Bercut-MMT

Data Transmission Interfaces Testing

Operation Manual
1.2.7, 2009

Metrotek

Contents

1. Introduction

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[1]), 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.

[1] 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.

2. General

Data transmission interfaces analysis subsystem (Datacom) based on the **Bercut-MMT** platform is designed to perform measurements and diagnostic testing of data transmission equipment working at rates from 50 bit/s to 2 Mbit/s.

2.1 Data transmission interfaces analysis module features

Data transmission interfaces analysis card (Datacom card hereinafter) extends the capabilities of **Bercut-MMT** with testing functions that ensure correctness of services provided by global networks and local data transmission channels. The device task is to help technical stuff to quickly and effectively perform commissioning tests for new data transmission services and to perform diagnostics of existing network. Testing system can be used to carry out the wide range of different measurement tasks including end-to-end connection measurements in the data transmission networks in the DTE/DCE emulation mode, passive monitoring, measurements of main parameters according to G.821/G.826/M.100 recommendations.

The Datacom card supports measurements in the DTE/DCE emulation mode and passive monitoring mode for the following interfaces (complies to **B4-DA** option):

- X.24/V.11 (X.21, X.21bis)
- V.24/V.28
- V.24/V.35
- V.24/V.11 (V.35/RS-449)

To connect to the data transmission interfaces, a dedicated adapter is used that is connected to the **Bercut-MMT** platform with SCSI cable included in the B4-DA card set.

The B4-DA card layout is shown at the Figure 2.1.

Figure 2.1. B4-DA Card

2.2 Distribution Kit

- B4-DA Module (pluggable card) for data transmission interfaces testing.
- A1 Adapter – X.24/V.11
- A2 Adapter – V24/V.28
- A3 Adapter – V.24/V.11 (V.36/RS-449)
- A4 Adapter – V.24/V.35
- Card - adapter interconnection cable, SCSI type
- Data transmission interfaces analysis. Operations Manual

2.3 LED States

In order to visually monitor measurements conditions and reception of data, the data transmission interfaces analysis card has the number of indicators. Three-color indicators provide enough information to examine the situation and make decision.

Figure 2.2. Indicators

LOS — Loss Of Signal:

- Green — signal is permanently present since the moment of reset;
- Red — currently no signal;

- Yellow — since the moment of reset signal has been lost for some time.

LOC — Loss Of Clock:

- Green — since the moment of reset clock has not been lost;
- Red — currently there is no clock;
- Yellow — since the moment of reset clock has been lost for some time.

BL — Broken Line:

- Green — since the moment of reset line has not been broken;
- Red — currently line is not broken;
- Yellow — since the moment of reset line has been broken for some time.

BSL — Byte Synchronization Lost:

- Green — since the moment of reset byte synchronization has been detected and has not been lost;
- Red — currently there is no byte synchronization;
- Yellow — since the moment of reset byte synchronization has been lost for some time.

LSS — Loss of test Sequence Synchronization:

- Green — since the moment of reset test sequence synchronization has been detected and has not been lost;
- Red — currently there is no test sequence synchronization;
- Yellow — since the moment of reset test sequence synchronization has been lost for some time.

ALL0 — All zeroes:

- Green — received sequence has no zeroes;
- Red — currently received sequence has all zeroes;
- Yellow — since the moment of reset there was received sequence with all zeroes for some time.

ALL1 — All ones:

- Green — received signal has no sequence of ones;
- Red — currently received sequence has all ones;
- Yellow — since the moment of reset there was received sequence with all ones for some time.

In case corresponding event cannot or should not be analyzed, LOS, LOC, BL, BSL, LSS, ALL0 and ALL1 indicators are off.

2.4 Operational Mode Selection

The data transmission interfaces analysis card can operate in a mode that is set with the help of **Firmware update utility** application: **O-Menu ⇒ Settings ⇒Firmware update utility** (For details refer to operational mode setup for pluggable cards in the Operations Manual "**Bercut-MMT**. Telecommunication Systems Universal Analyzer Platform").

3. Selecting Measurement Parameters and Mode

Data transmission interfaces testing subsystem based on the **Bercut-MMT** platform provides for the analysis capability in the terminal mode with **DTE** (Data Termination Equipment) or **DCE** (Data Communication Equipment) emulation or in the passive monitoring mode.

3.1 Interface Configuring

In order to perform measurements, the device should be connected to the objects being tested, using appropriate adapter and cables, and then configuration of B4-DA pluggable card parameters configuration should be performed, with the help of **Datacom Configuration** program. Screen layout during configuring is shown at Figure 3.1.

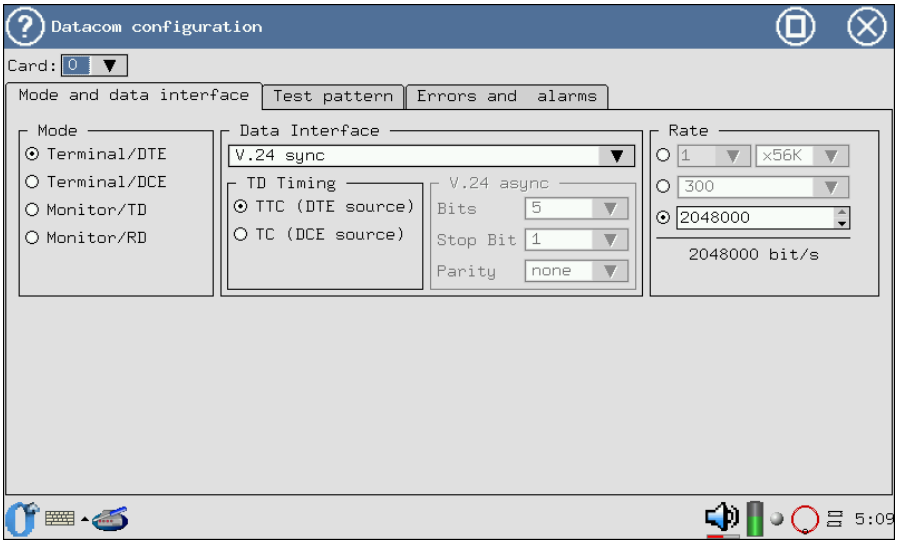

Figure 3.1. Parameters of Datacom Interfaces

Bercut-MMT configuring sequence for data transmission interfaces testing:

1. Activate program **Datacom Configuration** (**O-Menu** ⇒**Datacom Analysis** ⇒**Datacom Config**).
2. Select an active B4-DA card (ref. to Figure 3.2).

