

# **Bercut-MMT**

**Telecommunication Networks Analyzer Universal  
Platform**

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**Operation Manual  
1.2.7, 2009**

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**Metrotek**

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# 1. Introduction

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## 1.1 General

**Bercut-MMT** Analyzer is a measurement device designed on the basis of a modular platform. It supports measurements in different segments of modern multi-technology telecommunication networks.

The analyzer's modular design provides its user with virtually unlimited testing and measuring capabilities for both traditional interface parameters and for working out long term diagnostics solutions for the communication network.

Figure 1.1 presents an external view of the device.



Figure 1.1. External view

The **Bercut-MMT** device consists of the system unit and two pluggable modules (cards<sup>1</sup>), that provide an interface to such testing objects as PCM E1 streams, data transmission interfaces (Datacom) or Gigabit Ethernet.

The System Unit provides for the basic device functionality, i.e.: control of **Bercut-MMT** platform components, an interface to peripheral devices, power supply monitoring, a user interface and specialized computation, states and measurement modes indication.

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<sup>1</sup> Terms *Pluggable Cards* and *Pluggable Modules* are convertible terms in the present manual and will be used interchangeably with equal meaning.

The **Bercut-MMT** System Unit consists of the following main components:

- Processor Module with a preinstalled operation system and nonvolatile data storage devices;
- LCD display with a sensor panel;
- number of multipurpose indication LEDs;
- keyboard;
- batteries;
- connectors for peripheral devices (serial port, USB interfaces, 10/100BaseT LAN interfaces, SD/MMC card connectors and connectors for headphones and an external power supply);
- connectors for specialized pluggable cards (modules) installation.

Cards usually contain a powerful processor that performs computations typical for a certain measurements mode. Computation results are transferred to the platform central processor that displays them to a user.

Various pluggable cards have different sets of hardware interfaces and programmable options. Each card has a unique serial number and provides information about a manufacturer, types of interfaces, allowed measurement options, etc.

## 1.2 Documentation Set

Depending on the ordered options, the following operations guides are delivered with the device:

- **Bercut-MMT**. Telecommunication Networks Analyzer Universal Platform.
- **Bercut-MMT**. E1 Interfaces Analysis.
- **Bercut-MMT**. Signalling Protocol Analysis.
- **Bercut-MMT**. Data transmission Interfaces Testing.
- **Bercut-MMT**. Ethernet 10/100 and Gigabit Ethernet Analysis.
- **Bercut-MMT**. OPIE Graphical Environment.

## 1.3 Modifications Notice

The manufacturer reserves the right to make any modifications that do not affect operability of the analyzer **Bercut-MMT** to the device hardware and software and to operation manuals without further notice and at its sole discretion.



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## 2. Bercut-MMT: Platform Description

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The appearance of **Bercut-MMT** is shown in Figure 1.1 (See page 7). The analyzer comprises a base block with touch screen, keyboard, two slots for plug-in cards, peripheral interfaces, and a battery providing the device off-line operation.

**Bercut-MMT** is built in a metal housing. The analyzer is powered by a built-in battery (4) or from AC mains through an adapter which is included in the delivery set.

### 2.1 System Interface Panel (Front Panel)

The front panel appearance is shown in Figure 2.1.

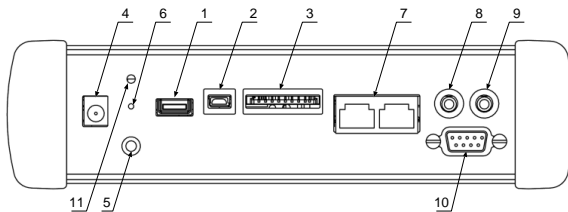


Figure 2.1. System Interface Panel

1. USB-H — a connector to connect USB compatible devices.
2. USB-C — a connector to connect the device **Bercut-MMT** to a computer as USB-client.
3. SD/MMC — a slot for SecureDigital or MultiMedia Cards.
4. A socket to connect an external power supply adapter.
5. A grounding jack.
6. A hole for so called *hard* reset (see item 6.2.2 , page 24 ).
7. 10/100 BaseT — a connector to connect to local network.
8. SP — headphones socket.
9. MIC — microphone socket.
10. RS-232 — serial port.
11. Power and battery charge control LED.

## 2.2 Plug-in card panel (back panel)

The device back panel has two slots for plug-in cards. The back panel appearance is shown in Figure 2.2.

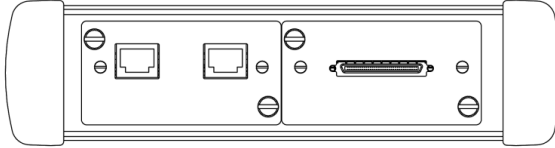


Figure 2.2. Plug-in Card Panel

## 2.3 Bottom Panel

The bottom panel appearance is show in Figure 2.3.

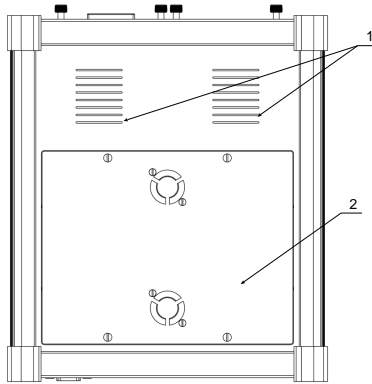


Figure 2.3. Bottom Panel

1. Air holes.
2. Battery compartment cover.

## 2.4 Clipboard

The clipboard appearance is shown in Figure 2.4.

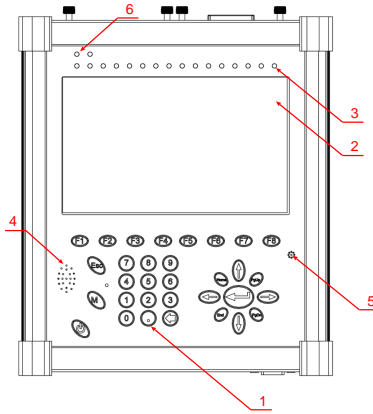


Figure 2.4. Clipboard

1. Keyboard.
2. Color display, touch panel.
3. 16 dedicated indicators — designated to indicate the state of measurements. The operation mode of these indicators depends on a type of installed plug-in cards (modules)<sup>1</sup>.
4. Speaker.
5. Microphone.
6. System indicators.

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<sup>1</sup>In case of using the graphical environment based on Opie (Open palmtop environment), the designation of each dedicated indicator is shown in the upper part of the device display and correspond to the type of failure or error specific for a current operation mode of plug-in cards. A display mode of indicator panel can be selected from the taskbar (see Fig. 2.5).

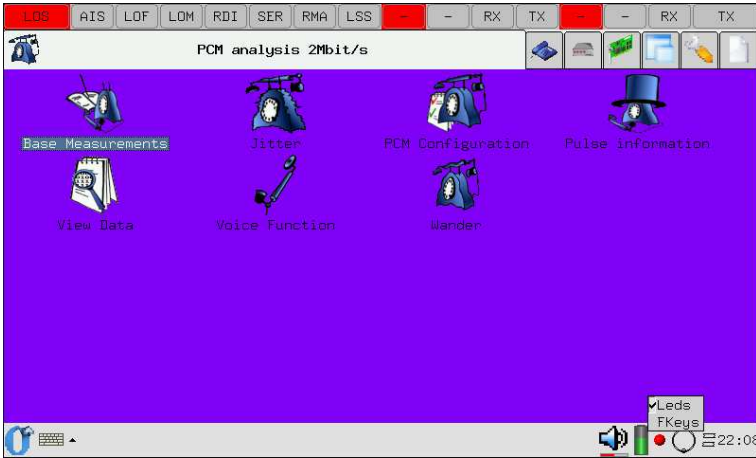


Figure 2.5. Indicator Panel

## 2.5 Operation Rules and Conditions

1. During the operation a secure grounding of the device **Bercut-MMT** must be ensured.
2. Batteries should be replaced by the manufacturer only.
3. The device can be used under the following environmental conditions:
  - ambient air temperature from  $-5^{\circ}C$  to  $+40^{\circ}C$ ;
  - relative air humidity 90%,  $25^{\circ}C$ ;

## 2.6 Device Characteristics

- Dimensions of the measuring unit not more than  $50 \times 220 \times 55$  mm.
- Dimensions of the power unit not more than  $145 \times 75 \times 45$  mm.
- Weight of the measuring unit not more that 2.960 kg.
- Weight of the power unit not more than 0.35 kg.



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### 3. Safe Operation Rules

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To ensure safe and correct operation of **Bercut-MMT** the following rules must be observed:

1. Do not use sharp or cutting items to work with the touch screen and keyboard.
2. Do not open the device.
3. Do not insert anything except dedicated plug-in cards in the card slots.
4. Avoid dropping the device from a height above 0.1 m.
5. Do not close the air holes during the device operation.
6. Use only a standard source of external power supply.
7. Have batteries replaced at the manufacturer's plant only.
8. Provide a secure grounding of the device case by using an appropriate grounding jack (Fig.2.1, page 9).
9. The plug-in card (module) slot must be sealed by a plug if no plug-in card (module) is installed.





