Patch PA1 key to produce 129 in lower case, 139 in upper
case.

; get and save a version of BIOS

A> <u>GETBIOS</u>
   .
   .
A> <u>SAVE 31 CBIOS.SYS</u>
A>
; change the values of PA1.
;
; Compare patch table No 1 and the
; keyboard (PA1 = key pos. 3).
;
; Patch addresses found in table No 2 and
; No 3:
; lower case for keypos. 3: 1E08
; upper case for keypos. 3: 1E95

A> <u>DDT CBIOS.SYS</u>
   .
   .
- <u>S1E08</u>
- 1E08 20 <u>81</u>
- 1E09 20 <u>.</u>
- <u>S1E95</u>
- 1E95 20 <u>8B</u>
- 1E96 20 <u>.</u>
- <u>GO</u>

A> <u>SAVE 31 CBIOS.SYS</u>
A>

; test the patched version of BIOS

A> <u>WRTBIOS CBIOS.SYS</u>

    .

    .

; select TEST and the system will reboot,

; now press PA1 and check the result.

D. PATCH TABLES

Patch table No 1 - keyboard.

Figure 1: Key position values.

Key position marked: numeric code (1..140) - key included on standard RC850 keyboard.

   X   - position available but not used.

   Y   - position used, pre-defined keys (ESC, LOCK, SHIFT).

Patch table No 2 - lower case conversion.

key pos.	patch addr.	key pos.	patch addr.	key pos.	patch addr.
1	1E06	40	1E2D	65	1E46
2	1E07	41	1E2E	66	1E47
3	1E08	42	1E2F	67	1E48
4	1E09	43	1E30	68	1E49
5	1E0A	44	1E31	69	1E4A
6	1E0B	45	1E32	70	1E4B
7	1E0C	46	1E33	71	1E4C
8	1E0D	47	1E34	72	1E4D
9	1E0E	48	1E35	73	1E4E
10	1E0F	49	1E36	74	1E4F
11	1E10	50	1E37	75	1E50
12	1E11	51	1E38	76	1E51
13	1E12	52	1E39	77	1E52
14	1E13	53	1E3A	77	1E52
15	1E14	54	1E3B	78	1E53
		55	1E3C	80	1E55
18	1E17	56	1E3D	81	1E56
19	1E18	57	1E3E		
20	1E19	58	1E3F	84	1E59
21	1E1A	59	1E40	85	1E5A
22	1E1B			86	1E5B
		62	1E43	87	1E5C
		63	1E44	88	1E5D
		64	1E45		

Patch table No 2 - lower case conversion.

key pos.	patch addr.	key pos.	patch addr.	key pos.	patch addr.
89	1E5E	114	1E77	140	1E91
90	1E5F	115	1E78		
91	1E60	116	1E79		
92	1E61	117	1E7A		
93	1E62	118	1E7B		
94	1E63	119	1E7C		
95	1E64				
96	1E65	122	1E7F		
97	1E66	123	1E80		
98	1E67	124	1E81		
99	1E68	125	1E82		
100	1E69	126	1E83		
101	1E6A	127	1E84		
		128	1E85		
104	1E6D	129	1E86		
105	1E6E	130	1E87		
106	1E6F	131	1E88		
107	1E70	132	1E89		
108	1E71	133	1E8A		
109	1E72				
110	1E73	136	1E8D		
111	1E74	137	1E8E		
112	1E75	138	1E8F		
113	1E76	139	1E90		

Patch table No 3 - upper case conversion.

key pos.	patch addr.	key pos.	patch addr.	key pos.	patch addr.
1	1E93	40	1EBA	65	1ED3
2	1E94	41	1EBB	66	1ED4
3	1E95	42	1EBC	67	1ED5
4	1E96	43	1EBD	68	1ED6
5	1E97	44	1EBE	69	1ED7
6	1E98	45	1EBF	70	1ED8
7	1E99	46	1EC0	71	1ED9
8	1E9A	47	1EC1	72	1EDA
9	1E9B	48	1EC2	73	1EDB
10	1E9C	49	1EC3	74	1EDC
11	1E90	50	1EC4	75	1EDD
12	1E9E	51	1EC5	76	1EDE
13	1E9F	52	1EC6	77	1EDF
14	1EA0	53	1EC7	77	1EE0
15	1EA1	54	1EC8	78	1EE1
		55	1EC9	80	1EE2
18	1EA4	56	1ECA	81	1EE3
19	1EA5	57	1ECB		
20	1EA6	58	1ECC	84	1EE6
21	1EA7	59	1ECD	85	1EE7
22	1EA8			86	1EE8
		62	1ED0	87	1EE9
		63	1ED1	88	1EEA
		64	1ED2		

Patch table No 3 - upper case conversion.