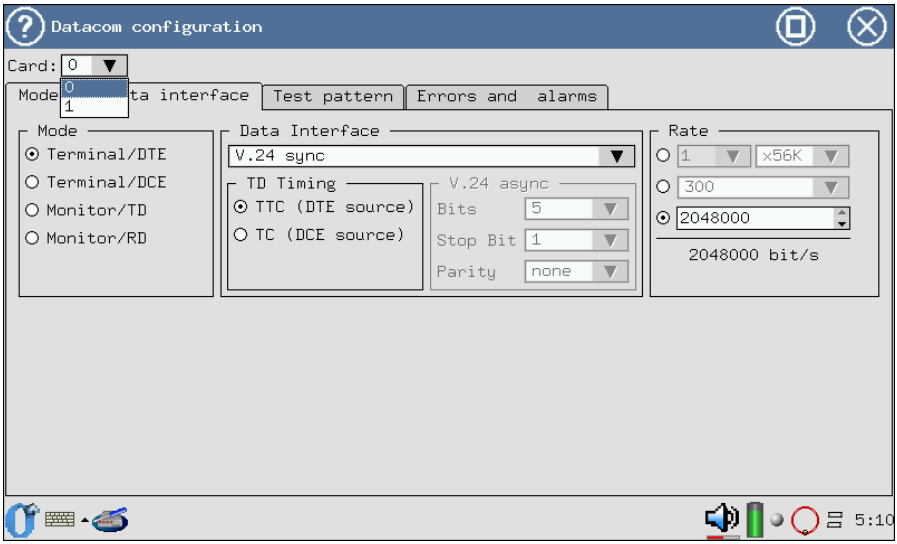

Figure 3.2. Card Selection

3. The **Mode and data interface** allows to define:
   - emulation mode (this mode is used for line path testing):
     - **Terminal/DTE** — the card is connected instead of a terminal as DTE (Data Terminal Equipment) to the line path and is used for signal transmission and reception.
     - **Terminal/DCE** — the card is connected instead of a terminal as DCE (Data Communications Equipment).
   - monitoring mode (this mode is used when it is necessary to implement monitoring access without impact on a path):
     - **Monitor/TD** — card monitors the transmitted stream;
     - **Monitor/RD** — card monitors the received stream.
4. The **Data Interface** field allows to select interface type according to the data protocols used (Figure 3.3):
   - X.24;

- V.24 async (asynchronous);
- V.24 sync (synchronous).

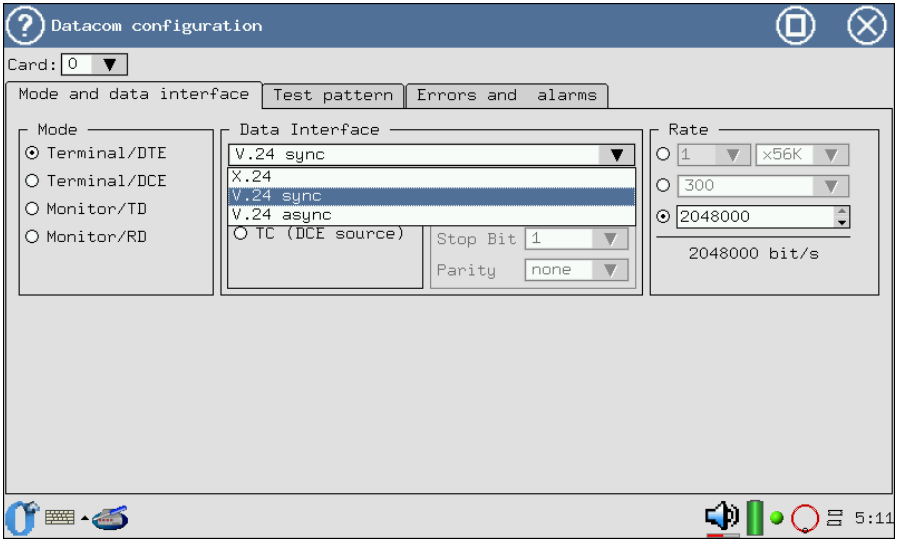

Figure 3.3. Interface Type Selection

The device determines physical interface type (V.11, V.28, V.35) automatically, depending on the connected adapter.

5. In the asynchronous modes (**V.24 async** field) it is possible to configure additional parameters (Figure 3.4):
   - **Bits** — the size of a "word";
   - **Stop bit** — quantity of stop bits (value of "1,5" determines just stop interval duration);
   - **Parity** — parity check mode.

Table 3.1: Values of the **Parity field**

Value	Description
none	no parity check
mark	setting of "one"
space	setting of "zero"
even	even quantity of ones
odd	odd quantity of ones

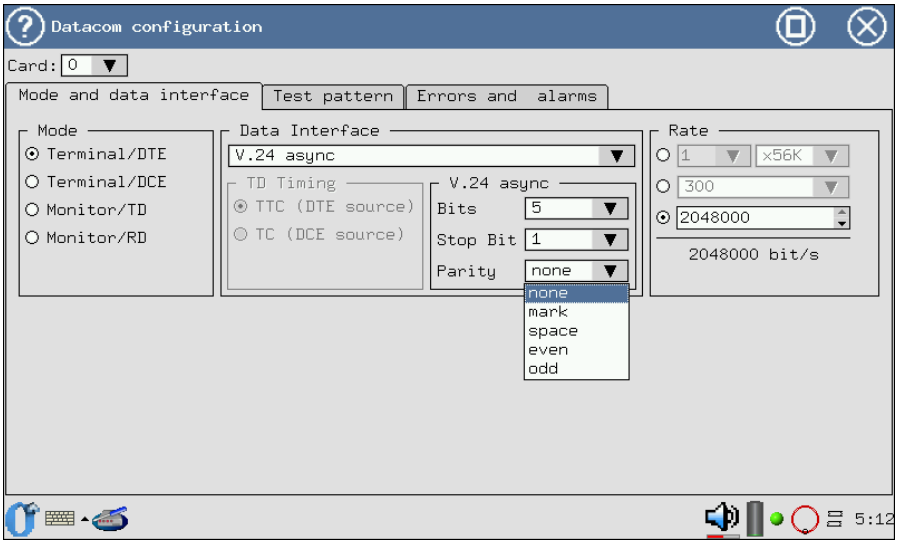

Figure 3.4. Parity check mode selection

6. For synchronous transmission interfaces (in case **V.24 sync** field is selected) the source of synchronization signal can be defined, depending of emulation mode:
   - **TTC** — DTE acts as synchronization signal source;
   - **TC** — DCE acts as synchronization signal source.
7. The **Rate** field allows to set the testing rate (Figure 3.5, p. 15).

