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Title:

RCNET
Terminal User's Guide and
RC 3600 Device Controller Operator's Guide

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References

(1) Erik Lilholt RCSL 43-Ri0635
RCNET - General Information
Abstract: This manual describes in an introductary manner the concepts and capabilities of the computer network RCNET.

(2) Erik Lilholt RCSL 43-Ri0174
RCNET - Device Control Protocol
(Reference Manual)
Abstract: Describes the message protocol used in RCNET when one host controls devices at another host.

(3) Ole Krag Hansen RCSL 43-Ri0260
RCNET - User defined driver programs
in RC3600 Device Controller
(Reference Manual)
Abstract: This manual defines the standard interface between the Network Control Program, NCP, and user defined application programs of driver type.

(4) Erik Lilholt RCSL 43-Ri0611
RCNET - RC3600 General Host Interface
Programmers Guide
Abstract: Decribes the interface to NCP in RC3600 computers, which allows userwritten programs to act as Hosts in RCNET. Special emphasis is placed on the use of the Device Control Protocol.

(5) Klaus Hansen RCSL 43-GL4055

RCNET - Line Control Module (RCLC)
Half-Duplex
Reference Manual

Abstract: The protocol implements concepts from ISO HDLC and IBM SDLC procedures for exchanging information on a communication line using BSC synchronous communications hardware. The protocol is designed to use half-duplex lines.

Note: At the time of release of the current manual, full-duplex operation of the communication line is also possible.

1. Introduction

This manual may be used both as an Operators Guide for RC3600 Device Controllers as well as an RCNET Terminal Users Guide.

The manual contains the following sections in excess to the introduction:

Section 2: RCNET concepts

A very brief description of some fundamental RCNET concepts.

Section 3: RCNET terminals

A description of how to operate a terminal connected to RCNET, i.e. how to establish and remove connections to computers in the network, and a description of the network messages that may appear on the terminal.

Section 4: The Main Console

A description of how to operate the Main Console of an RC3600 Device Controller and of the system messages, that may appear.

Section 5: System operation procedures

A description of how to load the system tape on an RC3600 Device Controller of how to turn power on and off the system.

Section 2 and 3 contain information of interest for all persons, who are going to use a terminal connected to RCNET.

Sections 4 and 5 contain information needed by the operator of an RC3600 Device Controller. However, the information in sections 2 and 3 may also be of interest to get an overview of the network, to which the Device Controller is connected.

2. RCNET concepts

This section briefly outlines some RCNET-concepts used in the manual without further explanation.

2.1 Hosts

Generally speaking, a network includes a transportation part and an application part. The application part consists of a number of hosts, which communicates with each other by means of the transportation part.

A host may incorporate a number of processes (or programs) which, from a network point of view, constitute a whole.

Each host is assigned a unique identification, its hostid .

2.2 Protocols

According their needs, hosts may communicate by means of the transportation part according to different protocols. A protocol is a set of rules and procedures to be carried out in the exchange of information.

A Remote Device Controller only supports the protocol denoted Device Control Protocol (2).

2.3 Jobhosts and Devicehosts

In the Device Control Protocol, hosts are divided into jobhosts and devicehosts.

A jobhost executes (user)programs, which may access devices at devicehosts. A device may be either a physical device or a user defined program playing the role of a device as described in (3).

2.4 Links

When a jobhost wants to use a device, it establishes a connection from the jobhost to the devicehost. This connection includes information about the device accessed. The connection is called a link. After using the device, the link is removed from the jobhost.

In certain cases (terminals) creation of a link may be requested from the device instead of from the jobhost.

The link serves as a reservation mechanism, assuring that no more than one jobhost can access a device at a time. Requests for creation of a link may be queued at the device and served in order of their arrival as the device becomes free.

2.5 RC 3600 Device Controller

This is an RC3600 computer, equipped with a number of devices and connected to RCNET as a devicehost. The RC3600 may, in addition to the Device Controllerfunctions, include other network-functions such as jobhost- and switching functions.

In an RC3600 Remote Device Controller the traffic to or from the devices is concentrated on to a single communication line. The communication line connects the Remote Device Controller to a node in RCNET.