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## 4. Analyzer Power Supply

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There are two ways of power supply of **Bercut-MMT**:

- from an external power supply unit (see Fig.2.1).
- from two internal batteries (see Fig.2.3).

### 4.1 Operation from External Source

**Bercut-MMT** can operate from an external power supply source — through an 220 V adapter. To connect the device, plug the adapter to 220 V main, and insert the other end to the external power adapter socket on **Bercut-MMT** (see Fig.2.1).

### 4.2 Off-Line Operation

The time of the device operation from the built-in batteries is limited. It depends on a number of program running, brightness of display light.

At a maximum display brightness, the analyzer operation time is 4 hours 30 minutes.

#### 4.2.1 Battery Charge

The batteries are charged through a mains adapter which is included in the delivery set. The time required to complete the battery charge is 14 hours.

**At a temperature exceeding 45°C the charging will be suspended in order to avoid the battery overheating.**

#### 4.2.2 Battery Charge View

To view the battery charge level, in the command line enter the command

```
cat /proc/apm
```

If you have the Opie graphical environment installed, you can view the battery charge level by using the taskbar.



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## 5. Plug-in Cards

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### 5.1 Operation Mode Selection

In **Bercut-MMT** you can set different operation modes of E1 interface analysis cards: *PCM Analysis* or *Protocol Analysis*.

Besides, there is a possibility to install new versions of microcode of B4-GBE and Datacom card.

The application **Firmware Update utility** can be accessed as follows:  
**O-Menu** ⇒ **Settings** ⇒ **Firmware Update utility**.

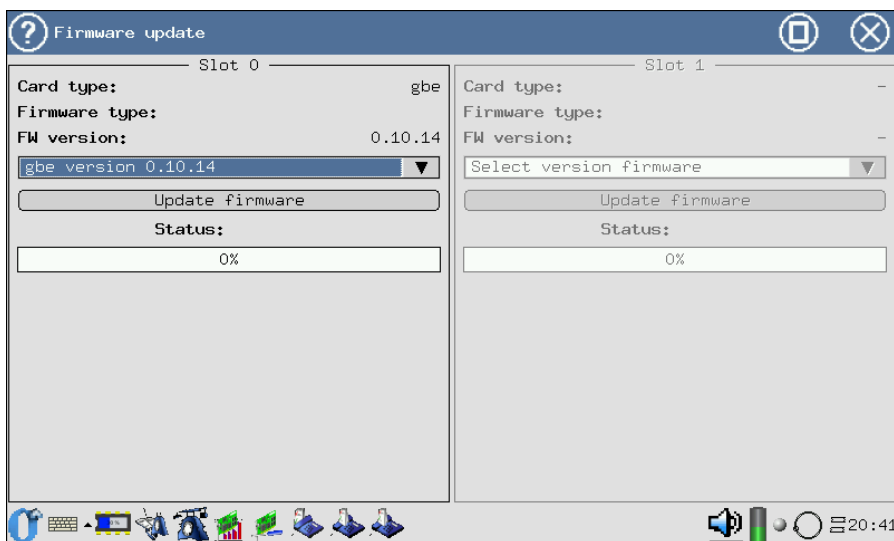


Figure 5.1. Window of Card Operation Mode Setting

To complete an upgrade of the card board microcode it is necessary:

1. Close all running applications of the analyzer **Bercut-MMT**.
2. Run the application **Firmware Update utility**.
3. Select an upgrade version in the drop-down list in accordance with the table 5.1.

4. To save changes and to switch the current mode, tap on the button **Update Firmware**.

The operation mode installation will take about 20 seconds. To complete the change mode process, it is not required to restart the device.

Table 5.1: Available Modes

Card	Mode
gbe	gbe
e1	pcm <sup>1</sup>
	hdlc <sup>2</sup>
datacom	datacom

***Warning! If the programming is cancelled, microcode can be damaged. In such case, the programming procedure should be restarted.***

## 5.2 Card Insertion

If it is required to install an additional module (which is not included in the delivery set), the following actions should be performed:

1. Unscrew the mounting screws on the card compartment.
2. Remove the compartment cover.
3. Install a new module.
4. Screw the mounting screws.

A card should be inserted face up (see Fig. 5.2) along the guides, without applying extra force.

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<sup>1</sup>Microcode corresponds to the card mode **B4-E1-4** *Measurements and analysis of 2048 kbit/s PCM paths*.

<sup>2</sup>Microcode corresponds to the card mode **B4-E1-4** *Monitoring and analysis of signaling data flow*.

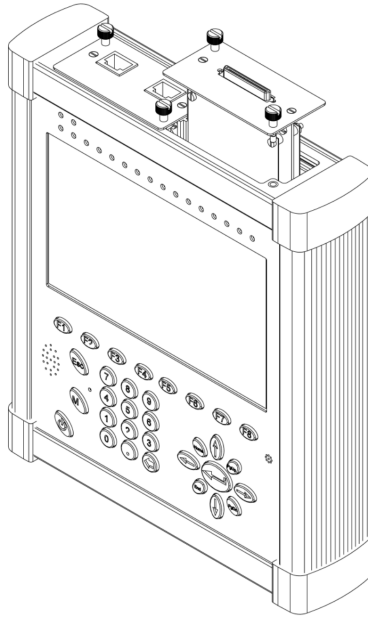


Figure 5.2. Card Installation

### 5.3 Option Control

Card options can be set up by using the application **Options** (**O-Menu** ⇒ **Settings** ⇒ **Options**).

Select a card (Figure 5.3) and enter the key delivered with the device<sup>3</sup>.

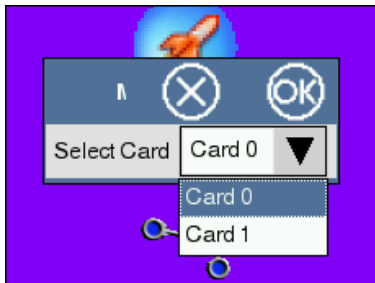


Figure 5.3. Card Selection

<sup>3</sup>The already installed card options can be viewed by using the application **Bercut-MMT Information** (**O-Menu** ⇒ **Settings** ⇒ **Bercut-MMT Information**).

Detailed description of options available for each card can be found in respective Manuals to **Bercut-MMT**.

## 5.4 Card Extraction

A card can be extracted by the screws on it (see Fig. 5.2).

## 5.5 Rules of Operation and Storage

To avoid card damage, you should not do the following:

- apply extreme physical force that may bend or break cards;
- store at temperature below +5 and above +49°C;
- expose card to chemicals;
- insert cards into the device in any manner other than described in this operation manual;
- repair damaged cards.

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## 6. Platform Switching On/Off

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1. Unpack the platform and check it visually. Check the completeness of delivery in accordance with the description in Appendix A.
2. Keep the analyzer under normal conditions for at least 2 hours.
3. Connect the tester component part in accordance with Figure 2.1 and item 2.1
4. If you are going to use the AC mains of  $U=110 — 240$  V,  $f=50 — 60$  Hz for power supply, connect the analyzer power supply unit to the mains (see item 4.1).

If you are going to use batteries as the power source, they must be charged. If the batteries have not been used for a long time or if they are used for the first time, they must be charged fully (see item 4.2).

5. After switching on, the analyzer will perform initialization procedure. As soon as the initialization is completed, the system log-in menu appears on the platform display. You may start operation after entering the user log-in data.

### 6.1 Setting Up System Time

To set up the system date and time, in the command line enter **date -s [time/date format]**. The time format is written using `:`, for example, **date -s 11:35:45**.

The date is written in the following format: mm/dd/yy, for example, 15 June 2007 will be written as follows: **date -s 06/15/2007**.

***Note:** The system time is set up in the root user mode (see item 11.2, page 39).*

### 6.2 Platform Reset

#### 6.2.1 Soft Reset

The soft reset will end all running programs but will not delete saved data or installed programs.

***Note:** Save the data that you need before the reset, as the unsaved data might be lost.*

To reset the platform, using the stylus press the hidden button **Reset** on the front panel (see item 2.4, page 12).

### **6.2.2 Forced Hard Reset**

The hard reset is similar to the soft reset except that the real time clock is cleared and the system state before reset is not saved.

If you perform the platform hard reset, the device **Bercut-MMT** will return to the state *by default*, and all the data that are not stored in the ROM area will be lost.

The hard reset can be performed through the access hole (see Fig. 2.1, page 9).



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## 7. Obtaining Information About Device

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### 7.1 Device Information

This application displays the device information; it can be started by tapping on a corresponding icon on the desktop or through the main menu as follows:

**O-Menu ⇒ Settings ⇒ Bercut-MMT Information.**

The application screen consists of two information panes. The upper pane (Fig. 7.1) contains the device information: serial number, MAC-address of built-in interfaces (eth0, eth1), device name, SW release, baseboard microcode version.