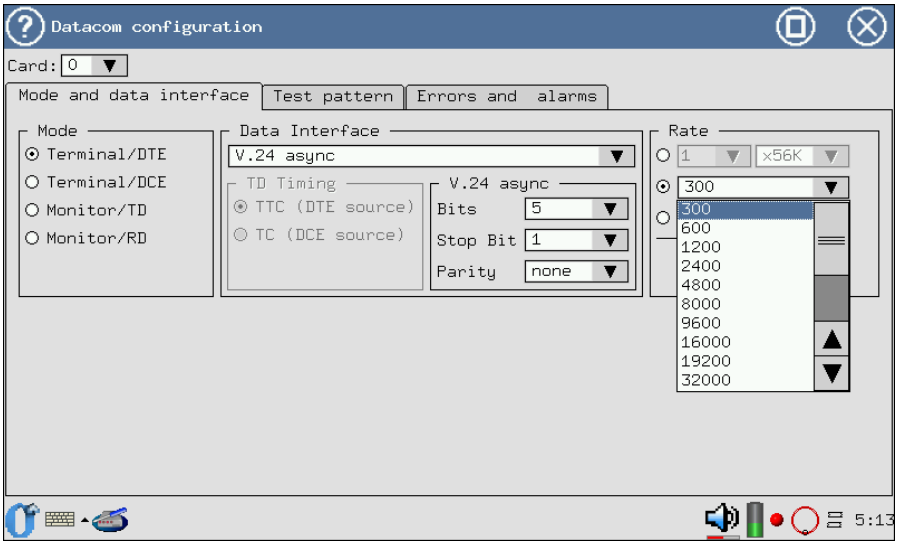

Figure 3.5. Data Transmission Rate Selection

3.2 Test Pattern

After the parameters of interface part of the data transmission system are configured, it is necessary to configure modes of test sequences transmission and reception. This is performed via **Test Pattern** tab of the **Datacom Configuration** program (Figure 3.6, p. 16).

The **Type** field allows to select the test sequence type from the following list:

- 2e6 — $2^6 - 1$ pseudorandom sequence generation;
- 2e9 — $2^9 - 1$ pseudorandom sequence generation;
- 2e11 — $2^{11} - 1$ pseudorandom sequence generation;
- 2e15 — $2^{15} - 1$ pseudorandom sequence generation;
- 2e23 — $2^{23} - 1$ pseudorandom sequence generation;
- All 1 — all "ones";
- All 0 — all "zeroes";
- 55 — interlacing zeroes and ones in the data stream;
- user — user defined sequence generation.

Byte 1, **Byte 2** and **Byte 3** fields allow to define 24 bits of user sequence.

In order to edit Byte 1, Byte 2 and Byte 3 fields, press with a stylus one of the windows and insert needed quantity of zeroes and ones using keyboard.

- **Invert TX** field allows to switch on the transmitted test sequence inversion
- **Invert RX** field allows to switch on the received test sequence inversion.

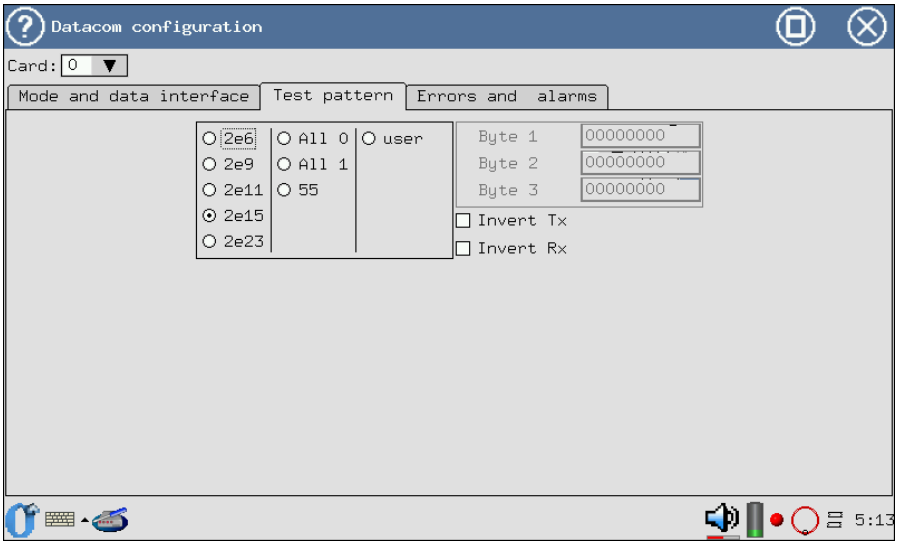

Figure 3.6. Test Sequence Parameters

3.3 Errors and Alarms Generation

If during measurements it is necessary to introduce intentional errors and alarms, it is needed to configure desired event type under the **Errors and Alarms** tab (Figure 3.7, p. 17). Fault events or errors generation is performed within the **Datacom Measurements** program (refer to the section 4, p. 19).

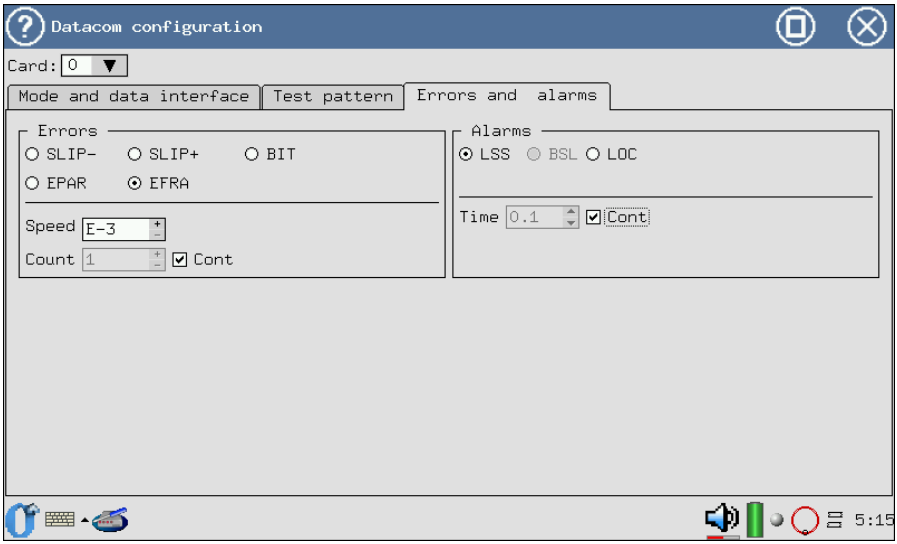

Figure 3.7. Errors and Alarms Generation Parameters

The **Errors** parameter defines type of error from the following list:

- EPAR — packet parity error generation;
- EFRA — packet structure error generation;
- E-bit — bit errors generation in the sequence;
- SLIP− — negative slips generation in the test sequence;
- SLIP+ — positive slips generation in the test sequence.

