TX50E e-Manual

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About the analyzer

TX50e is an advanced compact handheld analyzer/generator for E1 communications. It can be use for installation, serve, and maintenance of 2Mbps transmission paths which contain voice, data service at 2.048 Mbps rate.

The test set is connected to the primary data transfer interface (ITU-T Recommendation G.703). It can be operate as a generator/supervisor for different types of test signal in AMI and HDB-3 coding or as a monitor/signal analyzer for PCM systems (ITU-T Recommendation 0.162)

Technical specifications

Output Line interface

Interface	G.703
Connector	RJ-45, banana or BNC

Rate	2.048 Mbit/s
Impedance	120 O balance or 75 O unbalance
Pulse masks	G.703
Line code	AMI, HDB-3
Maximum peak to peak jitter	0.015 UIpp (Conforms to G.823)

Input Line interface

Interface	G.703
Connector	RJ-45, banana or BNC
Rate	2.048 Mbit/s
Impedance	120 O balance or 75 O unbalance
Pulse masks	G.703
Line code	AMI, HDB-3
Maximum input jitter	Conforms to G.823

Transmitter

Transmitter Clock

Clock source	From received signal
	Internal: 2.048 Mbps ± 3ppm
	External: 2.408 MHz or 2,048 Mbps
Internal clock stability	5 ppm
Frequency offset	± 6 KHz in 1 Hz resolution

Frame structure

2048 kbit/s G704	PCM 30, PCM31 with/without CRC-4

Test Pattern

Pattern types	Fixed: All 1, All 0, 1010
	PRBS: 2n-1 where n = 6, 9, 11, 15, 23
Pattern Standard	O.153
	O.152, O.153
	O.151
	O.151
	O.151

Fixed word length	24 bit
Polarity	Normal, inverted

Alarm and Errors

Generation modes	Single, continuous, user defined
Errors/Slips insertion	Continuous or single
Errors rate	1 x 10-n, where n= 2 to 7
Alarm type	LOS - Loss of Signal
	AIS - Alarm indication signal
	LOF - Loss of Frame alignment
	RDI - Remote Alarm Indicator
	LOM - Loss of CAS Multiframe Alignment
	RMA - Multiframe Remote Alarm Indicator
	LSS - Loss of Test Sequence Synchronization
	ARTF: Unstructured alternating 1s and 0s.
Error type	CODE - Code error
	FAS - Frame alignment error
	CRC - CRC-4 block error
	REBE - CRC block error in remote end
	BIT - Bit error in PRBS and fixed word
	+SLP - Positive bit slip
	-SLP - Negative bit slip
	E-bit - Transmitted E-bit errors
	MFAS - Multiframe Alignment Synchronization

Receiver

Receiver Clock

Clock source	Recovered form received data stream

Frame structure

2048 kbit/s G704	PCM 30, PCM31 with/without CRC-4

Test Pattern

Pattern types	Fixed: All 1, All 0, 1010
	PRBS: 2n-1 where n = 6, 9, 11, 15, 23
Pattern Standard	O.153

	O.152, O.153
	O.151
	O.151
	O.151
Fixed word length	24 bit
Polarity	Normal, inverted

Detected events

Alarm	LOS - Loss of Signal
	AIS - Alarm indication signal
	LFA - Loss of Frame alignment
	RDI - Remote Alarm Indicator
	LOM - Loss of CAS Multiframe Alignment (SW-CAS)
	RMA - Multiframe Remote Alarm Indicator (SW-CAS)
	LSS - Loss of Test Sequence Synchronization
Errors and Slips	CODE- Code error
	FASE - Frame alignment error
	CRC - CRC-4 block error
	REBE - CRC block error in remote end
	BIT - Bit error in PRBS and fixed word
	+SLP - Positive bit slip (SW-ES)
	-SLP - Negative bit slip (SW-ES)
	MFSE – Multiframe Synchronization Error
Oscilloscope	Line signal

Jitter Measurements

Interface	2.048 Mbit/s
Jitter measuring circuit and filters	Conforms to ITU 0.171
Frequency reference	internal
Range	0.05 to 10 UIpp
Error Jitter measuring	0.025% ± 5% UIpp

Results

Events	Alarm counters
	Errors counters

	Bit Error Rate
Bit monitoring	Timeslot 0 (FAS, NFAS)
	Timeslot 16 (MFAS)
	abcd signaling bits of all 30 channels
	All timeslots (frame)

LED indication

LEDs on TX50e's front panel display following receiver conditions:

SIG	Signal Presence
AIS	Alarm Indication Signal (G.703)
FRM	Frame Alignment Detected
MFR	Multiframe Alignment Detected
RDI	Remote Alarm Indicator
SES	Severely Errored Seconds If the BER value is more than 10^{-3} in BER test mode or if more than 30% CRC blocks are Errored in case of CRC synchronization.
RMA	Multiframe Remote Alarm Indicator
PAT	Pattern Synchronization and Loss

Software Features

GUI language	English
Software update	USB

Hardware platform

External power	Input 100-240V AC, 50/60 Hz
	Output 9V @ 0.8 A
Battery power	rated voltage 4.8V
	from interface USB
Dissipation	8 Watt
Autonomy mode	6 hours
Interface	USB
Dimensions (H x W x D)	85x155x40mm (6.1 x 3.34 x 1.57 in)
Weight	0.4 kg (0.88 lbs)
Display	Backlight color LED
	240x320 pixels

Input	keyboard

General Description

Main Parts

Front panel

Front panel is made up of color LCD display, keyboard, and a row of three-color LEDs indications (see Figure 3.1).

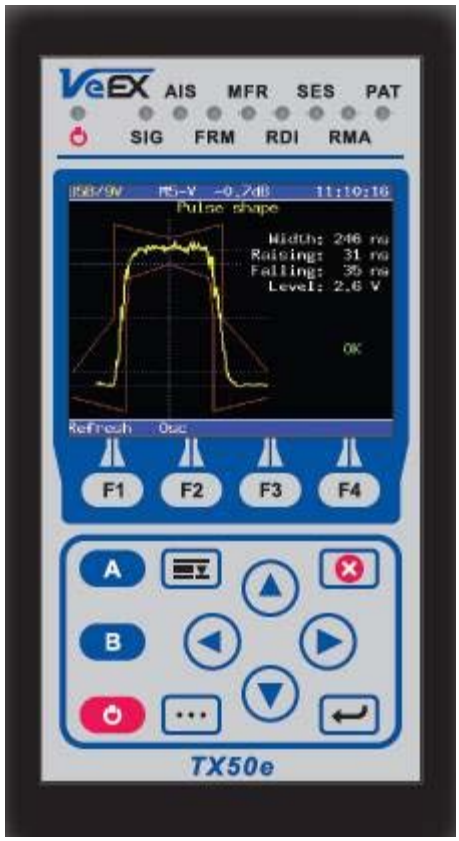

Figure 3.1: Front panel

1. LEDs

   Three-color LED indicators provide visual control for power supply, measurements and data receiving conditions. The color of any LED would denote the following:

   Green: Correct operation since LED reset.
   Red: Alarm present.
   Yellow: Since LED reset, at least one error has been registered.

2. Display

   320 x 240 pixels, backlight color LCD.

3. Keyboard

   15 button keyboard.

4. Power button (On/Off)

   To switch the instrument on/off press the power button and hold it for 1-2 seconds.

5. Status bar shows following parameters (left to right):
   - Internal battery voltage (in Volts) or an “USB/9V” sign in case of external power supply or USB-interface is connected.
   - “M”, “P” or “–“ symbols show state of measuring mode: “M” – measurements, “P” – pause, “–“ – no measurements at the moment.
   - “S” or “–“ symbols show state of the test pattern transmission mode: ”S” – transmission, “–“ – no test pattern transmission.
   - “A”, “E” or “–“ symbols show the errors insertion mode state: “E”– errors insertion, ”A” – alarms generation, “–“ – normal operation.
   - “V” or “–“ symbols show the voice function mode: “V” – VF insertion from the microphone, “– “ – normal operation.
   - Signal level at the Rx port (in dB).
   - Current time.

LED indicators description

Power

External power supply:
- No indication – no external power supply connected.
- Green – external power supply is connected.
- Green/Yellow (blinking) – internal battery is charging.

SIG

Signal Presence:
- Green – signal detected.
- Red – loss of signal at the moment.
- Yellow – since reset, loss of signal has been registered at least once.

AIS

Alarm Indication Signal (all 1):
- Green – no AIS alarm has been registered since reset.
- Red – AIS alarm at the moment.
- Yellow – since reset, AIS alarm has been registered at least once.

FRM

Frame Alignment Detected:
- Green – frame is synchronized.
- Red – loss of frame synchronization at the moment.
- Yellow – since reset, loss of frame synchronization has been registered.

MFR

Multiframe Alignment Detected:
- Green – multiframe is synchronized.
- Red – loss of multiframe synchronization at the moment.
- Yellow – since reset, loss of multiframe synchronization has been registered.