2.6 Datapoint Terminal Concentrator

A Datapoint computer (DP2200 etc.) may be connected to RCNET in the same way as a RC3600 Remote Device Controller. The difference between the two is the speed of the communication line and the number and type of devices supported.

2.7 RCNET/rev 3 Network Structure

At the time of preparation of this manual, the network level is RCNET/rev 3. This means that the network structure is a starnetwork with one node, to which all the other computers must have a direct connection.

The devices may be accessed from programs executed in

- RC8000 computers
- RC4000 computers
- the RC3600 Network Node and interfaced to the network as described in (4).

RCNET/rev 3 does not support direct communication between programs in different (or the same) RC8000, RC4000 or RC3600 computer.

The following figure illustrates the principal network structure. It should be noted, however, that lack of core storage in the network node may limit the number of functions that may be simultaneously available.

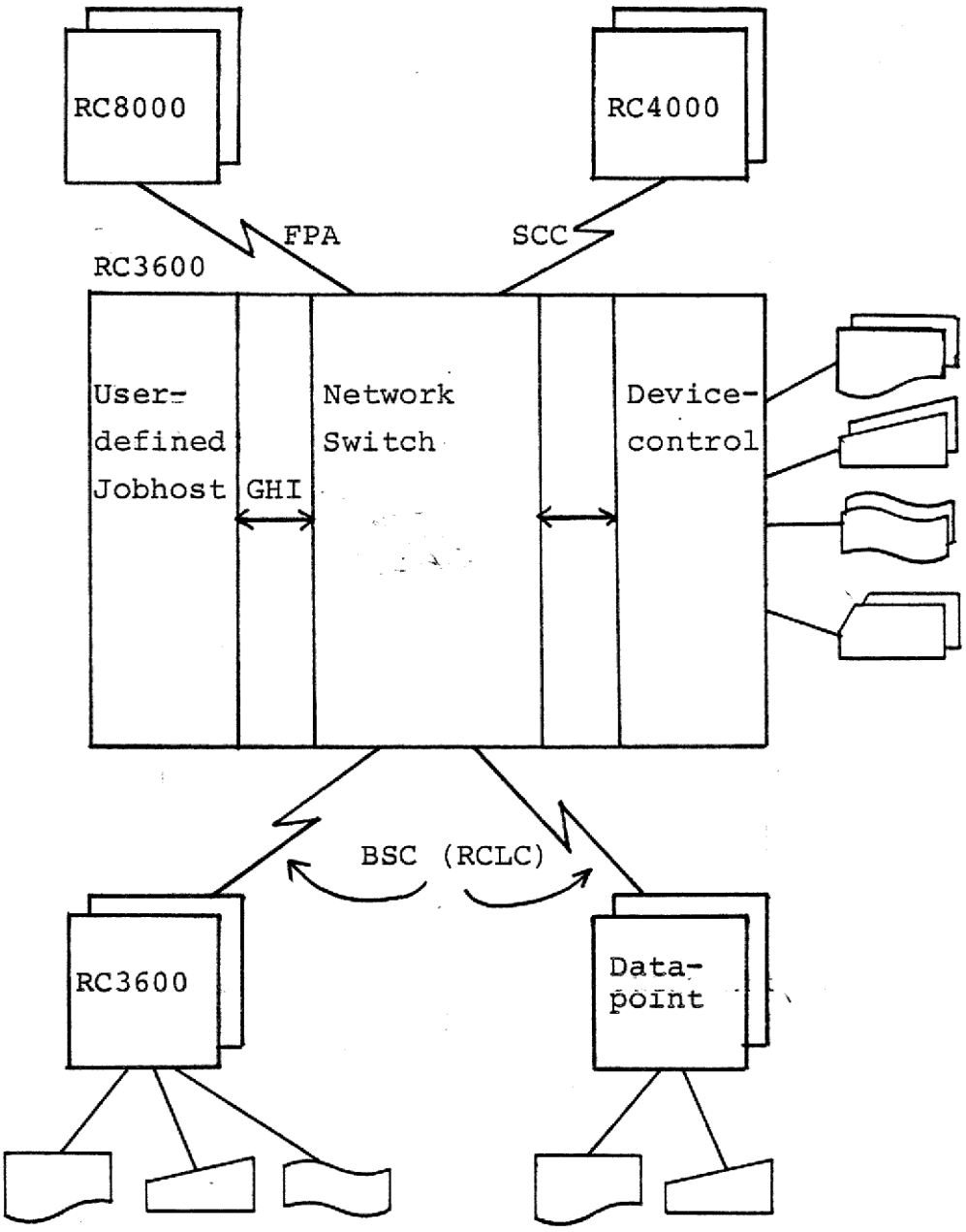

Figure 1.1 RCNET/rev 3 principal network structure

In RCNET/rev 4, which is intended to be released in spring 1978, a more general network structure is introduced.