The **Speed** fields determines errors insertion rate. It is set with the help of a stylus.

The **Count** field determines quantity of errors to be inserted. **Cont** can be set to determine continuous insertion of errors and numbers.

The **Alarms** parameter defines type of alarm from the following list:

- LSS — loss of synchronization signal with the received test sequence;
- BSL — byte synchronization lost signal;
- LOC — loss of clock signal.

The **Time** field value determines duration of alarm generation. Numerical value or **Continuous** — continuous generation can be set.

Available alarm events and errors are summarized in the Table 3.2, page 18.

Table 3.2: Errors and Faults

Adapter	Source	Faults	Errors
V.24/V.28	DTE, DCE	LSS	E-bit, SLIP+, SLIP-, EPAR, EFRA
V.24/V.35	DTE	LSS	E-bit, SLIP+, SLIP-
V.24/V.35	DCE	LSS, LOC	E-bit, SLIP+, SLIP-
X.24/V.11	DTE	LSS	E-bit, SLIP+, SLIP-
X.24/V.11	DCE	LSS, LOC, BSL	E-bit, SLIP+, SLIP-
V.24/V.11	DTE	LSS	E-bit, SLIP+, SLIP-
V.24/V.11	DCE	LSS, LOC	E-bit, SLIP+, SLIP-

4. G.821/G.826/M.2100 Measurements

This measurement mode presents main results of a measurement.

To access the program press the **DATACOM Measurements** icon. Measurement results can be viewed in the following tabs:

- **Base Parameters**;
- **G.821**;
- **G.826/M.2100**.

Switching between screens is performed with a stylus.

To start or to stop the measurements use the **Start/Stop** key. After the **Start** button is pressed, **Error** and **Alarm** buttons appear, that allow to control errors and alarms generation process.

The device screen layout in the Datacom measurements mode is shown at Figure 4.1).

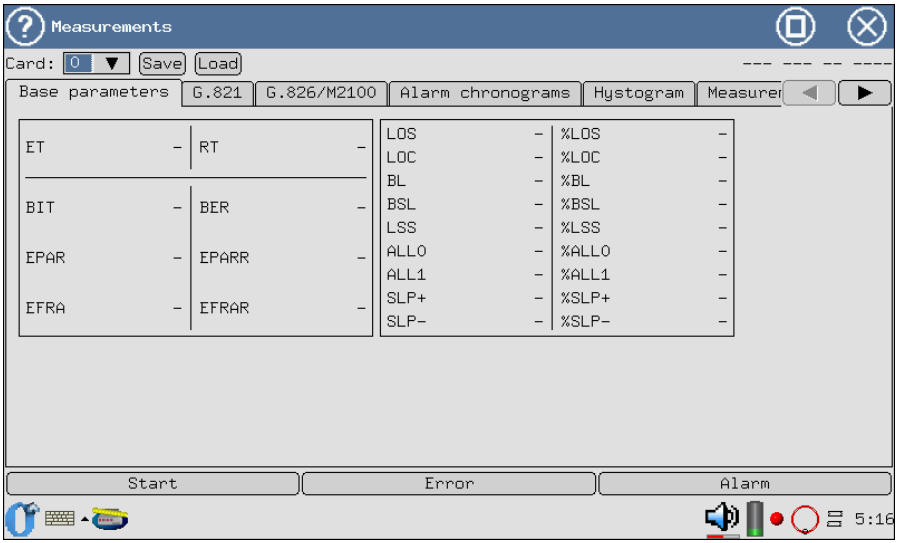

Figure 4.1. Measurements. Base Parameters

The **Base Parameters** tab screen contains measurement data, linked to special information distortion types, such as code violation, parity errors, stop bit errors, etc. This screen also reports all service provisioning criteria, such as errored seconds and errored seconds percentage.

The **G.821** tab presents all parameters that are measured according to G.821 recommendation "Error performance of an international digital connection operating at a bit rate below the primary rate and forming part of an Integrated Services Digital Network".

The **G.826** tab presents all parameters that are measured according to G.826 recommendation "End-to-end error performance parameters and objectives for international, constant bit-rate digital paths and connections".

The majority of results have a counter shown in the first column and corresponding rate or percentage value in the second column. For example, **LOS** is shown in the first column while its corresponding parameter **%LOS** – in the second column of the same row. **LOS** is a counter of seconds during which there was no signal, and **%LOS** is percentage.

4.1 Base Parameters

The **Base Parameters** tab view is shown at Figure 4.1.

Basic measured parameters detailed description can be found in Table 4.1.

Table 4.1: Main Parameters Description

Param.	Description	Formula	Meas. Unit	Note
RT	Time remaining to the end of testing	Countdown	second	Countdown from the start of testing
ET	Time elapsed from the start of testing	Cumulative count	second	Continuous counting from the start of testing
BIT	Errored bits counter from the start of testing	Cumulative count	error	When test sequence is not synchronized, is not counted
BER	Bit error rate	$\frac{BIT}{ABIT}$		ABIT — quantity of bits received
EPAR	Counter of packets with parity error	Cumulative count	error	Counting is performed for asynchronous interface.
EPARR	Relative number of packets with parity error			Packets with parity error to the total quantity of packets ratio
EFRA	Counter of packets with structure error	Cumulative count	error	Counting is performed for asynchronous interface
EFRAR	Relative number of packets with structure error			Quantity of packets with structure error to the total quantity of packets ratio
LOS	Count of seconds when signal was lost	Cumulative count	second	
%LOS	Percent of seconds when signal was lost	$\frac{LOS}{ET} * 100\%$		

Table 4.1: Main Parameters Description (cont.)