key pos.	patch addr.	key pos.	patch addr.	key pos.	patch addr.
89	1EEB	114	1F04	140	1F1E
90	1EEC	115	1F05		
91	1EED	116	1F06		
92	1EEE	117	1F07		
93	1EEF	118	1F08		
94	1EE0	119	1F09		
95	1EF1				
96	1EF2	122	1F0C		
97	1EF3	123	1F0D		
98	1EF4	124	1F0E		
99	1EF5	125	1F0F		
100	1EF6	126	1F10		
101	1EF7	127	1F11		
		128	1F12		
104	1EFA	129	1F13		
105	1EFB	130	1F14		
106	1EFC	131	1F15		
107	1EFD	132	1F16		
108	1EFE	133	1F17		
109	1EFF				
110	1F00	136	1F1A		
111	1F01	137	1F1B		
112	1F02	138	1F1C		
113	1F03	139	1F1D		

E.   DISKETTE FORMATS   E.

E.1   System Diskette   E.1

The 8" MAXI diskette is a double-density, double-sided, 512 bytes
per sector, 15 sectors per track diskette with 77 cylinders.
Recommended type: 3M 743-0-512

The CP/M characteristics are:
- 1124 KB drive capacity in blocks of 2 KB
- 128 directory entries
- 2 reserved cylinders
- logical sector mapping with 4 to 1 interleaved sectors and zero
  track to track skew.

E.2   Data Diskettes   E.2

The RC855 CP/M system supports the "standard exchange" 8" MAXI
diskette as a data diskette only. This diskette is a single-
density, single-sided, 128 bytes per sector, 26 sectors per track
diskette with 77 cylinders.
Recommended type: 3M-740/2-0

The CP/M characteristics are:
- 243 KB drive capacity in blocks of 1 KB
- 64 directory entries
- 2 reserved tracks
- logical sector mapping with 6 to 1 interleaved sectors and zero
  track to track skew.

F. PRINTER PORT   F.

The RC855 Printer Port is supported as the CP/M LST: logical
device. The configuration parameters:

   number of stopbits

   even/odd parity

   speed

   number of data bits

are automatically taken from the NVM (non volatile memory) when
the CP/M system is loaded (cold boot).

The port can be used for attachment of most printers with a
serial interface and busy control. The ready status of the list
device can be accessed by means of the LISTST BIOS function.

G.   CONFIGURATION   G.

This appendix describes the RC855 configuration parameters
handled by the CONFI utility program.

G.1   KBL: Keyboard Lock   G.1

Range: 0-1

Meaning:
0 - alphalock lamp off after "cold boot"
1 - alphalock lamp on after "cold boot"

G.2   CP: Cursor Representation   G.2

Range: 0-3

Meaning:
0 - underline
1 - underline blinking
2 - block
3 - block blinking

G.3   PLS: Printer Line Speed   G.3

Range: 0-6

Meaning:
Determines bit rate of transmission to printer attached via V.24
connection.

0: 110 bps
1: 300 -
2: 600 -
3: 1200 -
4: 2400 -

5: 4800 bps

6: 9600 -

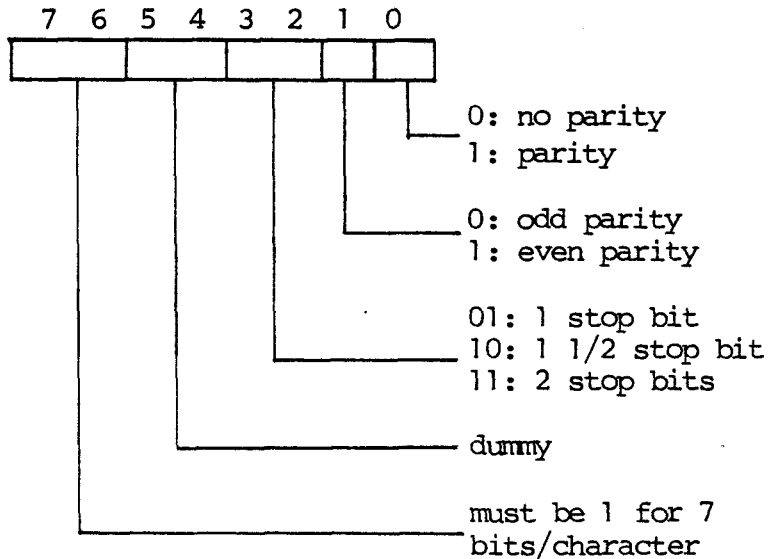G.4   CF: Character Format   G.4

Range: 0-255

Meaning:

CF determines the format of characters transmitted to printer attached via V.24 connection. CF is the decimal value of a byte coded as follows:

```
 7  6  5  4  3  2  1  0
┌──┬──┬──┬──┬──┐
│  │  │  │  │  │
└──┴──┴──┴──┴──┘
               └──── 0: no parity
                     1: parity

            └─────── 0: odd parity
                     1: even parity

         ┌────────── 01: 1 stop bit
         └────────── 10: 1 1/2 stop bit
                     11: 2 stop bits

      └───────────── dummy

   └──────────────── must be 1 for 7
                     bits/character
```

Recommended value for printers supplied by RC is 79 (2 stop bits, even parity).