This, however, will not change the funtional behaviour of a terminal as described in this manual.

3.Terminals

This section describes the functions offered by the network to the user of a terminal. These include facilities for creation of links to specified jobhosts, commands to print the current state of the terminal and certain informational messages printed when a change of the terminalstate occurs.

It does, however, not describe how to operate the terminal with respect to a jobhost, because it depends on the jobhost and often also on the program module accessed within the jobhost.

3.1 Attention buttons.

When communicating with a jobhost, the operator normally types commands to and receives responds from a "user" program. In order to communicate with the operating system it is necessary to generate a certain attention signal indicating that a special type of input follows.

Correspondingly an attention signal must be generated from the terminal before commands to the network can be typed in.

These signals are generated from the terminal by typing certain predefined characters. Two characters are recognized:

local attention character, which is used to indicate a request for a local network command

remote attention character, which is used to generate an attention signal to the jobhost which may then take its own actions.

The local attention character has the value 28.On keybords with Danish letters it is generated by pressing the CTRL-key and, while doing so, pressing the letter Ø.

On teletype compatible keyboards it may be generated by pressing the SHIFT- and CTRL-key simultaneously and, while doing so, pressing the key for the letter L.

The remote attention character has the value 27 or 7. Normally it is generated by pressing the key marked ESC or BELL.

3.2 Terminal state

Two pieces of information are used to describe the current state of the terminal, the current jobhost and the current linkstate.

The current jobhost is the host to which a link has latest been present or attempted to be created. It is changed either by a SELECT-command, or when a jobhost requests creation of a link.

The current linkstate defines the progress in the last attempt to create or remove the link. Three values are possible:

FREE	meaning no link present
INTERMEDIATE	meaning link under creation or removal
CONNECTED	meaning link present

3.3 Local network commands

When the operator wants to type a local network command, the local attention character must be generated.

The network responds by typing the character

@

and waits for a command.

The following commands are possible:

SELECT <host name>
REMOVE
STATE
DISPLAY

The underlining indicates that only the first two characters are significant.

The text

not implemented

is output, if an unknown command name is given. This may be due to either a mistyping or because certain systems do not implement all commands.

The text

command error

is output, if some error occurs during input of the command.

3.3.1 SELECT-command

Sets the current jobhost of the terminal according to the parameter.

SELECT <hostname>

<hostname> is an identification of the jobhost wanted.

Errormessages:

UNKNOWN. <hostname> is not found in the hostname-table
TERMINAL BUSY. The terminal is not in the free state.

If the command is accepted, the text

OK

appears, current jobhost is set to the host stated by <hostname>, and creation of a link to the jobhost is initiated.

3.3.2 REMOVE-command

Initiates removal of a possible link from the terminal to the jobhost.

3.3.3 STATE-command

Prints the current jobhost and the current link state of the terminal.

The response has the format

HOST : <current jobhost>
STATE: <current linkstate>

3.3.4 DISPLAY-command

Prints the contents of the hostnametable, i.e. the names of the jobhosts,that may be selected from the terminal by means of the SELECT-command.

3.4. Creation of a link

A link may be created for the following reasons:

- when the linkstate of the terminal is FREE, the operator types the remote attention character.
- the operator issues a SELECT-command
- a request for creation is received from a jobhost.

When a link is created, the text

CONNECTED TO <hostname>

is output.

If the jobhost is found in the hostnametable, <hostname> will be the name of the host. Otherwise <hostname> is replaced by a *.