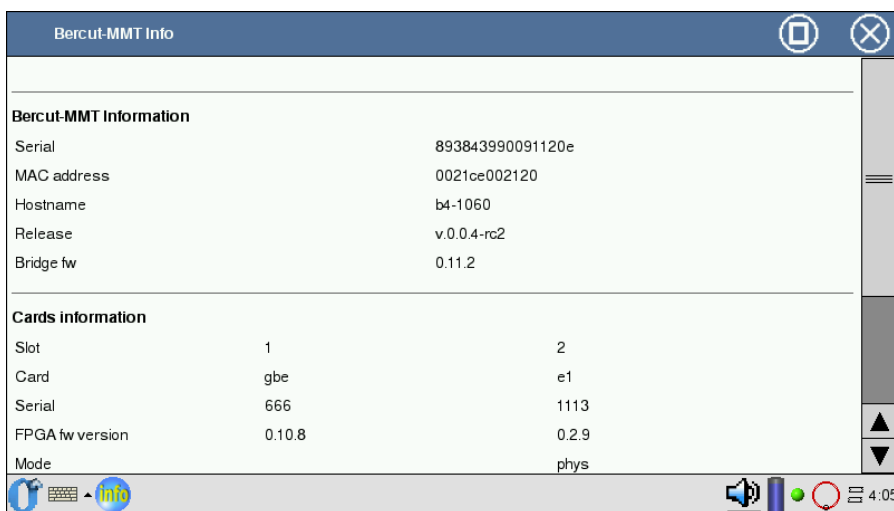


Figure 7.1. Device Information

The lower pane (see Fig. 7.2, c. 26) shows the following data for each mounting slot: card type, serial number, FPGA microcode version, card operation mode, MAXII circuit microcode version, printed board version, available options, power supply status.

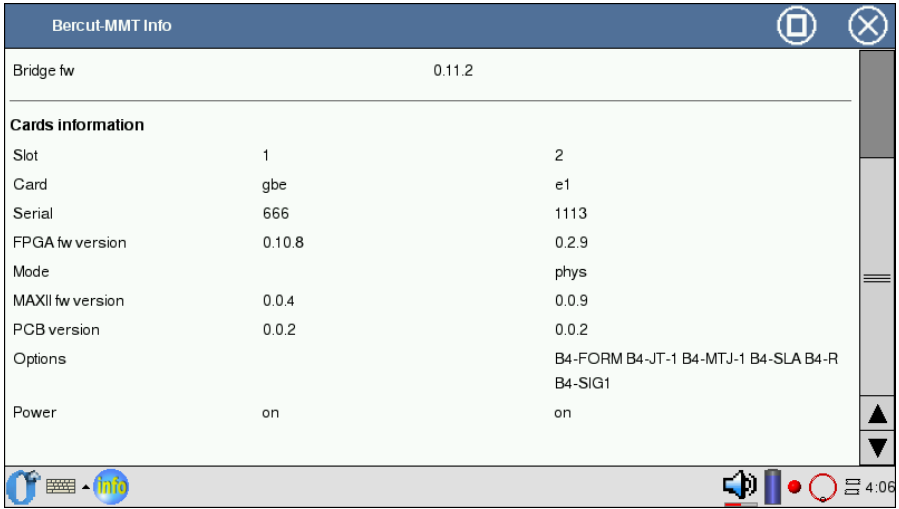


Figure 7.2. Plug-in cards Information

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## 8. User Interface

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### 8.1 Keyboard Operation

There are two possibilities for the user to input data:

- data input from the virtual keyboard (see item 8.1.1);
- data input from the physical keyboard (on the device clipboard), see item. 8.1.2, page 28.

#### 8.1.1 Data Input From Virtual Keyboard

To call the virtual keyboard, tap the keyboard button on the device display.

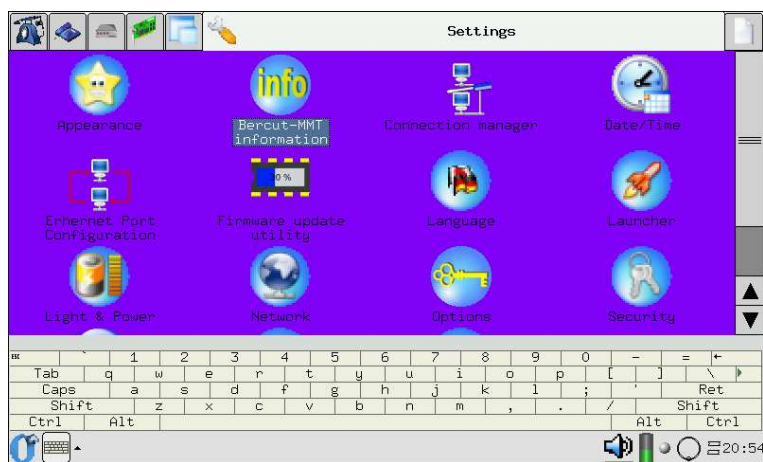

















Figure 8.1. Virtual keyboard

Characters are entered by using the stylus.

### 8.1.2 Data Input From Physical Keyboard

The keyboard is located on the device clipboard (see Fig. 2.4, page 12). Tapping on any key will generate a beep tone.

-  — cancel key.
-  — enter key.
-  ,  ,  ,  — arrow keys.
-  —  — function keys.
-  — M-key (a programmable key).
-  — Home key, moving the cursor to the start of line.
-  — a key moving the cursor to the end of line.
-  — Page Up key.
-  — Page Down key.
-  — Backspace key, deleting a preceding character.
-  — On/Off button.

## 8.2 Touchpad Operation

The delivery set of **Bercut-MMT** includes a stylus (see Appendix A), which is used to input data and to control the device by means of the touch screen.

*Note: to avoid damaging the device screen, do not use any tool for entering character or tapping the screen other than the stylus included in the delivery set.*

Possible Actions Using Stylus:

- **Tap.** Touch the screen lightly by the stylus point to select or open any item. Tapping is equivalent to mouse click on PC.
- **Drag.** To select data: using the stylus tap on the start of data block that you want to select, then holding the stylus draw it on the screen to the end of block that you want to select. This action is similar to data selection by using a mouse with the pressed left button on PC.
- **Hold.** Using the stylus, tap and hold an item until a menu is opened. Holding the stylus is similar to clicking by the mouse right button on PC.

### 8.2.1 Navigation

During the device operation you can perform the following actions to access applications:

- **Tap or Click.** By tapping on the screen you can open applications and select parameters. For instance, by tapping on the icon **O** (Opie-Menu) in the left corner of the Taskbar, you will open the start menu with a list of available applications.
- **Tap and Hold.** By tapping and holding the stylus for about a second is equivalent to clicking by the mouse right button on PC — opening a pop-up menu.



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## 9. Graphical Interface

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In the device **Bercut-MMT** there can be installed various graphical interfaces, e.g. Opie, GPE... The main option is a graphical environment based on Opie (Open Palmtop Integrated Environment); its detailed description can be found in Chapter 14 , c. 49.





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## 10. Network Interfaces

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### 10.1 Ethernet Port Settings

The application **Ethernet Port Configuration** is used to change network interface settings and can be run through a respective desktop icon or from the main menu as follows:

**O-menu** ⇒ **Settings** ⇒ **Ethernet Port Configuration**.

The program allows to:

- select the interface operation speed;
- turn on/off the auto-negotiation mode;
- select a duplex operation mode: half/full.

The display layout is shown in Figure 10.1.

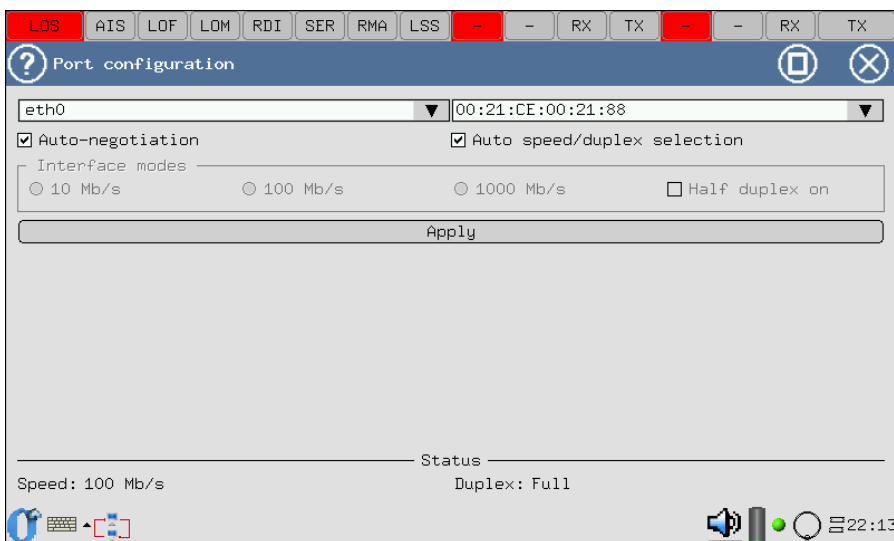


Figure 10.1. Ethernet Port Configuration

Auto-negotiation is a mode in which the transmitter communicates the

supported modes to the remote side and establishes a connection according to the selected speed/duplex and modes supported on the remote side.

