

RC855 IBM 3270 BSC Emulator Operating Guide



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Operating Guide

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Abstract: Operating guide for RC855 IBM 3270 BSC Emulator. Describes: keyboard functions; operating procedures; emulator messages; terminal configuration; diagnostics. Covers the specific aspects of operating the emulator and is meant to be used in conjunction with the terminal operating, the software installation, the application guidance and the technical reference data documents.

(54 printed pages)

FOREWORD

First edition: RCSL No 42-i1691.

This manual and the manual: RCSL No 42-i1692: RC855 IBM 3270 BSC Emulator, Reference Manual, supersede the manual: RCSL No 42-i1834: How to Operate the RC855 IBM 3270 BSC Emulator.

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Second edition: RCSL No 42-i2150.

This manual replaces the first edition. Differences from first edition are indicated by vertical lines in the left margin.

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1. INTRODUCTION

1.

The RC855 IBM 3270 BSC Emulator software package is available for use either with the RC855 Work Station in which case it is loaded from an attached diskette drive, or with the dedicated RC855 Terminals in which case it is loaded from an internal memory board.

Operation of the work station/terminal is covered by the RC855 Operating Guide [1].

Loading of the emulator software from diskette is covered by the RC855 IBM 3270 BSC Emulator, Installation Guide [2].

This guide covers the general aspects of using the emulator; specific technical information is found in the emulator reference manual [3].

1.1 Terminal Configuration

1.1

The functioning of the terminal running the IBM 3270 BSC emulator is affected by a number of configuration parameters. These parameters may be changed under program control. Modification of the configuration parameter values normally takes place immediately after the emulator has been loaded, but before the emulator is started. The configuration parameter values are stored in the non-volatile memory, which means they are kept permanently, also when the terminal is powered down.

A few of the configuration parameter values may also be changed after the emulator has been started. Configuration parameters are described in more detail in section 3.5 and in chapter 4.

1.2 Cluster Concept

1.2

Up to eight RC855 terminals may be interconnected using an RC-CIRCUIT, a simple twisted wire pair, to form a terminal cluster. For IBM 3270 compatible operation one terminal in the cluster

must be selected as the primary terminal, which runs the "CU/Display Station" version of the emulator program. The remaining terminals in the cluster are secondary terminals which must run the "Display Station" version of the program.

The primary terminal is responsible for handling the communication with the host computer and monitoring the state of all secondary terminals. For this reason the primary terminal must not be powered down or loaded with another program as long as any secondary terminal is operating. However, when an RC855 with a diskette drive is used as a secondary terminal, it may be reloaded with a local application program (or even another communication program) at any time, provided the newly loaded program does not use the RC-CIRCUIT.

1.3 Emulator Operation

1.3

A cluster of RC855 terminals running the IBM 3270 BSC emulator programs will communicate with a host computer in the same fashion as an IBM 3270 cluster control unit using the BSC communication line discipline.

From the operator point of view, each terminal in the cluster works as an IBM 3277 model 2 display station. However, the RC855 keyboard has a different layout and certain extensions when compared with the corresponding IBM typewriter keyboard. If the terminal is equipped with a magnetic ID-card reader in connection with the keyboard, the handling of the magnetic ID-card reader input data may also be specified to be compatible with the IBM 3277, the IBM 3278, or the Alfaskop System 37 system's handling of magnetic ID-card reader input data by setting a dedicated configuration parameter to a proper value.

A 3270 oriented application program in the host computer communicates with the operator through a series of display screen images. An image of the data transmitted from the host is displayed at the terminal. By means of the keyboard, the operator can enter, modify, or erase data on the display, and cause the

revised data to be returned to the host for storage or further processing. Printed copy of data displayed at a terminal or transmitted from the host may be provided by an attached printer.

Normally the application program supplies a "form" for the operator to fill in and return. A formatted screen image consists of protected fields containing guide texts and unprotected fields for user input. Each screen image field begins with a so-called attribute character, which occupies a character position on the display, but is shown as a blank.

The operator may cause information to be transmitted to the host computer (application program) by pressing an attention key. Pressing a data attention key, i.e. SEND or PF, causes the contents of modified fields on the display to be transmitted.

By attaching one or more printers to the cluster it is possible to obtain data printouts of the screen images or from the host computer directly.

Detailed information on how a particular application uses the 3270 features must be found in the operating guide for the application in question. Note in particular that the meaning of PA and PF keys is application dependent.

When the emulator is running all operator control is performed from the keyboard as described in chapter 2.

1.4 Terminal Status Messages

1.4

The RC855 display image has 25 lines, each of which has 80 character positions. Present edition of the 3270 display image requires the upper 24 lines. The bottom line is the terminal status line, used for operator messages. These messages originate from the emulator and are not generated by the application program. They are displayed in inverse video in order to be distinguished from application-generated messages.

The position within the status line in which a message begins indicates the type of message. The messages are further discussed in chapter 3.

2. KEYBOARD FUNCTION

2.

In IBM 3270 BSC emulation operations the RC855 keyboard functions according to the following description. A knowledge of the keyboard functions as described in the RC855 Operating Guide [1] is assumed.

2.1 General Features

2.1

All general features (as described in [1], section 3.1) are available. If a general key feature is used together with a specific key this is mentioned when describing the use of the specific key.

LOCK

- the use of the LOCK key is affected by the KBL configuration parameter. By setting the appropriate parameter, the keyboard works permanently in the alpha lock mode. See subsection 4.2.1.

2.2 Alphanumeric Keys

2.2

2.2.1 Alphabetic

2.2.1

The alphabetic keys (i.e. letter keys and other non-numeric character keys) are used for typing data into alphanumeric input fields (not into numeric fields).

Valid:

Character is displayed in cursor position and cursor advances to next unprotected position. Any character previously occupying the position is overwritten.

Invalid:

Alarm sounds and no function is accomplished.