Param.	Description	Formula	Meas. Unit	Note
LOC	Count of seconds when the clock was lost	Cumulative count	Second	Counting is performed for synchronous interface
%LOC	Percent of seconds when the clock was lost	$\frac{LOC}{ET} * 100\%$	%	
BL	Count of seconds when line was broken	Cumulative count	second	
%BL	Percent of seconds from the start of testing when the line was broken	$\frac{BL}{ET} * 100\%$	%	
BSL	Count of seconds when byte synchronization was lost	Cumulative count	Second	Counting is performed for X.24/V.11 interfaces
%BSL	Count of seconds from the start of testing when byte synchronization was lost	$\frac{BSL}{ET} * 100\%$	%	
LSS	Count of seconds when there was no test sequence synchronization signal, from start of testing	Cumulative count	Second	
%LSS	Percent of seconds when there was no test sequence synchronization, from start of testing	$\frac{LSS}{ET} * 100\%$	%	
All 0	Count of seconds when All 0 sequence was received	Cumulative count	Second	
%All 0	Percent of seconds when All 0 sequence was received, from the start of testing	$\frac{All0}{ET} * 100\%$	%	
All 1	Count of seconds when All 1 sequence *was received*	Cumulative count	second	
%All 1	Percent of seconds when All 1 sequence *was received*, from the start of testing	$\frac{All1}{ET} * 100\%$	%	
SLP+	Count of positive slips in the test sequence	Cumulative count	error	
%SLP+	Percent of positive slips in the test sequence from the start of testing	$\frac{SLP+}{ET} * 100\%$	%	
SLP—	Count of negative slips in the test sequence	Cumulative count	second	
%SLP—	Percent of positive slips in the test sequence from the start of testing	$\frac{SLP-}{ET} * 100\%$	%	

4.2 G.821

The **G.821** tab view is shown at Figure 4.2.

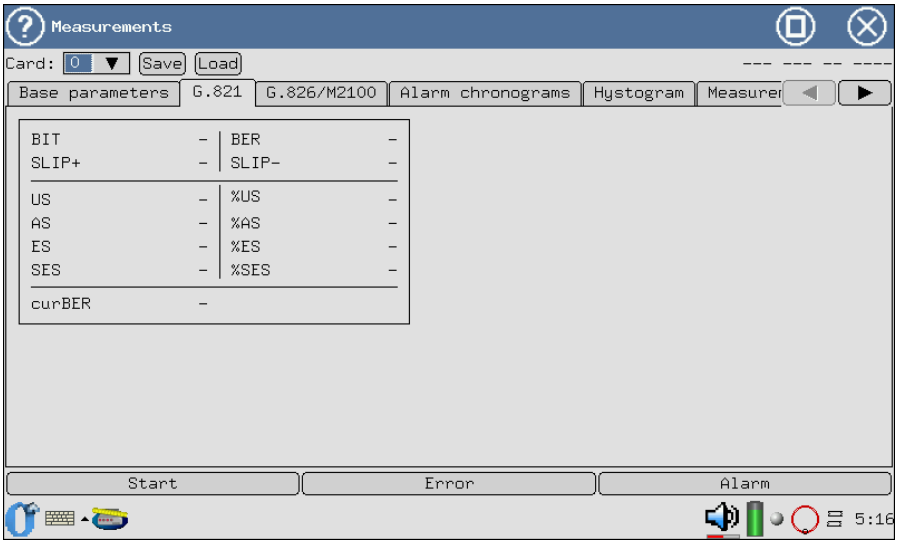

Figure 4.2. Measurements. ITU-T G.821

Detailed description of measured parameters according to G.821 recommendation is presented in the Table 4.2.

Table 4.2: G.821 Recommendation Parameters Description

Parameter	Description	Formula	Meas. Unit	Meas. condition
BIT	Errored bits counter from the start of testing	Cumulative count	error	Is not counted when test sequence is not synchronized
BER	Bit error rate	$\frac{BIT}{ABIT}$		ABIT — quantity of bits received
SLIP+	Counter of positive slips in the test sequence	Cumulative count	error	Positive slip is repetition of one bit of the test sequence.
SLIP−	Counter of negative slips in the test sequence	Cumulative count	error	Negative slip is exclusion of one bit of the test sequence.
US	Quantity of unavailable seconds[1] from the start of testing	Cumulative count	second	

[1] Unavailable seconds are counted from the beginning of 10 consecutive severely errored seconds; counting stops at the beginning of 10 seconds without errors.

Table 4.2: G.821 Recommendation Parameters Description (cont.)

Parameter	Description	Formula	Meas. Unit	Meas. condition
%US	Percent of unavailable seconds from the start of testing	$\frac{US}{ET} * 100\%$	%	
ES	Quantity of errored seconds from the start of testing. These are seconds with at least one error.	Cumulative count	second	Errored second is not counted as unavailable second
%ES	Percent of errored seconds from the start of testing.	$\frac{ES}{AS} * 100\%$	%	
SES	Number of severely errored seconds, from the start of testing (seconds with error rate $> 10^{-3}$).	Cumulative count	second	Severely errored seconds are not counted as unavailable seconds.
%SES	Percent of severely errored seconds	$\frac{SES}{AS} * 100\%$	%	
AS	Quantity not available seconds (readiness seconds)	$AS = ET - UAS$	second	
%AS	Percent of availability from the start of testing	$\frac{AS}{ET} * 100\%$	%	
curBER	Current bit error rate averaged for 10 seconds and less	$\frac{\sum_{i=0}^{T_{cur}} BIT_i}{T_{cur}}$		$T_{cur} = 10s$

4.3 G.826/M.2100

Screen view is shown at Figure 4.3.