If the auto-negotiation mode is switched off, the autoconfiguration mode becomes available. In this case, the transmitter sets the connection to the maximum possible speed and a duplex mode, which is supported by both side.

In case of manual setting the speed/duplex, the field **Interface modes** becomes active. If the check box *Half duplex* is not selected, the interface will be set to *Full-duplex*.

***Note:** in case the remote side does not support the selected interface mode, the connection may not be established (the connection will also be disabled during the change of settings).*

The Ethernet port configuration window also contains the following elements:

- a drop-down menu listing ports available for configuration:

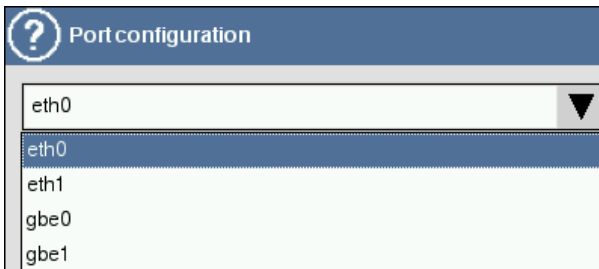


Figure 10.2. Interface selection

- a field to configure MAC-addresses of the selected interface (to be edited from a virtual/physical keyboard);
- **Auto-negotiation** — a check box to switch on/off the auto-negotiation mode;
- **Auto-speed/duplex selection** — a check box to switch on/off the autoconfiguration mode;

***Note:** The autoconfiguration mode is only available if the auto-negotiation mode is switched on.*

- **Interface modes** — check boxes for manual selection of speed/duplex.

To save previously set parameters, click the button **Apply**.

Below the application fields there is information on the speed and duplex to which the transceiver is currently configured.

## 10.2 Network Settings

The application is used to configure and manage the status of network interfaces and can be run through a respective desktop icon or or from the main menu as follows:

**O**-menu ⇒ **S**ettings ⇒ **N**etwork.

The program allows to:

- run/stop, add/delete network interfaces;
- configure IP-addresses, subnet masks, gate IP-addresses, etc.;
- autoconfigure by means of DHCP-server;
- edit the device name.

The display layout is shown in Figure 10.3.

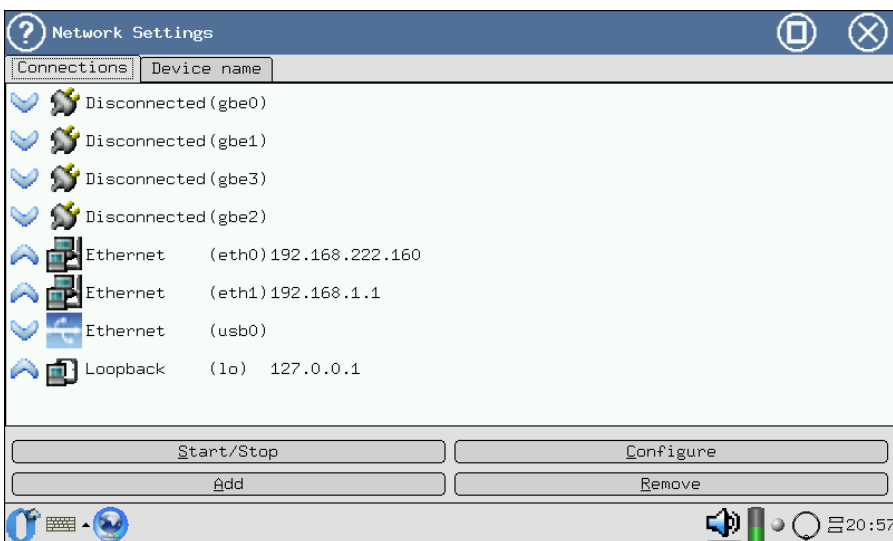


Figure 10.3. Network Settings

***Note:** To display an interface in the lists of connections available for testing and diagnosis, it is necessary to activate it by means of this application.*

The display of the tab **Connections** contains a list of the device interfaces which can be configured by the following buttons.

- **Start/Stop** — to start and stop a current interface; also displays advanced information on the interface;

after clicking this button, there appears a window as shown in Figure 10.4.

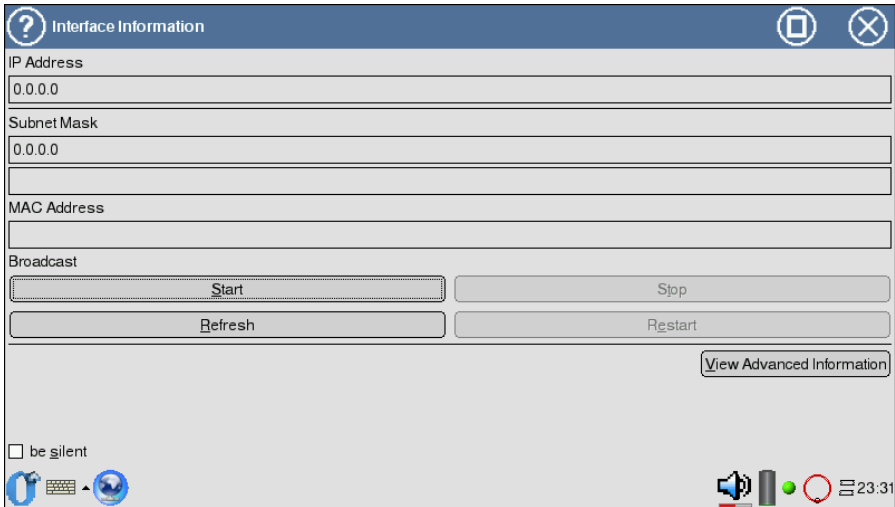


Figure 10.4. Interface Information

The application display contains reference information for the selected interface (IP-address, subnet mask, MAC-address), which can be configured in the tab **Connections** (button **Configure**).

The window contains the following elements:

- **Start** — to activate the current interface;
- **Stop** — to stop the current interface;
- **Refresh** — to refresh information;
- **Restart** — to stop and start the interface.

The check box **be silent** switches off the output of messages about actions results.

Advanced reference information is displayed by clicking the button **View Advanced Information** and contains the interface name, its IP-address, subnet mask, MAC-address, broadcast query IP-address.

**DHCP Information** contains the IP-address of DHCP-server, date and time of the automatic receipt of the IP-address (*Lease Obtained*), expiry of the received IP-address (*Lease Expires*).

*Note:* This field is active if the check box **DHCP** has been selected in the tab **Connection** (the button **Configure**).

- **Configure** — edits the current interface; by clicking the button there

appears a window as shown in Figure 10.5.

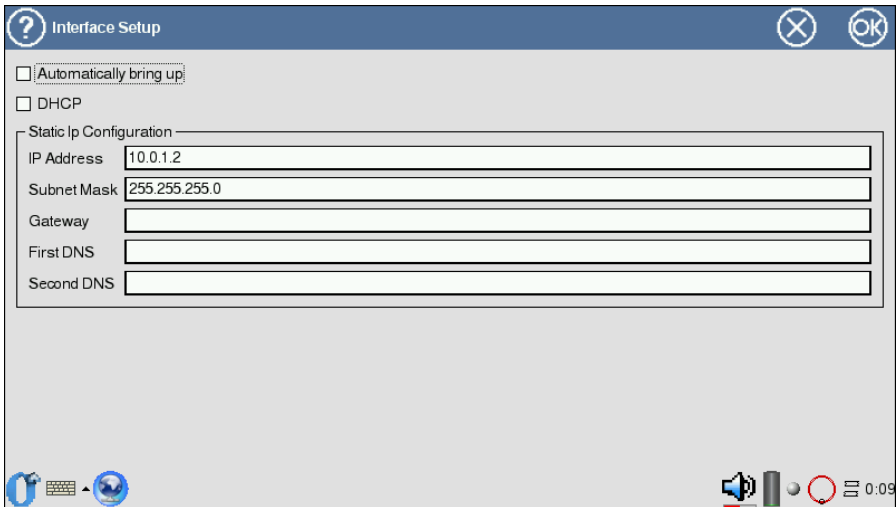


Figure 10.5. Interface Setup

- **Automatically bring up** — automatically activates the interface (upon starting up the device);
- **DHCP** (Dynamic Host Configuration Protocol ) — a check box for automatic obtaining of parameters by using DHCP-server;

***Note:** If this check box is selected, the field **Static Ip Configuration** is deactivated.*

- **Static Ip Configuration** contains fields for manual setup (IP-address, subnet mask, gateway IP-address, IP-address of the first and second DNS (Domain Name System)).