2.2.2 Numeric

2.2.2

The numeric keys (i.e. digit, minus sign, and decimal point keys) are used for typing numeric data into numeric or alphanumeric input fields. The decimal point character in numeric fields may be either "," or "." or both. This is determined by the NFR configuration parameter. See subsection 4.2.1.

Valid:

Numeric character is displayed in cursor position and cursor advances to next unprotected position. Any character previously occupying the position is overwritten.

Invalid:

Alarm sounds and no function is accomplished.

2.2.2.1 Numeric Key Bank

2.2.2.1

The decimal point key can operate in two modes either producing a decimal point or a comma. This is determined by the DPC configuration parameter. See subsection 4.2.1.

2.3 Attention Keys

2.3

The attention keys provide the means for submitting information to the application system. The actual effect obtained depends on how the application system is constructed to respond to the particular attention key. This must be studied in the documentation covering the application system. During the time from an attention key is pressed to a response is received, the keyboard is inhibited.

The attention keys do not accomplish any function when the communication line to the host is disconnected except for some of the functions which also have a local effect; to obtain the local function associated with the PRINT key in a cluster configuration

the primary terminal must be running as well as the terminal to which the hard copy printer is attached, if these are other terminals than the one from which the operating is intended.

Only those keys are described which have a specific relation to the emulator operations.

SELECT (Select) (key/indicator) - only used together with SHIFT; see section 3.5. The indicator flashes during screen image timeout; see section 3.6.

CLEAR - erases the entire display screen. Cursor moves to first position on the screen. Submits an attention code; response is application dependent.

CTRL CLEAR: Same effect as performing a hardware reset, provided the emulator is running on the terminal.

ESC (Escape) - used in updating of parameters and screen image timeout; see sections 3.5 and 3.6.

PA (Program Access) - submits an attention code only, does not cause any input data to be sent; function is application dependent.

CTRL PA: For use in system monitoring; see section 5.2.

USM (Unsolicited Message) (key/indicator) - the indicator may be switched on by the application program and is switched off by pressing the key. Pressing the key at the same time submits an attention code (only); function is application dependent.

PF (Program Function) - submits the input data together with an attention code; function is application dependent.

CTRL PF: For use in system monitoring; see section 5.2.

CURSR SELCT (Cursor Select) - only valid in fields designated by the application as cursor (light pen) selectable. Function depends partly on the character displayed in the second position of the field (the position following the non-displayed attribute character). To obtain function, position cursor in field and press the key.

Character displayed:	Function:
&	- submits the input data with an attention code as if the SEND key had been pressed.
blank	- submits the address of the input data field with an attention code.
>	- character changes to "?"; on the next data submission the field is omitted.
?	- character changes to ">"; on the next data submission the field (ag: ') is included.

PRINT
(key/indicator (not used)) - local function.

The display image is printed on the hard copy printer. Print requests are queued. The keyboard is inhibited until the print data has been transferred to the printer buffer.

A print request can be cancelled and the keyboard restored by depressing SHIFT RESET.

CTRLR PRINT: For use in system monitoring; see section 5.2.

RESET

- local function; only used in connection with the SHIFT key.

I: Nullifies input data and attention code requested to be submitted, but not yet transferred from the terminal.

II: Used for cancelling a print request; see PRINT above.

III: Used for cancelling marks produced by the MARK key; see section 2.4.

IV: For use in diagnostics; see chapter 5.

SEND

- submits the input data for processing.

For use in parameter setting; see section 4.2.

2.4 Editing Keys

2.4

The editing functions are operational as soon as the emulator program has been loaded and they can be used whenever the keyboard is not inhibited.

When data is entered, the cursor advances one position each time a character is typed. When a character is entered in the last position of a field, the cursor will usually skip to the next input field. The cursor can also be moved by pressing the keys

described below. The movements achieved this way take place without erasing the characters which the cursor passes.

- > - moves the cursor one position to the right (ultimately: next line/top line).
- <- - as -> , but to the left (ultimately: preceding line/bottom line).
- >| - moves the cursor to the next unprotected field (ultimately: first unprotected field).
- |<- - depends on the position of the cursor:
 - a) unprotected field, first position, or protected field, any position : moves the cursor to the first position of the preceding unprotected field;
 - b) unprotected field, position other than first : moves the cursor to first position of that field.
- ↓ - moves the cursor one line down . maintaining position laterally unchanged (ultimately: top line).
- ↑ - as ↓ , but upwards (ultimately: bottom line).
- ↖ - moves the cursor to the first input position of the first unprotected field.

<↓

- moves the cursor to the first unprotected position on the next line (ultimately: succeeding line/top line).

The keys described in the following are used for actual editing of the contents of the unprotected fields. In editing one must be aware of the field characteristics (i.e. numeric or alphanumeric); other specific requirements (if any) are included with the key descriptions. If an invalid operation is attempted, the alarm sounds.

- INS MDDE (Insert Mode)
(key/indicator)
- if the key is pressed, the insert mode is enabled and the indicator is lit; to disable, press once more.

While in the insert mode, a character is inserted in the cursor position when typing the character.

Note : Minimum one empty position at or to the right of the cursor position is required.

- INS LINE (Insert Line)
- the line in which the cursor is positioned is emptied by moving that line and all succeeding lines in the field downwards. The contents of the original last line is lost.

Note : The line lost must not include attribute characters.

- FM (Field Mark)
- enters an FM character which is displayed as a semicolon; the actual use is application dependent.

- DUP (Duplicate) - enters a DUP character which is displayed as an asterisk; cursor moves to next field. The actual use is application dependent.
- DEL CHAR (Delete Character) - the character at the cursor position is deleted.
- DEL LINE (Delete Line) - the line in which the cursor is positioned is deleted.

Note : The line deleted must not include attribute characters.

- ERASE FIELD - erases the characters from the cursor position to the end of the field.
- ERASE INPUT - erases all unprotected fields.
- MARK - marks a character string. Displayed as a frame around the character. See further below.
- ⁻MOVE - moves a character string. See further below.

Note : The character string must not include attribute characters.