RDI

Remote Defect Indication:
- Green – no RDI detected.
- Red – RDI detected at the moment (bit A=1 in NFAS).
- Yellow – normal operation, but since reset, RDI has been registered.

SES

Severely Errored Seconds. If the BER value is more than 10^{-3} in BER test mode or if more than 30% CRC blocks are Errored in case of CRC synchronization:
- Green– normal operation since reset.
- Red– SES at the moment.
- Yellow– since reset, at least one severely errored second has been registered.

RMA

Multiframe Remote Alarm Indicator:

- Green– no RMA detected.
- Red– RMA alarm at the moment.
- Yellow– normal operation, but since reset, RMA has been registered.

PAT

Pattern Synchronization and Loss:

- Green– test pattern detected.
- Red– loss of test sequence synchronization at the moment.
- Yellow– since reset, loss of pattern synchronization signal has been registered.

Any of described LED indicators (except the SIG indicator); will not lit if a corresponding event is not analyzed.

Keyboard description

- Enter  :

  This button provides following actions:

  1. When navigating through menus, press this button to enter a highlighted menu.
  2. When setting up parameters values, press the button to change current value or to move to a submenu parameter selection. If the button performs data input function then use button to move to previous menu.
- Escape  : Press to move one menu up or to cancel a set value in the data input mode.
- Main menu  : Use this button to move to the Main menu.
- Functional buttons: F1, F2, F3, and F4.
- A button: To view information on the current hardware and software version.
- B button: Not implemented in the current release.
- Cursor buttons: To navigate up, down, left, and right.
- Others menu  : (Figure 3.2) To reset LEDs, adjust LEDs' brightness, Backlight, Contrast, and Keyboard beep.

Figure 3.2: Others Menu

- Power On/Off: To switch the test set on/off press the button and hold it for 1-2 seconds.

Specifications of the analyzer's components

Power supply unit

Provides TX50e analyzer power from the mains and the test set built-in rechargeable battery.

Input: 100 - 240 V AC @ 50 - 60 Hz.
Output: 9V DC @0.8A.

USB cable

The USB cable provides the connection of the test set to a PC. Description of the cable's connector pins is shown in the table 3.2

below.

Table 3.2: USB-cable connector

TX50e	Signal	PC
1	+5V	1
2	D-	2
3	D+	3
4	GND	4

Preliminary steps

1. Unpack the TX50e analyzer. Check for the purchased items and any possible damage as the result of shipment. Note: If there is any damage please contact VeEX customer service or the freight forwarder.
2. After unpacking, keep the instrument in normal environment conditions for at least 2 hours.
3. Plug the power supply unit into a mains electricity socket.

   Before first use charge the internal battery for at least 30 minutes.

   Maximum recharging time is about 8 hours. During battery recharging the instrument can still be used normally.

   NOTE: Installation of internal battery pack has to be done at the service center only.

4. When the power is on, the test set performs a self-diagnosis. When the self-diagnosis successfully completes, the screen will display the Home menu.

Operation

Main menu

User interface of the TX50e test set is a system of menus which provides easy and quick access to any application. The Home menu screen is shown at Figure 5.1.

Figure 5.1: Home menu

Use the cursor to navigate the menu.

Line interface: Operational modes settings. Before operation, it is required to define parameters in this menu.

Test pattern: Test pattern parameters settings.

Voice functions: It measures the tone signal level and frequency. The user can also set up parameters for voice channel listening or audio data transmission.

Measurements: Provides the ability to measure basic performance parameters, G.821 and G.826/M.2100 parameters, and signal propagation delay. Measurement results can be saved as a file for further load and analysis.

View data: Provides the ability to view contents of tested dataflow: frame or timeslot contents; FAS/NFAS, CAS/MFAS words.

Insert errors: To insert errors or generates alarms of different types.

Pulse shape: To display and analyze received signal's pulse shape, or to display oscillogram of the signal.

Jitter (option): Provides jitter processing functions: measurements and analysis of jitter in the received signal. Measurements and graphical display of MTJ and JTF characteristics also jitter insertion in transmitted signal.

Configuration: To configure base hardware and software parameters.

Line interface

The “Line interface” menu contains main analyzer functional parameters. It is required to set up these parameters before operation. The menu screen example is shown at Figure 5.2 below.

Figure 5.2: “Line interface” menu

Mode

Select the operational mode from the following list:

Term: Terminal mode.
Tranz: Transit mode – Received signal is transmitted.
Monit: Monitoring mode.
Mon-Tr: Combined Transit-Monitor mode.