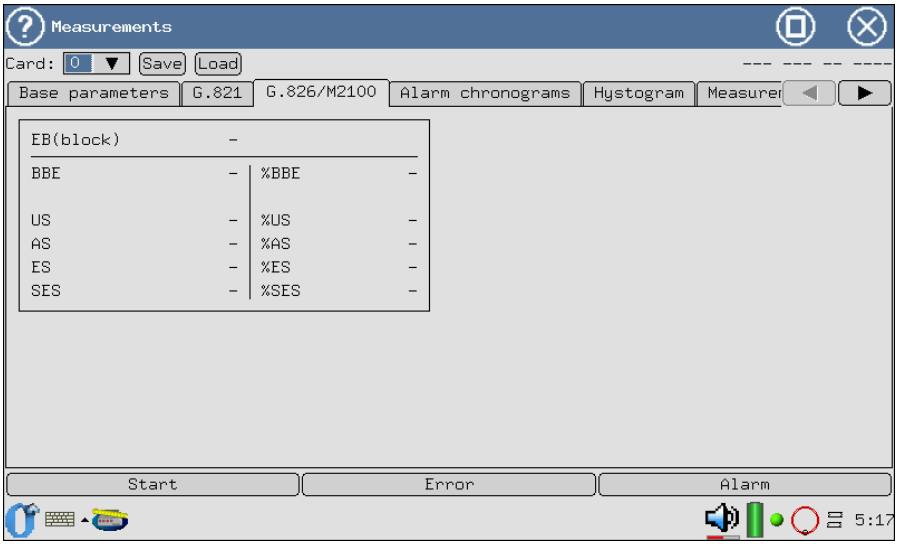

Figure 4.3. Measurements. ITU-T G.826/M.2100

G.826/M.2100 recommendation parameters description is presented in the Table 4.3.

Table 4.3: G.826 Recommendation Parameters Description

Parameter	Description	Formula	Meas. Unit	Meas. condition
EB(block)	Errored blocks counter from the start of testing	$EB = CRC$	block	
BBE	Counter of blocks with background errors (blocks with errors except blocks received during SES or UAS are counted)	Cumulative count	block	
%BBE	Coefficient of blocks with background errors (excluding blocks received during SES and UAS)	$\frac{BBE}{1000*(AS-SES)} * 100\%$	%	
US	Quantity of unavailable seconds [2] from the beginning of testing	Cumulative count	second	
%US	Percent of unavailable seconds from the start of testing	$\frac{US}{ET} * 100\%$	%	
ES	Quantity of errored seconds, from the start of testing These are seconds with at least one error.	Cumulative count	second	Errored second is not counted during unavailable second

[2]Unavailable seconds are counted form the beginning of 10 consecutive severely errored seconds; counting stops at the beginning of 10 seconds without errors.

Table 4.3: G.826 Recommendation Parameters Description (cont.)

Parameter	Description	Formula	Meas. Unit	Meas. condition
%ES	Percent of errored seconds	$\frac{ES}{AS} * 100\%$	%	
SES	l Number of severely errored seconds, from the start of testing (seconds with error rate $> 10^{-3}$).	Cumulative count	second	Severely errored second is not counted during unavailable second
%SES	Percent of severely errored seconds, from the start of testing	$\frac{SES}{AS} * 100\%$	%	
AS	Quantity of available seconds (readiness seconds)	$AS = ET - UAS$	second	
%AS	Percent of readiness seconds from the start of testing	$\frac{AS}{ET} * 100\%$	%	

4.4 Measurement duration

The **Measurement duration** tab is used to configure test duration. Number of hours and minutes should be specified, on expiry testing will automatically stop.

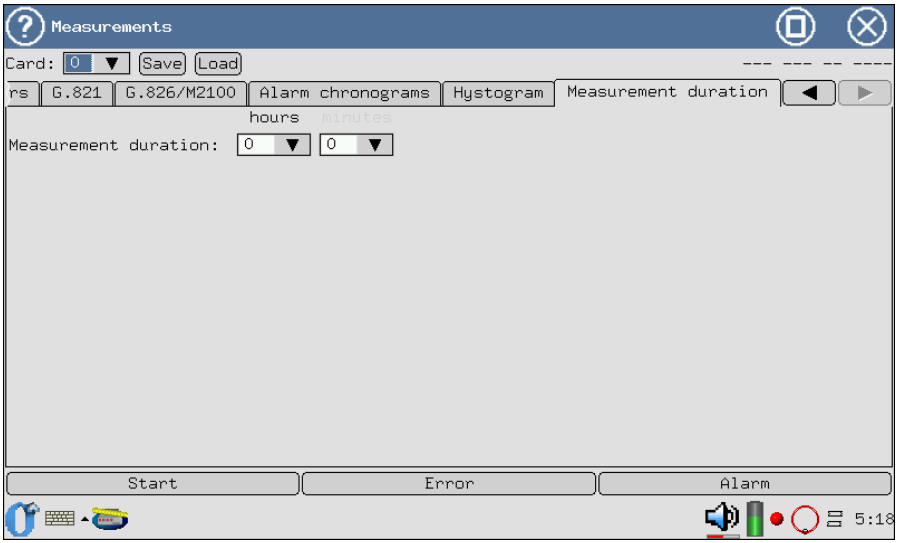

Figure 4.4. Screen Layout **Measurement Duration**

In case zero values are inserted, measurement time is counted starting

from zero until testing is interrupted by user.

5. Programming and Signal Status Monitoring

The states of being tested data transmission interfaces signal circuits may be viewed with the help of "Programming Circuits" program (Figure 5.1). The program also allows to change logical state of some circuits. These circuits are highlighted in the list of states with blue color. Changing of current signal logical level of available circuits is performed by pressing with stylus at the screen in the area of corresponding circuit.

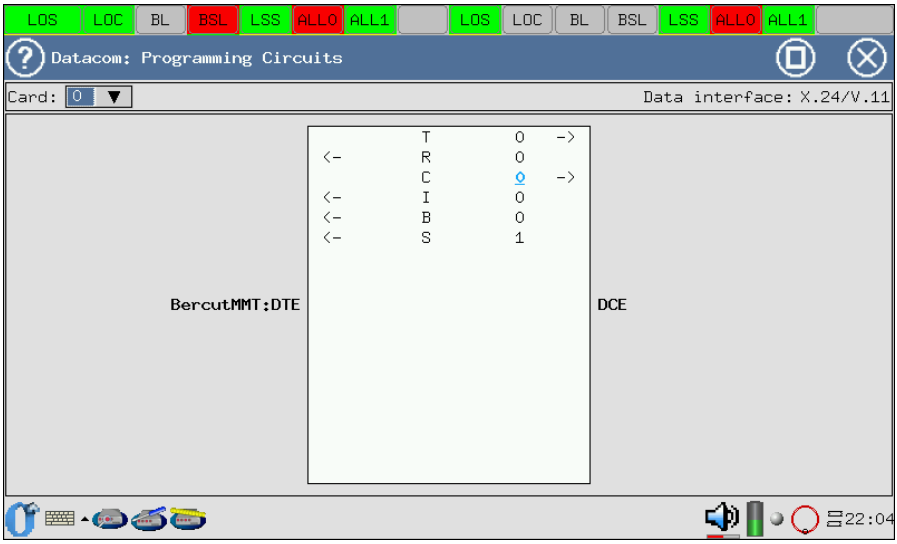

Figure 5.1. Signal Circuits State

6. Measurement Results

The **Alarm chronograms** and **Histogram** sections allow to view obtained measurement results in the graphical form.