MARK/MOVE Operation:

- 1) position the cursor at the first character in the desired string and press the MARK key.
- 2) Similarly mark the last character in the string.

Note: The marking of a character can be cancelled by pressing SHIFT RESET.

- 3) Position the cursor at the first character of the desired copy location and press the MOVE key.

3. OPERATING PROCEDURES

3.

3.1 Emulator Loading

3.1

Terminal operations prior to the software load is described in the RC855 Operating Guide [1]. Depending on the chosen combination of hardware and software, the RC855 IBM 3270 BSC Emulator is either loaded from an attached diskette drive or from an internal memory board:

- loading the emulator from diskette is described in the RC855 IBM 3270 BSC Emulator, Installation Guide [2].
- loading the emulator from the internal memory board takes place automatically after terminal start-up or reset (see also [1]).

When the emulator has been loaded, it identifies itself by displaying one of these messages (for primary and secondary terminals, respectively):

RC855 IBM3270 BSC CU/Display Station

RC855 IBM3270 BSC Display Station

The message is shown for a period of two seconds or until one of the subprograms is invoked. The subprograms are:

- the terminal configurator program which may be invoked by typing the character 'c'. See section 4.2.
- the terminal diagnostics program which may be invoked by typing the character 'd'. See chapter 5.

Note, however that the terminal configurator program is automatically invoked in case the contents of the non-volatile memory are undefined.

When the emulator is active all operations are performed using the keyboard as described in chapter 2 and in accordance with the application system guidelines. When any abnormal situation arises during emulator operation, a message is shown in the status line. The position in which a message begins indicates the type of message as follows:

xxx...	xxx...	xxx...	xx
--------	--------	--------	----

1) 2) 3) 4)

- 1) messages relating to system identification and status (see also [1]), reveal mode, and updating of configuration parameters.
- 2) messages relating to printer operations and magnetic ID-card reader operations.
- 3) messages relating to communication with the host computer, or within a cluster.
- 4) mode of operation during program load (see [1]).

During operation the depressing of the keys CTRL CLEAR causes a reset after which loading of the software is initiated as outlined in section 3.1.

3.2.1 Operation of the Magnetic ID-Card Reader

3.2.1

The RC855 IBM 3270 BSC Emulator software package supports the use of a magnetic ID-card reader, which is installed in connection with the keyboard. The operation confines itself to insertion and removal of a magnetic ID-card. Insertion of a magnetic ID-card should be done in one steady movement.

- When a magnetic ID-card is to be inserted, the application program at the host computer will normally announce this in a screen image, and the operator may then insert the card. In case of a read error during insertion of the card, the emulator will show a message in the status line, whereas cards which have been read correctly are validated by the application program.

3.3 Emulator Messages

3.3

The messages which can occur while the emulator is running are displayed in inverse video to set them apart from application-generated messages. They are displayed in the status line as indicated in the following subsections, concerning the different aspects of communication.

3.3.1 Host

3.3.1

Modem off

- the modem facilities are not working (V.24 interface signal DSR (Data Set Ready) is missing).

Line not ready

- no polls are issued by the host computer.

System not available

- polling traffic is detected, but not to the primary terminal (CU address) of this cluster.

3.3.2 Cluster

3.3.2

CU disconnected

- this message, which can only appear on a secondary terminal, indicates that the terminal is not communicating with a primary (CU) terminal. The reason is either that the primary terminal is not operating or that the RC-CIRCUIT is disconnected.

3.3.3 Printer

3.3.3

The following messages may appear in connection with the use of the hard-copy (PRINT key) function. Note that all of these messages refer to the hard-copy printer which has been configured for the terminal in question. This may be a different printer than the one physically attached to the terminal (see chapter 4).

Some of the messages also refer to the hard copy for diagnostic functions on a physically attached printer (see chapter 5).

Printer busy

- the printer is busy with other work, either hard-copy for another terminal, or application directed printing; the print request is queued and the keyboard remains inhibited. The print request may be cancelled and the keyboard restored by pressing SHIFT RESET.

Printer not available

- the printer indicated by the configuration parameter is not present in the cluster. The reason may be a configuration error or that the system to which the printer is attached is not currently running the emulator program.

Printer reserved

- the printer has been reserved by the application.

Printer offline

Printer not ready

- both of these messages may occur because of printer malfunction during a printout operation causing the operation to be aborted. Specifically they indicate:

Printer offline: power off, printer locally selected, paper out or bad printer cable connection.

Printer not ready: a timeout occurred during printing.

3.3.4 Keyboard

3.3.4

x

An 'x' is displayed when the keyboard is inhibited. This occurs when an attention has been generated and the keyboard has not yet been restored by the application, i.e. during the 'response time' of the application. The keyboard is also inhibited while the terminal is waiting in queue for a requested hard-copy printout when the PRINT key has been pressed, and after a read error on the magnetic ID-card reader.

3.3.5 Magnetic ID-Card Reader

3.3.5

In case of one of the below mentioned messages, the keyboard is inhibited. The keyboard may be restored by pressing SHIFT RESET.

Protected field

- The cursor is positioned in a protected field. When the cursor has been moved to a non-protected field the card insertion may be repeated.

Read error, reinsert

- The magnetic ID-card was not properly read. Either the card was not inserted correctly or the insertion was not done in one steady movement.

Card format error

- The magnetic ID-card contains invalid data.

Input field too small

The cursor is positioned in a field which is too small to hold the contents of the card. When the cursor has been moved to a field of adequate size the card insertion may be repeated.

3.4 Reveal Mode

3.4

11.pp X'00'

When the emulator is in reveal mode, the cursor position, indicated by line number and position number in the line, and the

screen image contents in the cursor position are shown in the status line. The contents are shown in hexadecimal notation. Whenever the cursor is positioned in a non-display field, the constant X'NN' is shown.

3.5 Updating of Parameters

3.5

As mentioned in section 1.1, some of the configuration parameter values may be changed after the start of the emulator. Such changes are temporary and are consequently valid only until the terminal is powered down.