G.5   LM: Line Mode   G.5

Range: 0-1

Meaning:

0 - asynchronous operation of terminal port

1 - synchronous operation

subj. Correction Leaf for RCSL 42-i1700, CP/M for RC855 Work Station, User's Guide

Appendix B:

In section B.7 page 28: '20' must be replaced by '31'.

Appendix B:

Display handling routines supported by the BIOS CONOUT procedure but not described in the manual:

- delete line (character 2)
- insert line (character 1)

These functions respectively delete or insert a line, at the line position where the cursor is currently placed, and scroll the rest of the screen image up or down.
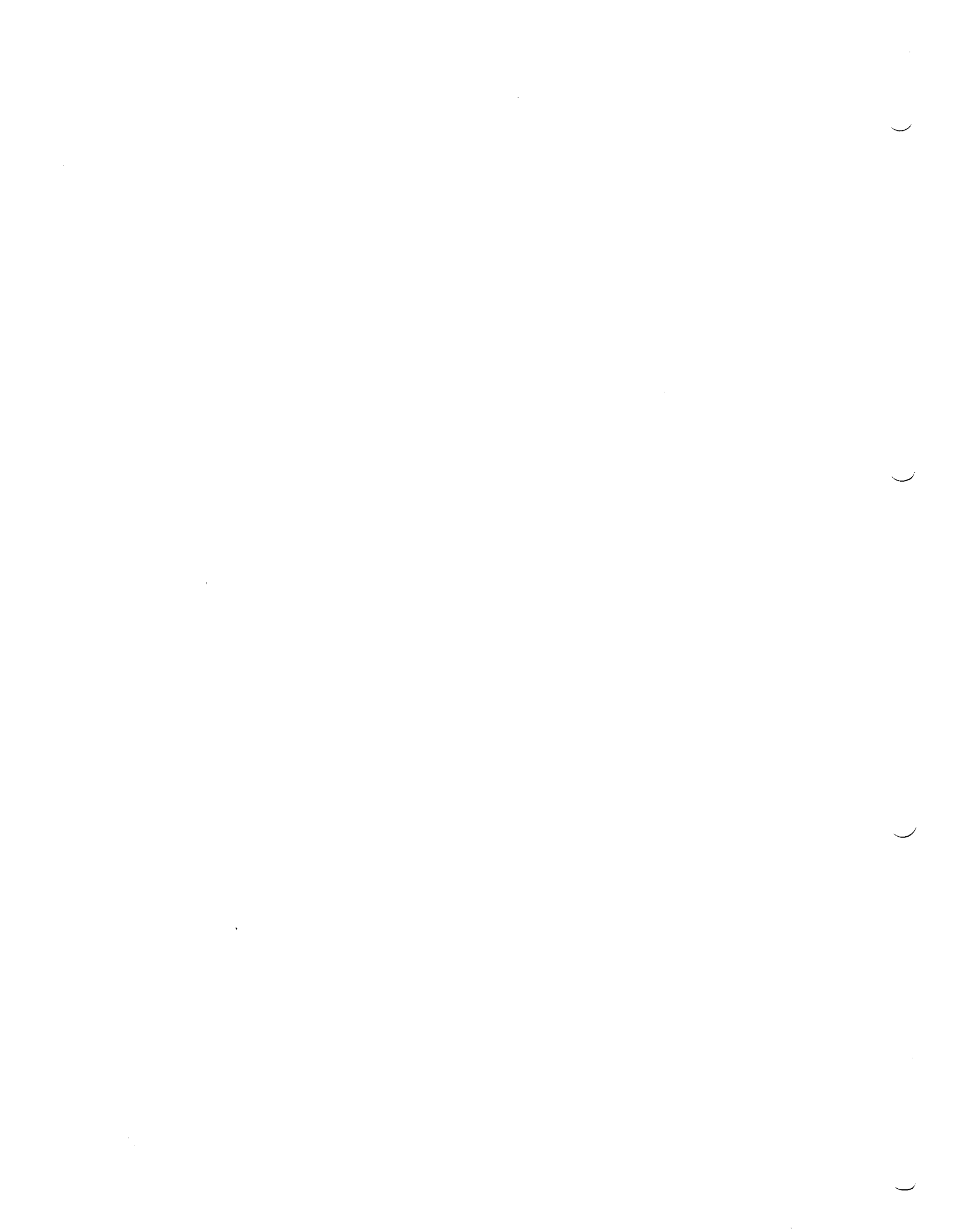
RETURN LETTER

Title: CP/M® for RC855 Work Station
      User's Guide
                    RCSL No.: 42-i1700

A/S Regnecentralen af 1979/RC Computer A/S maintains a continual effort to improve the quality and usefulness of its publications. To do this effectively we need user feedback, your critical evaluation of this manual.

Please comment on this manual's completeness, accuracy, organization, usability, and readability:

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Do you find errors in this manual? If so, specify by page.

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How can this manual be improved?

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