Horizontal axis is measurements time scale. Axis starting point corresponds to start of measurements time and then is calibrated according to the scale selected: 1, 5, 15, 30 minutes or 1 hour.

To generate and view graphical reports it is necessary to:

1. Activate measurements in the **Datacom Measurements** ⇒ **G.821** or **G.826/M.2100** program by pressing **Start** key.
2. Navigate to the needed graphical reports section (**Datacom Measurements** ⇒ **Alarms Chronograms** program, or **Datacom Measurements** ⇒**Histogram** program).
3. Select time measurement axis scale.

6.1 Histogram

Screen view is shown at Figure 6.1, p. 30.

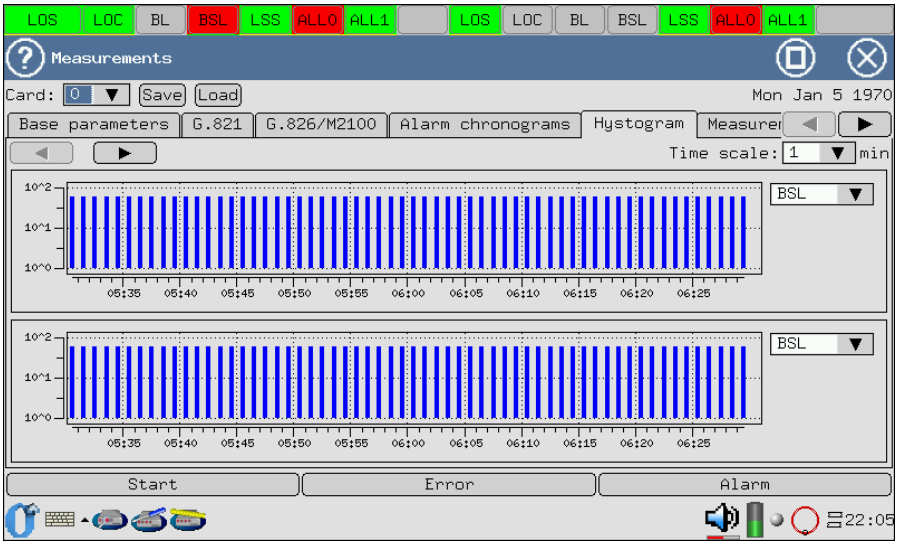

Figure 6.1. Alarms and Errors Histogram

The graph depicts distribution information about events observed during the measurement period. When a certain type of event is discovered, a column appears at the graph with the height that increases upon discovery of such type of event during the minute of observation.

Vertical axis has logarithmic scale and depicts values of corresponding parameters.

To view the events graph:

1. Event selection is performed with a stylus.
2. Use stylus to switch between diagram screens along horizontal axis.

6.2 Alarm chronograms

The chronograms graphically show errors in the stream under testing.

When a alarm is detected during measurements, a column appears at the axis that corresponds to this type of alarm, showing presence of a alarm.

The detected alarms are listed at the left side along vertical axis. Column height does not change, as it only demonstrates that an event has been detected. One column corresponds to one minute of observation.

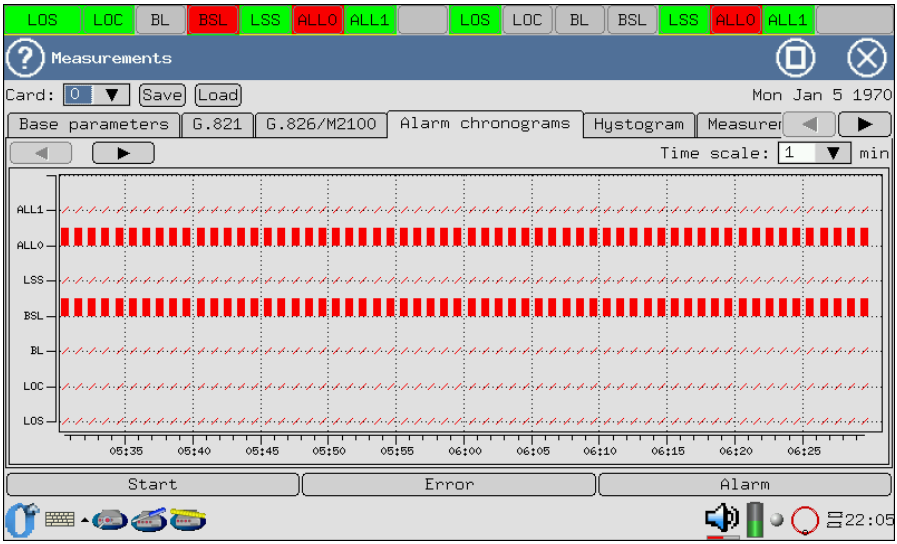

Figure 6.2. Measurements. Alarm chronograms

1. Activate the **Alarm chronograms** application.
2. Set the time axis scale using stylus.
3. To scroll the chronogram along horizontal axis, use stylus.

A. Datacom Adapters

In order to analyze data transmission interfaces, it is necessary to use corresponding adapters that are connected to **Bercut-MMT** with SCSI cable delivered with the device.

This section describes adapters that can be used and presents corresponding connectors diagrams with pin numbering[1].

Table A.1: Datacom Adapters

No	Coding	Interface type	Adapter connectors	
			DTE	DCE
1	B4-DA-A1	X.24/V.11	DB15 male	DB15 female
2	B4-DA-A2	V.24/V.28	DB25 male	DB25 female
3	B4-DA-A3	V.24/V.11	DB37 male	DB37 female
4	B4-DA-A4	V.24/V.35	V.35 male	V.35 female

[1] Each male contact is connected with corresponding female contact: 1 with 1, 2 with 2 and so on.