During the updating of configuration parameters, the keyboard is reserved for this specific purpose, whereas the screen will continue to show possible screen images received from the host computer.

The parameter updating mode is entered by pressing the SHIFT SELECT keys, and will initially show the message:

Setup

A configuration parameter to be updated is selected by pressing the H key (Hard Copy Printer), the C key (Cursor Presentation), the P key (Printer Mode), or the R key (Reveal Mode). Selection of one of the three first mentioned configuration parameters causes the displaying of the parameter name and its currently associated value, which may then be updated. Selection of the last-mentioned parameter causes an immediate change in the parameter value, i.e. reveal mode is either enabled or disabled and the parameter updating mode is terminated automatically.

HCP : 00

CP : 0

PM : 0

An additional cursor shows the current edit position in the parameter value. The numeric keys are used to update the parameter value whereby the additional cursor is moved right cyclically in the parameter value field. The additional cursor may also be moved leftwards by using the left arrow key.

When the new parameter value has been selected, returning from the parameter updating mode is obtained by pressing either the \leftarrow key or the SEND key. Returning from the parameter updating mode without changing the old parameter value is obtained by pressing the ESC key. Note that illegal parameter values will cause the alarm to sound.

3.6 Screen Image Timeout

3.6

A screen image switch-off facility is provided with the emulator and is automatically effected after a user-defined period of time during which no keys were struck and no screen images were received from the host computer application program.

When the screen image is switched off, the SELECT key indicator will flash.

The screen image may at any time be switched back on by pressing any key, and, in addition to switching the screen image on, the emulator will also perform the action associated with the key. If no action is required, the screen image may be switched on by pressing the ESC key.

4. CONFIGURATION PARAMETERS

4.

A number of configuration parameters are stored within each RC855 terminal. This is done using a non-volatile memory which retains its contents over time, also when the terminal is powered down.

When an RC855 terminal is installed, all configuration parameters should be set appropriately. Normally this is done by the installation staff. However, the description in the following enables the user to modify the configuration parameters as desired. The parameters are described in subsection 4.2.1.

4.1 Cluster Concept

4.1

Up to eight RC855 terminals can be grouped for connection to a BSC communication line as a 3270 cluster. The configuration aspects of the cluster concept are outlined in the following.

4.1.1 Primary/Secondary Terminal

4.1.1

One terminal in each cluster must be the primary (CU) terminal; the others are referred to as the secondary terminals. The primary terminal performs the function of a traditional cluster controller unit, i.e. it handles the BSC communication with the host computer and keeps track of the status of all terminals in the cluster.

The terminals in a cluster must be interconnected by means of the RC-CIRCUIT connection. In order for this interconnection to work correctly, each secondary terminal must be configured with a unique secondary address (0 through 7). (The secondary address has nothing to do with the 3270 concept of device numbering.)

4.1.2 Cluster Addressing

4.1.2

Several 3270 clusters may be connected to a host computer using a single (multidropped) communication line. Each cluster must have a unique number, the CU number, which determines when the cluster will respond to a poll or selection sequence transmitted by the host.

The CU number of a 3270 cluster consisting of RC855 terminals must be configured into the primary terminal only. Normally the CU number is obtained from the host computer system support staff. See appendix B for correspondence between CU number and polling and selection CU addresses.

4.1.3 Device Addressing

4.1.3

A device within a cluster is either a display or a printer. In a 3270 cluster consisting of RC855 terminals a printer is always physically attached to a particular display terminal. Logically, however, it has no special connection to the terminal to which it is attached. It is available as a general resource for the whole cluster.

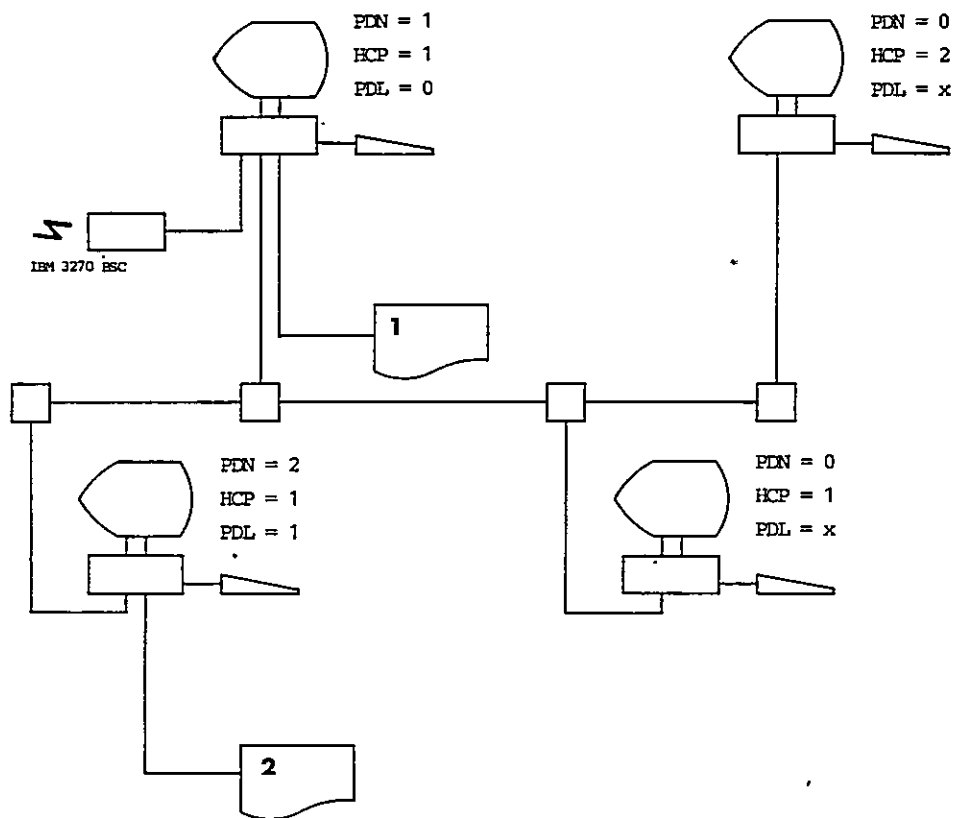
Every device in the cluster has a device number (0 through 62) which is used to identify the device both in communication with the host and internally in the cluster, i.e. for selection of a hard copy printer. The device number should be chosen in agreement with the host computer system support staff. See also appendix B.