To save the selected parameters, click the button **OK**, located in the upper right corner.

- **Add, Delete** — these buttons (adding and deleting interfaces) are not operable, as all interfaces are built-in.

In the tab **Device name** (see Fig. 10.6) the device name is entered from the physical keyboard. To save the entered name, click the button **Set value**.

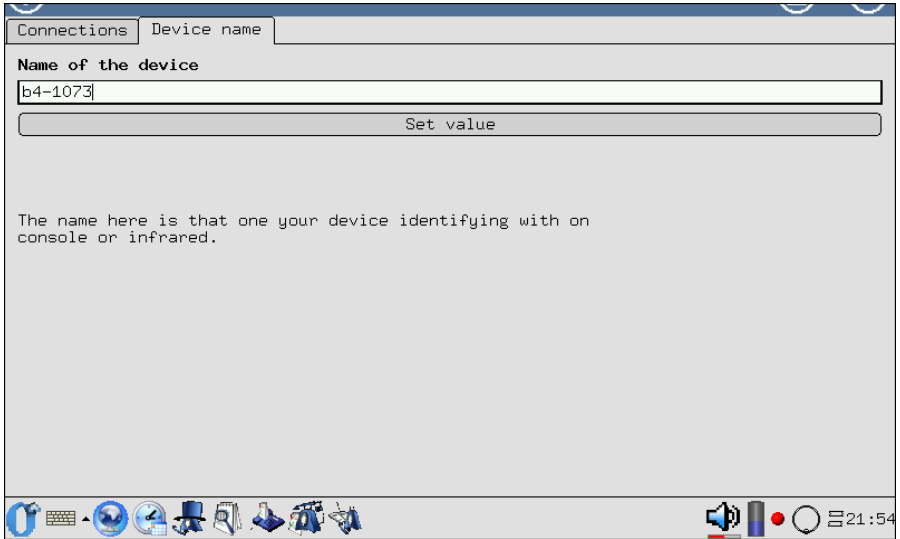


Figure 10.6. Window for setting the device name

---

## 11. Data Storage and Access Rights

---

### 11.1 Device Storage Media

In **Bercut-MMT** data are stored on the following storage media.

- **SD/MMC (external)** — a portable flash memory card. Flash memory can be read many times, but you can only write data in it a limited number of times (usually around 100000). Memory is erased by block, and therefore one bit or byte cannot be changed without rewriting the entire block. An advantage of flash memory is its nonvolatility; the memory content remains intact when power is switched off. To end flash card operation correctly, you can use the function **Turn off SD/MMC**.
- **CF** — internal flash memory. CF capacity is 2 Gb (see Appendix B, page 55);
- **Flash ROM** — nonvolatile memory used to store pure data. Its capacity is 32 Mb (see Appendix B, page 55);
- **RAM** — a type of memory that at any time allows to access any cell for reading or writing. Its capacity is 128 Mb (see Appendix B, page 55).

### 11.2 Rights of Users (root/user)

The device operates under Linux operating system, and there are two account created in it — root and user.

- **Root (superuser)**. It is a category of user with maximum privileges; one should work with extreme attention in this mode. In particular, the user `root` in configuration *by default* is assigned a password `lheujqgfjhkm`.
- **User**. It is a category of user with restricted rights. Entering under this account allows to perform measurements, save reports, etc. In particular, the `user` is *by default* assigned the password `user`.





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## 12. Connection to Computer

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### 12.1 Major Features

The analyzer **Bercut-MMT** provides for a possibility to use a fully-feature remote control from a PC. A set of Windows or Linux PC applications allows to:

- control the device functions;
- operate the devices configuration parameters;
- carry out real-time monitoring of signaling protocols;
- perform measurements (in graphical mode);
- view and save the results of measurements.

### 12.2 System Requirements

- Installed set of applications for **Bercut-MMT** remote control;
- Configured device connection to PC using the PPP protocol.

### 12.3 Remote Control

A remote connection to PC in the console mode can be established by means of two interfaces:

1. **COMport**;
2. **Ethernet**.

#### 12.3.1 COMport

To connect to PC by using COMport interface, the following actions should be performed:

***Note:** Both the device and PC must be turned off.*

1. Plug the connecting cable in the RS-232 connector (see Fig.2.1, page 9) on the device and in the COMport connector in PC.
2. Turn on the PC and the device.

3. After the device and PC loading, the following actions should be performed:

- If you are working in Windows:
  - (a) Run the program *HyperTerminal*;
  - (b) Configure it to work with the COMport to which **Bercut-MMT** is connected;
  - (c) Enter the system.
- If you are working in Linux:
  - (a) Run in the command line  

```
cu -l /dev/ttySX -s 115200
```

(where X is the COMport number:

1 COMport - ttyS0

2 COMport - ttyS1

- (b) Upon successful connection, in the console appears **Connected**, then enter the device under account **root/user** (see chapter 11.2, page 39).
- (c) Enter the system.

### 12.3.2 Ethernet

To connect to PC by using Ethernet interface, the following actions should be performed:

1. Connect **Bercut-MMT** to the 10/100 BaseT network (see Fig.2.1, page 9).
2. Turn on the device.
3. Perform the following:
  - in MS Windows:
    - (a) Run the program *putty.exe*.
    - (b) In the field *Hostname* enter the address/name of **Bercut-MMT** or of the network.
    - (c) Enter the system.
  - For UNIX-like systems:
    - (a) Run the command *ssh user@network name Bercut-MMT* or *ssh user@IPaddress*;
    - (b) Enter the system.

## 12.4 Remote Control (VNC)

The remote control in graphical mode is performed by using the VNC (Virtual Network Computing) protocol. Such connection allows to see the device screen on the PC display. By using the PC mouse and keyboard, you can run tests, save and view the results of measurements, control the device functions, and perform other necessary actions.

To establish a remote connection to **Bercut-MMT** using the VNC protocol, it is first install a VNC-client on the PC, e.g. UltraVNC (<http://www.uvnc.com/>).

To establish a connection between the device and PC, connect **Bercut-MMT** to the network, and run the VNC server application on the device (**O-Menu** ⇒ **Application** ⇒ **VNC server**), and run the VNC-client on the PC. In the field **VNC Server** of VNC-client enter the device IP-address.

In case of successful connection, the PC screen will display the screen of **Bercut-MMT**, refreshed in real time.



---

## 13. Software Package Update

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The latest software versions for **Bercut-MMT** are available in Internet at:

<http://www.metrotek.spb.ru>.

There are two methods to update software packages:

- Via Internet.
- From external media.

### 13.1 Software Update Via Internet

***Note:** Before software update, connect to device to external power supply source and turn on the built-in Ethernet-port (10/100Base-T — eth0). To update software packages via Internet, do the following.*

1. Run the program **Network** on the device (**O-Menu** ⇒ **Settings** ⇒ **Network**), choose interface `eth0` and click the button **Set Up** to edit. In the appearing window set up network parameters (IP, DNS, Gateway, Mask) according to parameters of the network, to which the device is connected. To end program **Network** — tap on the button **Start/Stop** and in the appearing window click **Restart**.
2. Check accessibility of the repository by executing the following command in the terminal or console window:

```
ping metrotek.spb.ru
```

A positive result after the command execution will be the following line appearing every second:

```
64 bytes from xxx.xxx.xxx.xxx: icmp_seq=x ttl=64 time=x.x ms
```

3. Connect to the device under account `root` (see. chapter 11.2, page 39) through the serial port (RS-232), LAN connectors (10/100 Base-T), see. chapter 12.3, page 41, or Opie-terminal (see. chapter 14, page 49).
4. Configure Package Manager:

- in the directory `/etc/ipkg/` delete all files except `arch.conf`:

```
rm /etc/ipkg/<file name>
```

(to show file list in the folder `/etc/ipkg/`, use the command `ls /etc/ipkg/`, see Appendix E).