Frame structure

Select frame structure of tested dataflow:

PCM30: Set this mode if the tested system operates with the multiframe synchronization in TS16 (CAS).
PCM31: Select this mode if the tested system does not use multiframe synchronization in TS16.
Unstr: Select this if the tested system functions is without either frame or multiframe synchronization.

CRC-4

This function allows the analyzer to enable/disable CRC-4 error detection algorithm. Select one of the following values:

On: If the function on the test set is able to measure CRC-4 errors in the received signal, and to send CRC-4 bits in transmitted signal.
Off: CRC-4 processing function is disabled.
Inv: Invert CRC-4 bits.

Line code

Select the coding type between AMI and HDB3.

Transmitter synchronization

“Send sync” field allows the user to set the following parameters:

Rx: Synchronization from the Rx clock.
Intr: Synchronization from the internal clock.
Sync: Synchronization from E1 Sync clock.

Long haul

To turn On/Off the “Long haul” mode.

The “Long haul” mode is able to receive a signal level up to -36 dB.

If the mode is switched off then minimum level of received signal level is up to -18 dB.

Deviation

If the transmitter synchronization is set to “Intr” the value of the Deviation field provides the ability to switch on/off deviation of the internal clock frequency. To specify deviation frequency use the function keys to adjust the value.

Test speed

This field allows the user to define the measured object (E1 path or a set of timeslots) for both receiver’s and transmitter's ports. Move the cursor to the field's line and press ‘Enter’. A Select timeslots submenu (see Figure 5.3) will appear on the screen.

Figure 5.3: “Select timeslots” submenu

To define measured object proceed as follows:

1. Highlight a desired timeslot number with the cursor.
2. Press ‘Enter’ to invert current status of the timeslot. Any timeslot marked with “*” symbol will be included in measured object.
3. Press ‘F1’ to select all the time slots.
4. Timeslots that is not valid for selection as a measured object will be highlighted with red color.
5. Press ‘F1’ to make both Receive and Transmit sections the same.
6. When measured object is selected press ‘F2’ to apply new settings. To move back to previous menu without saving new object parameters, press ‘ESC.’

Protective resistors

The Protective resistor field provides the control for built-in protective resistors (470Ohms). These resistors are used only in “Monitor” and “Transit-Monitor” operational modes.

If the field is set to “Off” value protective resistors are shunted.

Test pattern

This menu allows the user to set test pattern parameters and provides control for the test pattern sending. The “Test pattern” screen is shown at the Figure 5.4 below.

Figure 5.4: “Test pattern” menu

Send pattern

The Send field allows to start/stop the insertion of current test pattern into timeslots selected in the “Line interface/Test speed” menu.

Type

The Type field allows the user to select test pattern type from the following list:

All 1: All1
All 0: All 0
55: 55 Octet
2**e**6: Pseudo-random sequence
2**e**9: Pseudo-random sequence
2**e**11: Pseudo-random sequence
2**e**15: Pseudo-random sequence
2**e**23: Pseudo-random sequence
User: User-defined sequence

Byte 1, Byte 2, Byte 3

The Byte 1, Byte 2, and Byte 3 fields allows user to define 24 bits of a user defined pattern.

To edit these fields, move the cursor to the desired bytes and press ‘Enter.’ The digits will be highlighted with yellow color and use the function key to insert 0 (‘F1’) and 1 (‘F2’). Press ‘Enter’ to finish editing and save the results. To cancel the edit result, press the ‘ESC.’

Invert RX

This parameter allows the user to invert the received test pattern.

Invert **TX**

This parameter allows the user to invert the transmitted test pattern.

Voice functions

The menu provides following functions:

1. Transmit audio data from the microphone into selected timeslot.
2. Transmit 1000 Hz signal into selected timeslot.
3. Measure signal frequency and level in selected timeslot.
4. Listen to the voice channel in selected timeslot via external headset.
5. Adjust microphone signal amplification.
6. Adjust headset telephone volume level.
7. Set up abcd signaling bits in CAS-bits field which is relevant to selected timeslot.

Voice functions measurements

Figure 5.5: “Voice functions measurements” menu

TS Rx/Tx

This field displays numbers of timeslots selected for receiving/transmission signal respectively.

CAS Rx/Tx

The CAS Rx/Tx field shows signaling.

Frequency

This field shows the result of received signal frequency measurement.

Level

This field displays measured level of received signal.