Note: A printer intended exclusively for local hard copy does not need to be known by the host computer. The value of the configuration parameter PDL (Printer Device Local) should simply be set in accordance with the required way of use (see subsection 4.2.1).

Every display terminal must be configured with its own device number, the display device number, and the printer device number

of the attached printer, if any. All device numbers in the cluster must be unique. A printer cannot be given the device number 0, as this indicates that no printer is attached. Otherwise there are no restrictions on the assignment of device numbers.

Also every terminal must be configured with the printer device number of its hard copy printer. This may be any printer in the cluster; in particular it need not be attached to the terminal in question. The illustration below shows an example of how a printer configuration could be arranged. From the illustration it appears that printer 1 (PDN=1) is known by the host computer (PDL=0), whereas the host computer has no access to printer 2 (PDN=2, PDL=1), which at the same time may well be used locally in the cluster (HCP=2).



4.2 Configuring a Terminal

4.2

To invoke the configurator, type 'c' within two seconds of the emulator identification text being shown after program load (see section 3.1).

The configurator is a program contained in the RC855 IBM 3270 BSC Emulator and it works just like a 3270 oriented application, i.e. data is entered by the operator by typing into the input fields. The configurator provides a limit check of the parameters and displays a warning if the values exceed these limits. The parameters and the valid values are discussed in subsection 4.2.1.

Having entered the configurator, the values of the present parameters are displayed. The operator now updates the desired parameters and terminates by pressing the SEND key. If all parameter values are valid, the non-volatile memory (NVM) is updated and the terminal is reset automatically (i.e. the emulator is loaded anew so that all parameters can take effect).

Often it is desirable to keep a printout of the current parameter values. It is therefore recommended to fill in the screen image shown in appendix C with these values and to keep the description with the terminal.

If a printer is physically attached to the terminal, a printout of the parameter values may be produced by the following procedures. Note that the procedure to follow depends on whether updating is required or not.

1) enter configurator

2) proceed according to:

a) updating required

- enter parameters
- press SEND key
- invoke configurator again
- press PRINT key

b) no updating

- press PRINT key

3) terminate by pressing SEND key.

4.2.1 Parameters

4.2.1

In appendix C is shown the configurator program screen images for primary and secondary terminals, respectively.

SA: Secondary Address

Values: 0, 1, 2, ..., 7

Meaning: See subsection 4.1.1. Only relevant on a secondary terminal.

KBL: Keyboard Lock

Values: 0, 1

Meaning: KBL = 1, the keyboard works permanently in the alpha lock mode, i.e. alphabetic data can only be typed as upper case letters (does not cover letters which share a key with another symbol).

KBL = 0, the alpha lock mode may be entered and subsequently left by pressing the LOCK key. In this case the indicator in the LOCK key will light when the keyboard is in the alpha lock mode.

DPC: Decimal Point Character

Values: 0, 1

Meaning: DPC = 0, provides a "." (period sign).
DPC = 1, provides a "," (comma sign).

CP: Cursor Presentation

Values: 0, 1, 2, 3

Meaning: CP = 0, the cursor is shown as an underline.
CP = 1, the cursor is shown as a flashing underline.
CP = 2, the cursor is shown as a block.
CP = 3, the cursor is shown as a flashing block.

While the keyboard is inhibited, a steady cursor is shown as flashing and a flashing cursor is shown as steady.

PLS: Printer Line Speed

Values: 0, 1, 2, ..., 6

Meaning: Determines the bit rate of the transmission to the printer that is attached physically to the terminal (via V.24 connection).

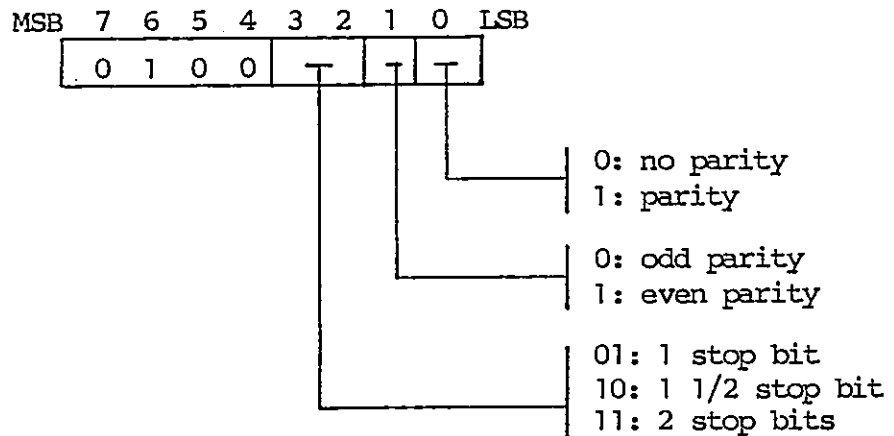
0: 110 bps
1: 300 -
2: 600 -
3: 1200 -
4: 2400 -
5: 4800 -
6: 9600 -

CF: Character Format

Values: 0, 1, 2, ..., 255

Meaning: CF determines the format of the characters transmitted to the printer attached via the V.24 connection.

CF is the decimal value of a byte coded as follows:



For RC supplied printers the recommended value is 79
(2 stop bits, even parity).

MPL: Maximum Print Line Length

Values: 0, 1, 2, ..., 132

Meaning: Maximum line length on the attached printer.

CU: CU Number

Values: 0, 1, 2, ..., 31

Meaning: See subsection 4.1.2. Only relevant on the primary terminal.