- execute the command

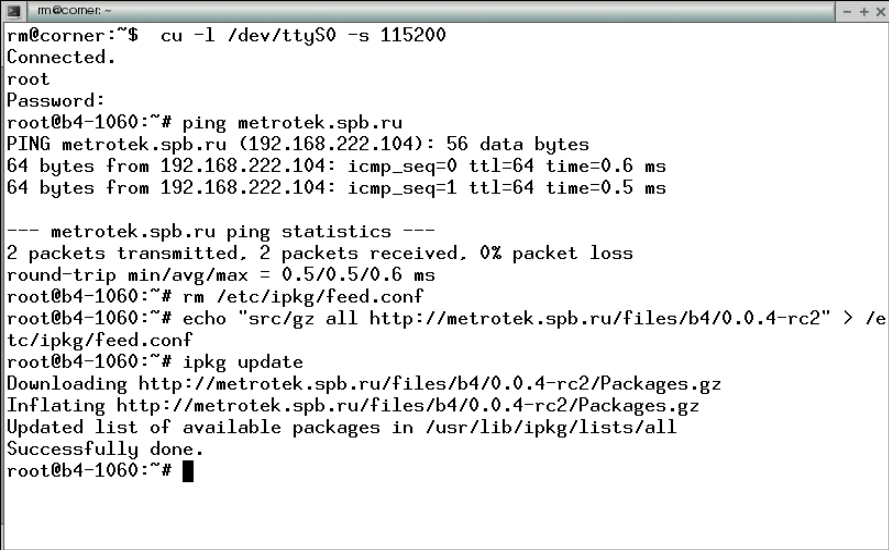
```
echo "src/gz all http://metrotek.spb.ru/files/b4/X.X.X-rcX" >
/etc/ipkg/feed.conf
```

**Note:** *instead of X.X.X-rcX indicate the latest software version.*

- refresh the packages list by executing:

```
ipkg update
```

The result is shown in Figure 13.1.



```

rm@corner:~$ cu -l /dev/ttyS0 -s 115200
Connected.
root
Password:
root@b4-1060:~# ping metrotek.spb.ru
PING metrotek.spb.ru (192.168.222.104): 56 data bytes
64 bytes from 192.168.222.104: icmp_seq=0 ttl=64 time=0.6 ms
64 bytes from 192.168.222.104: icmp_seq=1 ttl=64 time=0.5 ms

--- metrotek.spb.ru ping statistics ---
2 packets transmitted, 2 packets received, 0% packet loss
round-trip min/avg/max = 0.5/0.5/0.6 ms
root@b4-1060:~# rm /etc/ipkg/feed.conf
root@b4-1060:~# echo "src/gz all http://metrotek.spb.ru/files/b4/0.0.4-rc2" > /e
tc/ipkg/feed.conf
root@b4-1060:~# ipkg update
Downloading http://metrotek.spb.ru/files/b4/0.0.4-rc2/Packages.gz
Inflating http://metrotek.spb.ru/files/b4/0.0.4-rc2/Packages.gz
Updated list of available packages in /usr/lib/ipkg/lists/all
Successfully done.
root@b4-1060:~# █

```

Figure 13.1. Software Update Console

5. Delete the previously installed package `b4-gbe` by executing:

```
ipkg remove -force-depends b4-gbe
```

6. Delete the previously installed E1 drivers:

```
ipkg remove -force-depends b4pcmbm
ipkg remove -force-depends b4pcmconf
ipkg remove -force-depends b4eadaemon
ipkg remove -force-depends b4modeset
ipkg remove -force-depends b4-modeset
```

7. Install a new package b4-gbe:

```
ipkg install -force-overwrite b4-gbe
```

8. Install new drivers E1:

```
ipkg install -force-overwrite b4-pcmbm
ipkg install -force-overwrite b4-pcmconf
ipkg install -force-overwrite b4-eadaemon
ipkg install -force-overwrite b4-modeset
```

(for SW releases 0.0.4-rc2 and earlier,  
i.e. 0.0.4-rc1, 0.0.4-rc0 etc.)

or

```
ipkg install b4-release (for SW releases  
0.0.4-rc3 and later, i.e. 0.0.4-rc4, 0.0.4-rc5)
```

9. Update the existing packages by executing the command

```
ipkg upgrade -force-overwrite
```

10. Install the program for network ports configuration (if it has not been installed already):

```
ipkg install -force-overwrite b4-portconf
```

11. Update the baseboard microcode:

```
cat /lib/b4/fw/mb/bridge-rev2.rpd > /dev/b4/epcs
```

**Note:** *in case of connection through Ethernet interface, the process of baseboard microcode update is not displayed in the terminal or console window. In that case wait for 5 minutes and switch the device off and then on again.*

12. Execute the command `sync`.
13. Switch the device off and then on again.

## 13.2 External Media (SD/MMC/Flash)

Prior to the update, in the root directory on the external media create directory `ipks`, and copy from the repository (<http://metrotek.spb.ru/files/b4/>) to the root directory all files of the latest SW release.

**Note:** *Prior to the software update it is necessary to connect the devices to external power supply.*

To update the software packages from the external media, perform the following actions.

1. Log in to the device under account `root` (see. chapter 11.2, page 39).
2. Configure Package Manager:

- in the directory `/etc/ipkg/` delete all files except `arch.conf`:

```
rm /etc/ipkg/<file name>
```

(to show file list in the folder `/etc/ipkg/`, use the command `ls /etc/ipkg/`, see Appendix E).

- execute the command:

```
echo "src/gz all file:///media/card/ipks" > /etc/ipkg/feed.conf
```

**Note:** *If the update is done from Flash, then instead of `media/card` use `media/flash`.*

- refresh the packages list by executing the command:

```
ipkg update
```

Then the algorithm of actions is similar to the update process via Internet, starting from item 5.



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## 14. Opie-Based Graphical Interface

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The platform's user interface is based on Opie (Open Palmtop Integrated Environment) graphical environment.

**Opie** is a graphical user interface (GUI) for handheld devices running Linux. Opie is based on Qt/Embedded produced by Trolltech. More detailed information on Opie can be found on the website (<http://opie.handhelds.org>).

After successful authorization and loading of Opie, **desktop** (Launcher) will be displayed, where you can load applications. To start up any program, using the stylus tap once on the required program icon (see Fig. 14.1).

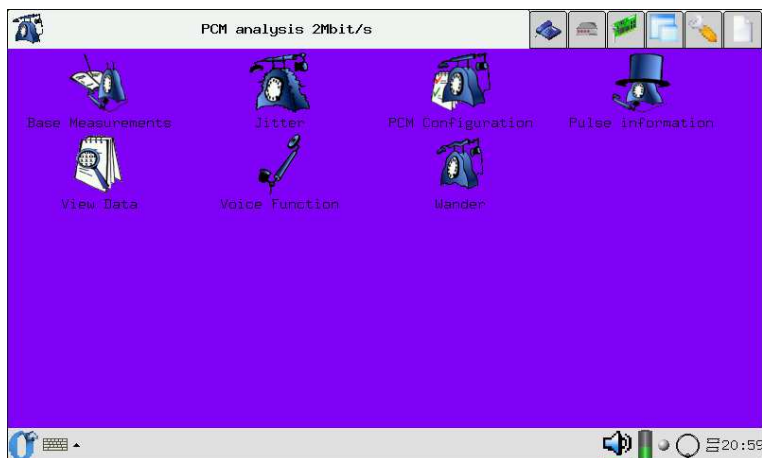


Figure 14.1. Opening a program

To close a program, tap on "x" button (see Fig.14.2).

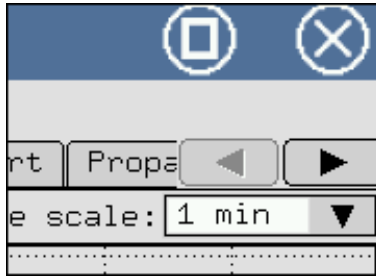


Figure 14.2. Closing a program

To get a help, tap on ? and hold the stylus for 3-4 seconds on the item for which you want to get information.



Figure 14.3. Help

Taskbar is a section at the bottom of the screen, on which all running programs are displayed. You can switch between the programs by using the stylus (click once on the required program in the taskbar).

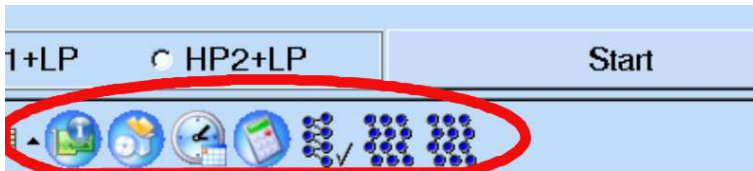


Figure 14.4. Taskbar

The icons in the right bottom corner  correspond to (from left to right):

- speaker — by tapping on the icon you can adjust the volume for the screen and keyboard;

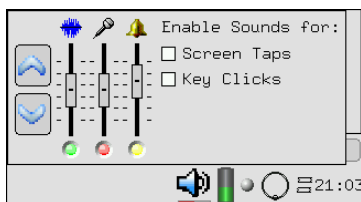


Figure 14.5. Volume control menu

- battery — by tapping on the icon you can see the information on the battery charge and time left till its discharge;
- LEDs — by tapping on the icon you can refresh the LED display status;
- current state of the data collection process for the card **B4-E1-4**;
- designations of function keys and LEDs (see Fig. 14.6);



Figure 14.6. Function keys and LEDs display

- current time (by tapping on the icon there appears the time setup menu (see Fig. 14.7)).