A.1 Datacom Adapters: pin designation

A.1.1 X.24/V.11

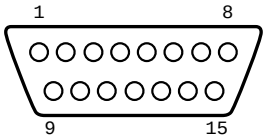

Figure A.1. Schematic drawing of B4-DA-A1 adapter interface (male)

Table A.2: X.24/V.11 Adapter Pins Designation

Pin	Signal	Source	V.24
1	**Frame Ground**	-	-
2	**Data Transmission (A)**	DTE	T(A)
3	**Control (A)**	DTE	C(A)
4	**Data Reception (A)**	DCE	R(A)
5	**Indication (A)**	DCE	I(A)
6	**Signal Element Timing (A)**	DCE	S(A)
7	**Byte timing (A)**	DCE	B(A)
8	**Signal ground**	-	G
9	**Data Transmission (B)**	DTE	T(B)
10	**Control (B)**	DTE	C(B)
11	**Data Reception (B)**	DCE	R(B)
12	**Indication (B)**	DCE	I(B)
13	**Signal Element Timing (B)**	DCE	S(B)
14	**Byte timing (B)**	DCE	B(B)

A.1.2 V.24/V.28

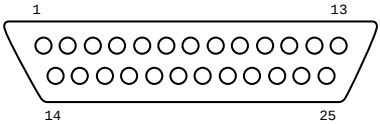

Figure A.2. Schematic drawing of B4-DA-A2 adapter interface (male)

Table A.3: V.24/V.28 Adapter Pins Designation

Pin	Signal	Source	V.24
1	**Frame Ground**	-	FGND
2	**Data Transmission**	DTE	DT(103)
3	**Data Reception**	DCE	DR(104)
4	**Request to Send**	DTE	RTS(105)
5	**Clear to Send**	DCE	CTS(106)
6	**Data Set Ready**	DCE	DSR(107)
7	**Signal Ground**	-	SGND(102)
8	**Receiver Line signal detected**	DCE	DCD(109)
14	**Back-up switching**	DTE	BS(116)
15	**Transmitter signal element timing (source: DCE)**	DCE	TC(114)
16	**Stand-by indicator**	DCE	SI(117)
17	**Receiver signal element timing (source: DCE)**	DCE	RC(115)
18	**Local Loopback**	DTE	LL(141)
20	**Data Terminal Ready**	DTE	DTR(108)
21	**Loopback/Maintenance Test**	DTE	RM(140)
22	**Calling Indicator**	DCE	CL(125)
24	**Data Signal Rate Sel/Transmitter signal element timing (source: DTE)**	DTE	TTC(113)
25	**Test Indicator**	DCE	TI(142)

A.1.3 V.24/V.11

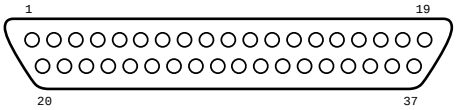

Figure A.3. Schematic drawing of B4-DA-A3 adapter interface (male)

Table A.4: V.24/V.11 Adapter Pins Designation

Pin	Signal	Source	V.24
1	**Frame Ground**	-	FGND
4	**Data Transmission**	DTE	DT(103a)
5	**Transmitter signal element timing (source: DCE)**	DCE	TC(114a)
6	**Data Reception**	DCE	DR(104a)
7	**Request to Send**	DTE	RTS(105a)
8	**Receiver signal element timing (source: DCE)**	DCE	RC(115a)
9	**Data Set Ready**	DCE	DSR(107a)
10	**Local Loopback**	DTE	LL(141)
11	**Clear to Send**	DCE	CTS(106a)
12	**Data Terminal Ready**	DTE	DTR(108a)
13	**Received Line signal detected**	DCE	DCD(109a)
14	**Loopback/Maintenance Test**	DTE	RM(140)
17	**Transmitter signal element timing (source: DTE)**	DTE	TTC(113a)
18	**Test Indicator**	DCE	TI(142)
19	**Signal Ground**	-	SGND(102)
20	**Common Ground**	-	-
22	**Data Transmission**	DTE	DT(103b)
23	**Transmitter signal element timing (source: DCE)**	DCE	TC(114b)
24	**Data Reception**	DCE	DR(104b)
25	**Request to Send**	DTE	RTS(105b)
26	**Receiver signal element timing (source: DCE)**	DCE	RC(115b)
27	**Data Set Ready**	DCE	DSR(107b)
29	**Clear to Send**	DCE	CTS(106b)
30	**Data Terminal Ready**	DTE	DTR(108b)
31	**Receiver Line signal detected/Data Carrier Detected**	DCE	DCD(109b)
35	**Transmitter signal element timing (source: DTE)**	DTE	TTC(113b)

A.1.4 V.24/V.35

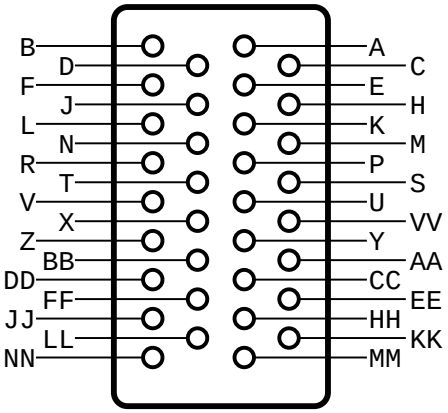

Figure A.4. Schematic drawing of B4-DA-A4 adapter interface (male)

Table A.5: V.24/V.35 Adapter Pins Designation

Pin	Signal	Source	V.24
A	**Frame ground**	-	FGND
B	**Signal Ground**	-	SGND(102)
C	**Request to Send**	DTE	RTS(105)
D	**Clear to Send**	DCE	CTS(106)
E	**Data Set Ready**	DCE	DSR(107)
F	**Receiver Line signal Detected/Data Carrier Detected**	DCE	DCD(109)
H	**Data Terminal Ready**	DTE	DTR(108)
J	**Calling Indicator**	DCE	Cl(125)
L	**Local Loopback**	DTE	LL(141)
N	**Loopback/Maintenance Test**	DTE	RM(140)
P	**Data Transmission**	DTE	DT(103a)
R	**Data Reception**	DCE	DR(104a)
S	**Data Transmission**	DTE	DT(103b)
T	**Data Reception**	DCE	DR(104b)
U	**Transmitter signal element timing (source: DTE)**	DTE	TTC(113a)
V	**Receiver signal element timing (source: DCE)**	DCE	RC(115a)
W	**Transmitter signal element timing (source: DTE)**	DTE	TTC(113b)
X	**Receiver signal element timing (source: DCE)**	DCE	RC(115b)
Y	**Transmitter signal element timing (source: DCE)**	DCE	TC(114a)
AA	**Transmitter signal element timing (source: DCE)**	DCE	TC(114b)
NN	**Test Indicator**	DCE	TI(142)

B. Technical support

Additional information on the **Bercut-MMT** device and new software can be found at the company site 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.*

B.1 Contact Information

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