3.5 Removal of a link

A link from a terminal may be removed and the linkstate set to FREE for the following reasons:

- the operator types the REMOVE-command
- the jobhost is disconnected from the network
- the Remote Device Controller is disconnected from the network

- the jobhost requests the link to be removed
- a jobhost requests creation of a central link
- the attempt to create the link was unsuccessfull

In any case the text

DISCONNECT CAUSED BY <cause>

appears.

<cause> may be:

REMOVE COMMAND

JOB HOST RELEASE. The jobhost requested removal of the link.

JOB HOST DOWN. Either the jobhost or the Remote Device Controller are disconnected from the network.

JOB HOST TIMEOUT. The request for creation of a link was not answered within a certain time. Normally because the Remote Device Controller or the jobhost are disconnected from the network.

JOB HOST NO RESOURCES. The jobhost refused creation of the link.

JOB HOST CENTRAL DEVICE. The link is removed because a jobhost requests the device included as a central device.

4. The Main Console

The Main Console (or short console) on a Remote Device Controller serves two purposes:

- it is the medium on which certain system messages will be displayed.
- it may usually be used as a normal terminal.

This section covers the functions as system console, whereas the functions as a normal terminal have been described in section 3.

4.1 Communication line messages

When the communication line to the network node changes state between operable and unoperable a message is printed on the console. The message shows the type of change and the time the change occured.

The messages, that may be printed have the following format:

```
<date> <time> HOST <hostid> READY
<date> <time> HOST          DISCONNECTED 100000
```

The messages may be preceded by the text

```
>NCPWR
```

<date> and <time> identifies the moment at which the event occured, provided they have been correctly initiated at last system loading or power up sequence. <date> is printed in the format YY.MM.DD (YY = year, MM = month, DD = day) and <time> is printed in the format HH.MM.SS (HH = hour, MM = minute, SS = seconds).

However, <date> is only printed, if date or hour has changed since last message printed. If this is not the case, <date> will be replaced by spaces.

5. System operation procedures

This section describes how operator functions such as system loading, power shutdown and power up sequences are performed.

5.1 System loading procedure

It is assumed that the system program is delivered on paper tape and that a paper tape reader is incorporated in the configuration.

Apply power to the system by pressing the power key and turning it anti-clockwise until stop. Release the key.

On the CPU-panel the switches in position 12 and 14 are up, all other switches are down. Once set to this position the switches need not be operated more. The key on the CPU-panel should be set in the LOCK-position and eventually removed. Place the system tape in the paper tape reader and press the RESET-key on the reader.

On the autoload-panel press the AUTOLOAD-pushbotton.

Now the system tape will be read in. When part of the tape has been read in, the text

```
> S
```

will appear on the console.

Some time later the text

```
>TIME
DATE,YY.MM.DD=
```

will appear. Enter the date from the console in the format specified, i.e. two digits for each of the items year, month, day and separated by periods. Terminate by pressing the RETURN-key.

The time is requested by the text

TIME,HH.MM.SS=

appearing and again the items hour, minute, second separated by periods are entered. Each item must consist of two digits.

The following is a complete example of the start-up sequence including initiation of date and time.

```
>S

>TIME
DATE,YY.MM.DD=77.11.10
TIME,HH.MM.SS=12.50.00
```

When the system tape has been loaded, the Remote Device Controller is ready for operation.

5.2 Power shutdown procedure

If power is to be removed, the power-key is pressed on turned clockwise until stop. Release the key.

5.3 Power up procedure

After having read in the system tape once the daily procedure of starting the Remote Device Controller will just be to apply power to the system and reinitialize date and time.

The key on the CPU-panel must be in the lock-position. Eventually the key is normally removed.

Apply power by pressing the power key and turning it anti-clockwise until stop. Release the key.

The text

```
POWER
```

will be displayed on the console.

Now the system is in principle ready to operate. However, date and time should be reinitialized to provide full use of the network informational messages printed on the console.

Press the CTRL- and while doing so, press the G-key. After

```
>
```

appearing, type S followed by RETURN.
Type

```
BREAK TIME
```

followed by RETURN after which the text

```
>TIME
DATE,YY.MM.DD=
```

will appear and date and time may be initialized as described in 5.1.

The following example illustrates the power up sequence:

```
POWER

>S
BREAK TIME

>TIME
DATE,YY.MM.DD=77.11.10
TIME,HH.MM.SS=14.08.00
```

RETURN LETTER

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