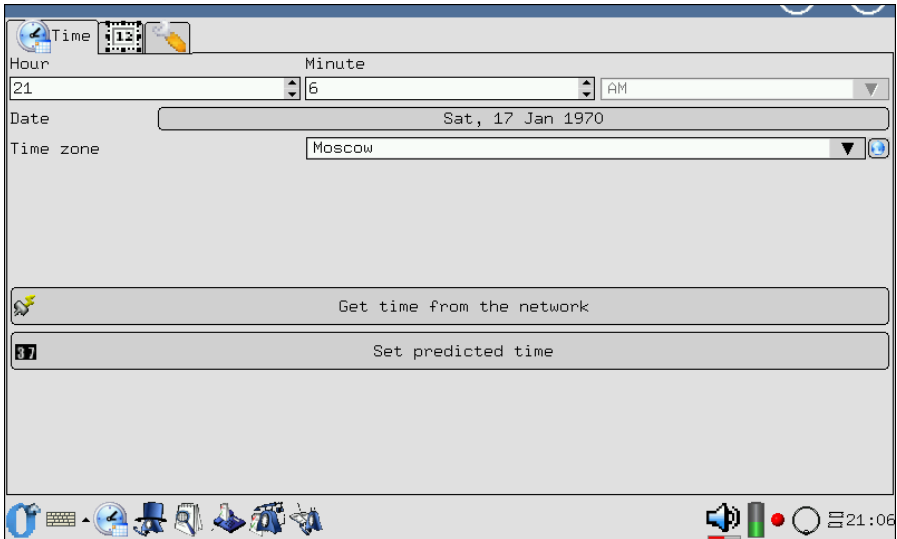


Figure 14.7. System time setup

Opie graphical interface allows to use Opie-terminal for editing and changing the device settings.

To enter commands it is necessary to switch to the program **Opie-Terminal** (**O-Menu**  $\Rightarrow$  **Applications**  $\Rightarrow$  **Console**). By default, this program is operated under the category **user** (see. chapter 11.2, p. 39).

You can switch to the mode **root user** (see. chapter 11.2, p. 39) by using the virtual keyboard (or from the physical keyboard — in case of remote control) and command **su -** (then enter the root user's password).

Further actions will depend on operations to be performed: update of the device software (see. chapter 13, p. 45), files operations (see application E, p. 67), etc.

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## A. Delivery Set

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The delivery set of **Bercut-MMT** analyzer includes the following:

- Chassis (system unit).
- Power supply unit.
- Measuring cables (depending on delivery options).
- User Manual for **Bercut-MMT** .
- Stylus for touch screen data input.
- Dedicated plug-in cards (depending on delivery options).
- Transportation bag.



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## B. Platform Specifications

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Table B.1: Platform Specification

<b>Processor</b>	Intel XScale PXA270 520MHz (options 312 or 416 MHz)
<b>Memory</b>	128 megabytes
<b>Flash memory</b>	32 megabytes
<b>CF (non-volatile)</b>	1(internal, stationary, from 512 megabytes to 4 gigabytes)
<b>Display</b>	TFT 7 inches, 800x480 points, 65536 colors, touch panel
<b>Keyboard</b>	cursor control, digit and function keys
<b>Computer connection interface</b>	RS-232, Ethernet 10/100BaseT, USB-client and USB-host.
<b>Power supply voltage</b>	9-15 V DC
<b>Input current</b>	up to 3 A
<b>Batteries</b>	Two Ni-Mh batteries with working voltage 7.2 V and capacity 4500 mA/h each. Batteries should be replaced at manufacturer's plant
<b>AC adapter</b>	100-240 V 50-60 Hz. Input current p to 1.5 A
<b>Power supply protection elements</b>	Internal fuse 7A
<b>Measuring unit dimensions</b>	250× 220× 55 mm
<b>Measuring unit weight</b>	2.960 kg





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## C. Terms

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**SSH (Secure Shell):**

A set of programs to connect to remote Unix-like systems. Various encryption algorithms (RSA, 3DES, IDEA, blowfish, etc.) are used in data transmission from the client to server and back. It ensures reliability and protection of network connections.

**Default Value:**

The term **default** refers to the state of an object after the initial configuration, i.e. after the system installation

**Bercut-MMT** by the manufacturer's representatives.

**DNS :**

Domain Name System. A distributed system (database) that is used to transform the network device name into IP-address. DNS operates in TCP/IP networks.

**Gateway :**

A network device connecting two or more different-type network systems and transforming the data flows between them.



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## D. Data Synchronization

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### D.1 Overview

In the process of work with **Bercut-MMT**, as any other devices capable of data saving, there is a need of backup copying and data exchange between the device and the user's desktop PC.

In the product line of **Bercut-MMT** devices, the backup and data exchange capabilities have been fully integrated on the basis of the popular Secure Shell (SSH) protocol for PC remote access and control.

### D.2 Requirements to Desktop PC Software

- Operation System – Windows 98/NT/2000/XP.
- WinSCP (a freeware program distributed under GPL license and available for loading via Internet).
- Setup connection to **Bercut-MMT** using PPP protocol.

### D.3 Required Programs Installation

#### D.3.1 WinSCP

##### D.3.1.1 How to Get Program

You can download a copy of the program at:

<http://winscp.sourceforge.net/eng/download.php>

### D.3.1.2 PC Installation

1. Copy the program `winscp356setupintl.exe` to any user-defined folder (e.g., `C:\TEMP`).

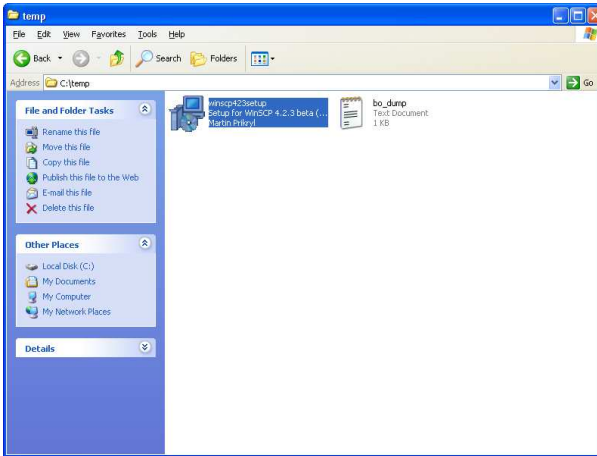


Figure D.1. Copying to user-defined folder

- Run the program and follow the instructions.
2. Select destination path.
  3. Select components to be installed.
  4. User interface options:

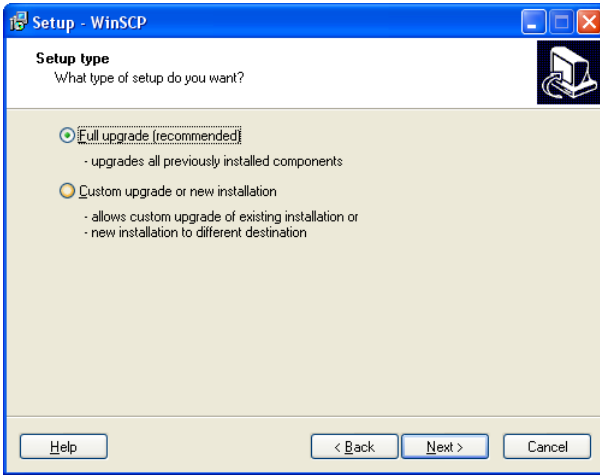


Figure D.2. Selection of user interface options

5. Install WinSCP by clicking **Install**:

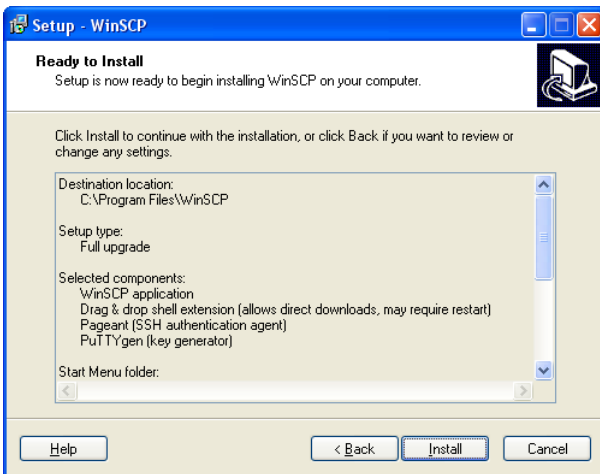


Figure D.3. Program installation

Upon successful installation, click the button **Finish** to exit the installer.