DDN: Display Device Number

Values: 0, 1, 2, ..., 62

Meaning: See subsection 4.1.3.

PDN: Printer Device Number

Values: 0, 1, 2, ..., 62

Meaning: See subsection 4.1.3. On a terminal with no attached printer, the PDN value must be 0.

HCP: Hard Copy Printer Device Number

Values: 0, 1, 2, ..., 62

Meaning: See subsection 4.1.3.

CS: Character Set

Values: 0, 1

Meaning: See reference manual for details. Only relevant on a primary terminal.

The information exchange code to the host computer can be based on either of the two modes according to the host computer requirements:

CS = 0, standard character set as base.

CS = 1, alternate character set as base (representing a former convention in information exchange).

NFR: Numeric Field Restrictions

Values: 0, 1

Meaning: - Determination of which decimal point character that is acceptable as numeric input.

NFR = 0, both the "." (period sign) and the "," (comma sign) is accepted.

NFR = 1, only the decimal point character determined by the DPC parameter (see above) is accepted.

PM: Printer Mode

Values: 0, 1

Meaning: PM refers to the printer physically attached to the terminal, not to its hard copy printer, if this is another printer.

PM = 0, the printout operations are performed in the compact mode, i.e. lines containing NUL characters only are not printed, and no FORM FEED character is printed.

PM = 1, every screen image is printed as shown on the display screen (i.e. with possible blank lines and terminated with FORM FEED).

PM does not apply to transparent printout generated from the application.

NUM: Numeric Field Check

Values: 0, 1

Meaning: Determines whether control of keyed-in characters is performed or not.

NUM = 0, control is suppressed, i.e. all characters allowed.

NUM = 1, control is performed, i.e. only numeric field standard characters are accepted.

PDL: Printer Device Local

Values: 0, 1

Meaning: Determines whether or not the host computer has access to (and thereby must be configured to handle) the printer which is physically connected to this terminal.

PDL = 0, the printer is accessible from the host computer.

PDL = 1, the printer is not accessible from the host computer.

The local printer (as well as a remote printer, i.e. known by the host computer) may be used for hard-copy print by all the terminals in the cluster.

BRM: Badge Reader Mode

Values: 0, 1, 2

Meaning: Determines the specifications according to which the magnetic ID-card reader data is handled.

BRM = 0, the magnetic ID-card reader is handled in accordance with the specifications for IBM 3277.

BRM = 1, the magnetic ID-card reader is handled in accordance with the specifications for IBM 3278.

BRM = 2, the magnetic ID-card reader is handled in accordance with the specifications for Alfaskop System 37.

PIM: Picture (screen image) Timeout

Values: 0, 1, ..., 254, 255

Meaning: Determines the number of minutes the screen image will remain switched on when no keys are pressed and no screen images are received from the host computer.

PIM = 0, the screen image is never switched off.

PIM > 0, the screen image is switched off after PIM minutes.

5. DIAGNOSTICS

5.

The RC855 IBM 3270 BSC Emulator contains programs for diagnostic tests (see section 5.1) and system monitoring (see section 5.2). The diagnostic tests are executable immediately after the loading of the emulator program, while the system monitoring can be used any time during emulator operation.

5.1 Diagnostic Tests

5.1

The diagnostic test programs are invoked by typing the character 'd' within two seconds of the emulator identification text being shown after program load (see section 3.1).

Entering the diagnostic test state, the test menu is displayed. The first line contains the release number of the emulator; the following lines show the selectable diagnostic tests.

Test selection

The selection of the specific test programs is controlled by pressing the PA keys as indicated in the menu. A test program is terminated by selecting another test program or by pressing the CLEAR key which causes a return to the menu.

Selection: PA key as indicated in menu

Termination: CLEAR key or new selection.

The diagnostic test programs are described below.

Hard copy

While the diagnostic test program is active, a printout of the display image can be obtained by pressing the PRINT key provided a printer is attached (physically) to the terminal running the test.

Termination of test state

Terminating a specific test program by pressing CLEAR causes a return to the menu - pressing the CLEAR key when the menu is displayed causes the diagnostic test state to be terminated. The terminal automatically enters emulator operation.

5.1.1 Character Set Test

5.1.1

The test program displays a test line, the displayable character set and the EBCDIC character code set (the latter only if the test is run on a primary terminal).

Test selection

Press the PA1 key.

Description of test line

In the test line, all possible field attribute characters are used in forming the series of fields indicated by the displayed characters. Positioning the cursor in the fields and performing the operations described below, enables all attribute functions to be tested.

P V PH VH PB VB PN UN ? S ND

constitutes the test line (ND should not be seen). Besides, the following will apply:

Protected fields: P PH PB PN

Entering data should not be possible. Other field characteristics:

P low intensity display
 PH high intensity display
 PB blink mode display

PN . automatic skip. Trying to position the cursor in this field automatically should move the cursor to the next field.

Unprotected fields: V VH VB

Entering of any character (alphabetic and numeric) should be possible. The entered character should be displayed according to the field characteristics:

V . low intensity display
 VH high intensity display
 VB blink mode display

Numeric unprotected field: VN

Entering of numeric data only should be possible, provided the parameter NUM is set to 1.

Cursor selectable field: ?S

Position the cursor in the field and press the CURSR SELECT key, the "?" should then change to ">" and vice versa.

Nondisplay field: ND

To the right of the cursor selectable field is a nondisplay field containing the text ND - which should not be visible.

5.1.2 Display Test

5.1.2

The display screen is filled with characters.

Test selection

Press the PA2 key.

This test program performs a loopback test on the LINE I connection by transmitting test blocks, whereby the state of some of the V.24 control signals are displayed. The test is only available on a primary terminal.

Prerequisites

The primary terminal must be connected to a modem and the modem must provide a loopback test button, which must be switched to the ON position.

Test selection

Press the PA3 key:

Test mode selection

The test can operate in two modes either of which is selected by pressing a PF key after pressing the PA3 key:

PF10 Single test. One block is transmitted/received. The result and state of the control signals are displayed.