### D.3.1.3 Connecting to Bercut-MMT

Launch WinSCP3 and enter connection parameters:

- server address (it must be the same as in the settings of the network connection to **Bercut-MMT**);
- user name (usually **user**);
- access password (upon delivery — **user**);

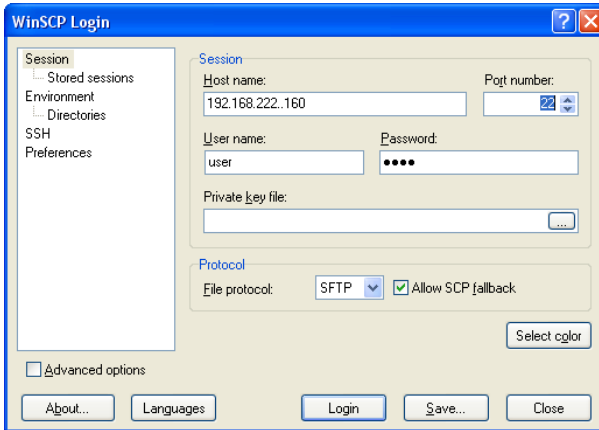


Figure D.4. Entering password

At the first connection, you may see a request to confirm a secure connection:

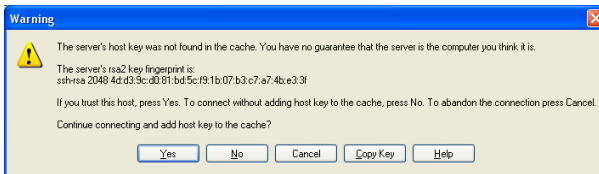


Figure D.5. Confirmation request

Click **Yes**. In case of successful connection, the main window of WinSCP will appear on the screen.

Create a user-defined folder on the desktop PC for data synchronization. In the subsequent description, it is assumed that data (files) exchange between the PC and device will be done in this local folder:

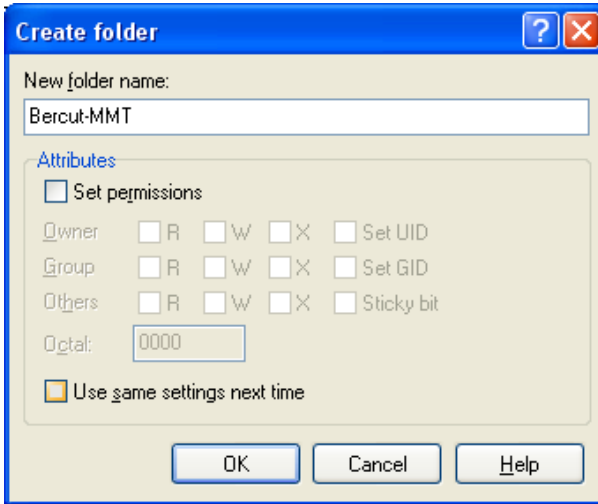


Figure D.6. Local folder

## D.4 File Synchronization

Create (`< F7 >`) any folder on the desktop PC and make it a work directory. Go to subfolder `/home/user` on the right bar (list of files on the device):

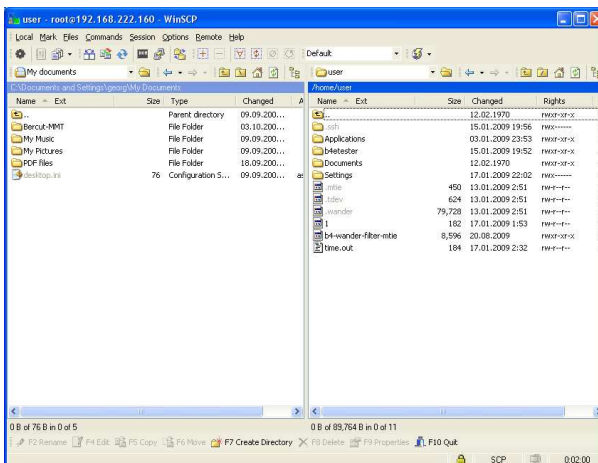



Figure D.7. Folder creation

Click < *Ctrl* > + < *S* > to start files transfer from the devices to the PC. You may also use a dropdown menu or a toolbar button (  ):

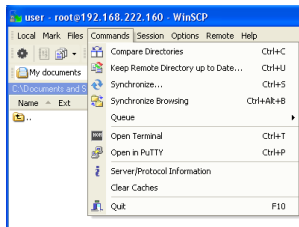


Figure D.8. File Transfer

In the appearing dialogue box select **Local** and uncheck **Delete Files** and **No Confirmation**:

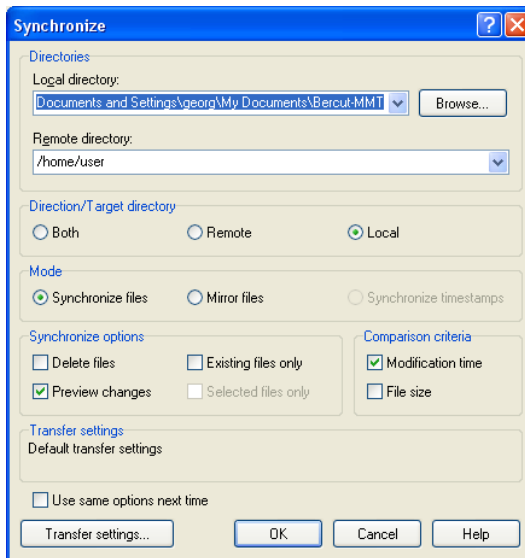


Figure D.9. Synchronize

As a result of synchronization all new files will be copied from the device to the desktop PC.



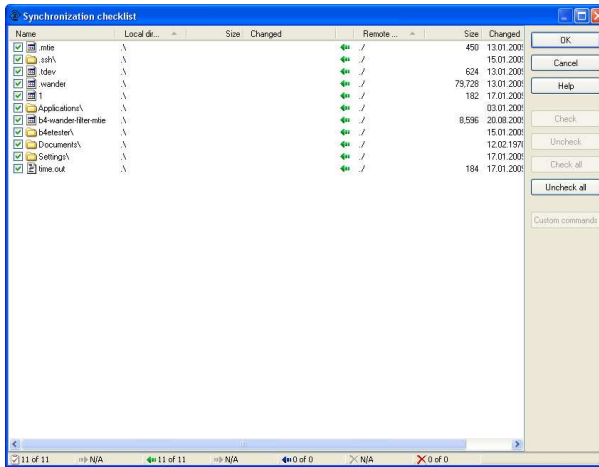


Figure D.10. Synchronization checklist



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## E. UNIX Command Quick Reference

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### E.1 Main File Operation

1. **ls** [**options**] **files** — show file list.

Useful Options:

- (a) **-a** — show a list of all files, including those with dotted names;
- (b) **-l** — show details, including file attributes;
- (c) **-s** — add file size in blocks;

2. **cp** [**options**] **files file/directory** — copy file.

Useful Options:

- (a) **-p** — Copy not only the file content but also rights to file, time stamps, and the file owner and group if you have sufficient rights;
- (b) **-i** — Interactive mode. Issue warning before rewriting an existing file;
- (c) **-a** — Copy directories hierarchy recursively saving special files, rights, symbolic links and hard links;
- (d) **-f** — Rewrite files while copying, without additional warnings;

3. **mv** [**options**] **source target** — rename or move file.

Useful Options:

- (a) **-i** — Interactive mode. Issue warning before rewriting an existing file;
- (b) **-f** — Rewrite files while copying, without additional warnings;

4. **rm** [**options**] **files/directories** — delete file/directory.

Useful Options:

- (a) **-i** — Interactive mode. Issue warning before deleting an existing file;
- (b) **-f** — Delete files ignoring any errors and warnings;
- (c) **-r** — Recursively delete directory and its contents;

## E.2 Operations with Directories

1. **cd directory** — change current directory;
2. **pwd** — show name of current directory;
3. **mkdir [options] directory** — create directory.

Useful Options:

- (a) **-m rights** — create directory with assigned access rights;

## E.3 Viewing Files

1. **cat [options] files** — view entire files.
2. **less [options] files** — view files page-by-page.  
Useful Options:
  - (a) **-c** — clear screen before showing next page;
  - (b) **-N** — show line numbers;
3. **gv [options] files** — view Postscript or PDF files.  
Useful Options:

- (a) **-page P** — start from page P;
- (b) **-scale N** — set display zoom ratio. Integer N may be positive (to zoom in) or negative (to zoom out)

4. **xdvi [options] files** — view Tex DVI files.

## E.4 Text Edit in Files

1. **grep [options] template [files]** — find line in file which correspond to a regular expression.
2. **unid** — find identical line in file.

---

## F. Troubleshooting

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Table F.1: Troubleshooting

<b>Symptoms</b>	<b>Possible cause and means of correction</b>
<b>The device power supply unexpectedly turns off in a short time (e.g. from 1 to 10 minutes)</b>	Check the battery charge level. Check settings of light and sleep mode.
<b>The device will not turn on</b>	Check the adapter connection, charge the battery



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## G. Technical support

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Additional information on the **Bercut-MMT** device and new software can be found at the company site [www.metrotek.ru](http://www.metrotek.ru). You also can send an email or call Technical Support Service (refer to **Contact Information** ). Please provide problem description and device data that can be found in the device's menu item: ***Bercut-MMT Device Information*** (**O-menu** ⇒ **Configuring** ⇒ **Bercut-MMT Information**), and consist of the following information:

- device serial number (also present on the rear panel);
- version;
- pluggable modules information.

***Note:** prior to application to the technical support service it is recommended to update the firmware version of the device and to check its operability again.*

### G.1 Contact Information

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