PF11 Continuous test. Blocks are continuously transmitted/received. The state of the control signals is shown and for each block the result is displayed.

The continuous test is terminated by pressing the SHIFT RESET key.

<u>Test output</u>	<u>Meaning</u>
DSR = <state>	- data set ready signal; state can be on or off.
DCD = <state>	- data carrier detect signal; state can be on or off.

<u>Test output</u>	<u>Meaning</u>
RFS = <state>	- ready for sending signal; state can be on or off.
Result = <message>	- loopback test message; message can be: transmit timeout receive timeout data error (i.e. data received not equal to data transmitted).

5.2 System Monitoring

5.2

The system monitoring functions are controlled by means of flags. Each of the attention keys PA1-5 and PF10-14 has a corresponding flag. Flags are set (system monitoring invoked) and reset (system monitoring terminated) as follows:

Set flag: CTRL <flag key>

Reset flag: CTRL SHIFT <flag key>

PA-1 flag

The PA-1 flag has a superior function. When it is set, the display screen is erased and the screen then displays the system monitoring output. The emulator continues to run, but it does not use the screen. On the other hand, as long as the PA-1 flag is not set, the system monitoring functions may well be invoked by setting their individual flags, but they will not display any information.

Hard copy

If a printer is attached to the terminal (physically attached, not cluster hard copy printer) and the PDN parameter is not 0, then a printout of the system monitoring screen image, invoked by the PA-1 flag, can be obtained by pressing CTRL PRINT.

The primary terminal can capture - and display on the screen - the communication on the LINE I connection to the host computer. The capture function includes all received and transmitted data blocks, certain errors in connection with receive operations, and information about the polling of other primary (CU) terminals on the line.

A secondary terminal can capture - but not display - the communication on the RC-CIRCUIT connection to the primary terminal.

Operation

PA-2 flag: Set in order to capture received/transmitted data.

PA-3 flag: Set in order to capture recognized poll/select sequences for other CUs (primary terminal only).

Screen image

The remaining part of this subsection describes the primary terminal screen image in connection with the displaying of the captured communication.

Writing on the screen is cyclic (wrapping) and no scrolling occurs.

The present position (how far the capture function has advanced in the screen image) of the capture function is displayed by the mark '<<'. The screen image consists of a number of small text strings following one another. The text strings which may occur and their meaning are described below.

Text string	Meaning
R-ENQ	The sequence shown is received. For a detailed explanation refer to [3].
R-EOT	
R-NAK	
R-RVI	
R-ACK0	
R-ACK1	
R-WACK	
R-DEOT	
R-TTD	
R-tx: <hex>	Text is received; the first 20 characters of the text are displayed in hexadecimal form.
R-pl <hex>	Poll or select is received; device address is displayed in hexadecimal form.
R-sl <hex>	
R-timeout	Receive timeout.
R-CRCerror	Text correctly received except for CRC error.
R-overflow	Too long a text received (exceeding 3840 characters). Possibly due to bad receiving, preventing recognition of ETB/ETX.
R-syntax	Text received without STX.
R-no_poll	A total of 50 poll/select sequences for other CUs is recognized without the terminal's own CU number being polled (corresponds to system not available).

<u>Text string</u>	<u>Meaning</u>
R-pl/sl <hex>	Poll or select for another CU is recognized. The CU address is displayed in hexadecimal form. Occurs only if PA-3 flag is set.
T> <hex>	A transmitted sequence is displayed in hexadecimal form; only up to 20 characters are shown. Includes all kinds of sequences, not only text transmissions.
T>timeout	Transmit timeout. Typically due to the modem not providing the transmitter clock or the CTS signal.

5.2.2 Statistics

5.2.2

Statistical information is automatically counted as long as the emulator is active. On primary (CU) terminals the countings concern information from the IBM 3270 BSC communication line (the host computer connection), and on secondary terminals the countings concern information from the RC-CIRCUIT communication to the primary terminal.

The primary terminal information is displayed as 6 counters of hexadecimal values (range '0000' to 'FFFF'). The secondary terminal information is displayed as 10 counters of hexadecimal values (the 8 first with range '00' to 'FF' and the last 2 with range '0000' to 'FFFF').

Operation

PA-4 flag: Set in order to display counters.

Screen image

On a primary terminal, the layout of the display of the counters is as follows:

```
S <<aaaa><bbbb><cccc><dddd><eeee><ffff>>
```

where

```
<aaaa>  text blocks transmitted
<bbbb>  text blocks received without error
<cccc>  receive timeouts
<dddd>  receive-poll timeouts
<eeee>  negative acknowledgements (NAK's) received
<ffff>  text blocks received with error (CRC error)
```

Each counter represents the number of occurrences since the last display, i.e. on display (setting PA-4 flag) the contents of the counters are reset to zero. To obtain accumulated statistics all displayed sets of counter values must be summarized.

On a secondary terminal, the layout of the display of the counters is as follows:

```
S<<aa><bb><cc><dd><ee><ff><gg><hh><iiii><jjjj>>
```

where

```
<aa>  receive-poll timeout (5 seconds)
<bb>  block length error or block format error during reception
<cc>  checksum error in received block
<dd>  data overrun during reception
<ee>  wrong sequence number in received block
<ff>  carrier still present 1 second after block is received
<gg>  data overrun during transmission
<hh>  'master reset' received
<iiii> text blocks received without errors
<jjjj> text blocks transmitted without errors
```


A. REFERENCES

A.

- [1] RCSL No 42-i1686:
RC855 Operating Guide
Henning Christensen, April 1982
Abstract: Operating guide for the RC855 Terminal/Work Station. Describes: connections and operator controls; keyboard features; start-up procedures. Covers the general aspects and is ment to be used in conjunction with the application documentation.
- [2] RCSL No 42-i1826:
RC855 IBM 3270 BSC Emulator, Installation Guide
Finn Verner Nielsen, April 1982
Abstract: This manual describes the installation of the RC855 IBM 3270 BSC Emulator under the RC855 CP/M operating system.
- [3] RCSL No 42-i2156:
RC855 IBM 3270 BSC Emulator, Reference Manual
Pierce C. Hazelton, November 1982
Abstract: Reference manual for RC855 IBM 3270 BSC Emulator. Describes: operational characteristics of display terminal, keyboard, magnetic ID-card reader, and printer; communication with host computer; commands and responses; character codes; and V.24 connections.

B. ADDRESSING OF CLUSTERS AND DEVICES

B.

The table shows the connection between CU-number and device number, and the corresponding hexadecimal addresses being used in poll/selection sequences, confer subsections 4.1.2 and 4.1.3.

CU number			CU poll address	CU selection address
	device number (1)	device number (2)	device address (1)	device address (2)
0	0	32	40	60
1	1	33	C1	61
2	2	34	C2	E2
3	3	35	C3	E3
4	4	36	C4	E4
5	5	37	C5	E5
6	6	38	C6	E6
7	7	39	C7	E7
8	8	40	C8	E8
9	9	41	C9	E9
10	10	42	4A	6A
11	11	43	4B	6B
12	12	44	4C	6C
13	13	45	4D	6D
14	14	46	4E	6E
15	15	47	4F	6F
16	16	48	50	F0
17	17	49	D1	F1
18	18	50	D2	F2
19	19	51	D3	F3
20	20	52	D4	F4
21	21	53	D5	F5
22	22	54	D6	F6
23	23	55	D7	F7
24	24	56	D8	F8
25	25	57	D9	F9
26	26	58	5A	7A
27	27	59	5B	7B
28	28	61	5C	7C
29	29	61	5D	7D
30	30	62	5E	7E
31	31		5F	7F

C. CONFIGURATION PROGRAM SCREEN IMAGE

C.

The primary terminal screen image:

KBL : CP : DCP : NFR : NUM : CS :

PDN : PDL : PLS : CF : MPL : PM :

CU : DDN : HCP :

BRM : PTM :

The secondary terminal screen image:

KBL : CP : DCP : NFR : NUM :

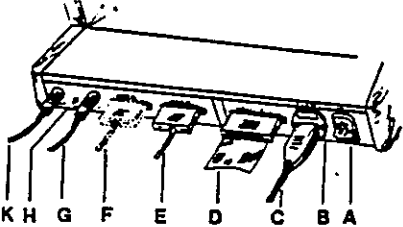
PDN : PDL : PLS : CF : MPL : PM :

SA : DDN : HCP :

BRM : PTM :

D. PROBLEM DETERMINATION GUIDE

D.

Question	If YES	If NO
<p>①</p>  <p>Is power switched on? Is indicator (fig. 1 ①) lit?</p>	Go to ②	<p>1. Is power cable connected? 2. Is mains outlet 220V? If 1 and 2 are in order call your Local Technical Service Dept.</p>
<p>②</p> <p>Message on screen after selftest:</p> <p>RCSSS</p> <p>(and no other text)?</p>	Go to ③	If another text is displayed write it down and call your Local Technical Service Dept.
<p>③</p> <p>Message on screen after program load</p> <p>RCSSS</p> <p>(and no other text)?</p> <p>or LD or SA or LA</p>	Go to ④	If another text is displayed write it down and call your Local Technical Service Dept.
<p>④</p> <p>Message on screen:</p> <p>RCSSS IBM 3270 BSC CU/Display Station</p> <p>or</p> <p>RCSSS IBM 3270 BSC Display Station</p>	Primary or Secondary, go to ⑤	Go to ⑤
<p>⑤</p> <p>Message on screen:</p> <p>RCSSS - insert diskette</p>	<p>1. Is a diskette drive connected and is power switched on? (fig. 1 ①)</p> <p>2. Is the diskette inserted and is the drive closed?</p> <p>3. Try your master copy.</p>	Call your Local Technical Service Dept.
<p>⑥</p> <p>Is keyboard connected? (Fig. 1 ②)</p>	Go to ⑦	Switch off power on the terminal and connect the keyboard to the socket. (fig. 1 ②)
<p>⑦</p> <p>Is the cursor visible in the upper left corner of the screen? Are characters shown on the display when keys are pressed?</p>	Press RESET button (fig. 1 ③) or press keys CTRL and CLEAR. When message ② is shown, press the C key and go to ⑧	Keyboard error, Call your Local Service Dept.
<p>⑧</p> <p>Does the configuration shown on the screen correspond to the terminal configuration description?</p>	Press the SEND key, causing a soft reset, and go to ⑨	Correct the configuration parameters if possible. If this is not possible call your Local Technical Service Dept.
<p>⑨</p> <p>Is there a status message in lower right corner of the screen? Is cursor in upper left corner?</p>	If primary, go to ⑩ If secondary, go to ⑪	The terminal should be all right.
<p>⑩</p> <p>Is status message:</p> <p>Modem off</p>	<p>1. Is modem cable mounted? Fig. 1 ④</p> <p>2. Is modem signal "DSR" (107) missing?</p> <p>3. Is modem power switched on?</p>	Go to ⑫
<p>⑪</p> <p>Is status message:</p> <p>Line not ready</p>	No polls are being transmitted. Call the host computer administration dept.	Go to ⑫
<p>⑫</p> <p>Is status message:</p> <p>System not available</p>	The host computer is transmitting polls, but not to the primary terminal (CU address) in this cluster. Call the administration department.	The terminal should be in order.
<p>⑬</p> <p>Is status message:</p> <p>CU disconnected</p>	<p>The secondary terminal is unable to communicate with the primary terminal (CU)</p> <p>1. Is the RC-CIRCUIT cable properly mounted, Fig. 1 ⑤</p> <p>2. Is the primary terminal switched on?</p>	The terminal should be in order.

RETURN LETTER

Title: RC855 IBM 3270 BSC Emulator
Operating Guide

RCSL No.: 42-12150

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