Settings

Press ‘Enter’ to entering to “Voice function settings” submenu.

Voice function settings

This submenu defines the Voice processing parameters.

Figure 5.6: “Voice functions settings” menu

T/S send

The T/S send field allows user to specify timeslot into which audio information from selected source will be transmitted.

Figure 5.7: “T/S send” mode

Note: T/S selected in Line Interface menu for BERT measurement cannot be selected for voice testing.

Source

Select the source of transmitted audio data:

Off: Voice function is disabled.
Mic: Insert audio data from the microphone.
1 KHz: Insert harmonic 1000 Hz signal.

CAS

The CAS field specifies signaling group which will be inserted into CAS-bits field corresponding to the selected timeslot.

Sensitivity

The Sensitivity parameter provides control for microphone signal amplification. To change the amplification, use the ‘Enter’ key and left and right cursor to change the sensitivity.

T/S recv

The T/S recv parameter allows the user to select a timeslot to receive the voice data. Move the cursor to the field and press ‘Enter.’ In appeared menu (see Figure 5.8) select required timeslot number and press button.

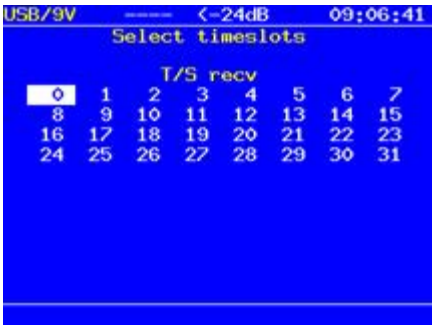

Figure 5.8: “T/S recv” submenu

Note: T/S selected in Line Interface menu for BERT measurement cannot be selected for voice testing.

Telephone

The Phone field allows the user to switch on/off a headset telephone.

Volume

This field allows the user to adjust the telephone volume. Use the ‘Enter’ key and left and right cursor keys to adjust the volume.

Measurements

The “Measurements” menu (see Figure 5.9) allows user to measure basic performance parameters for tested path.

Figure 5.9: “Measurements” menu

G821/G826/M2100: Tested path parameters measurements in compliance with ITU-T G.821, G.826/M.2100 recommendation.
Propagation delay: Measure signal propagation delay for the tested channel.

G821/G826/M2100

To start/stop the measurement session, press ‘F1.’ When the measurements are active, the “M” symbol will appear in the status bar.

This menu contains five screens:

Base parameters: To measure and analyze different type of errors and alarms.

Figure 5.10: “Base parameters” menus

G.821 parameters: To measure performance parameters according to ITU-T G.821 recommendation.

Figure 5.11: “G.821 parameters” menu

G.826/M.2100 parameters: Displays all parameters which could be measured in compliance with ITU-T G.826 and M.2100 recommendations.

Figure 5.12: G.826/M.2100 parameters

To switch between screens use the cursor keys.

To save and load previously saved measurement results, user ‘F3’ and ‘F4’ key.

For most of the measured parameters the test set will display an accumulative counter (left column) and the matching error rate (right column). For example the “CODE” parameter (a counter or code errors) is displayed in left column; and compliant ratio value “CODER” is shown in the same line in the right column.

Propagation delay

This submenu allows user to measure a signal propagation delay.

Preliminary settings:

1. In Line Interface Test speed menu select the same measured objects for receiving and transmitting ports (the timeslots quantity for both directions must be equal).

2. Stop or pause all currently performed measurements.
3. Stop or pause the errors insertion or alarms generation process.

Use button to start/stop propagation delay measurement.

Figure 5.13: “Propagation delay” menu

The following values will be displayed:

Cur.: Current signal propagation delay value.
Min.: Minimum delay value registered during the measured session.
Max.: Maximum delay value registered during the measured session.

View data

The View data menu (see Figure 5.14) provides the ability to view contents of the received dataflow: frame or timeslot contents; FAS/NFAS, CAS/MFAS words.

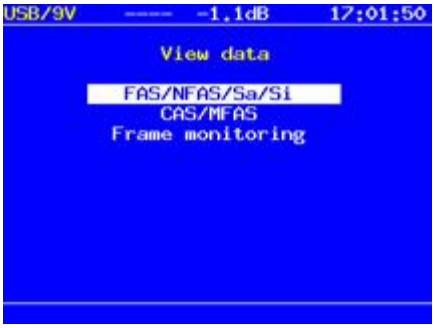

Figure 5.14: “View data” menu

FAS/NFAS/Sa/Si

View contents of FAS/NFAS words in last sixteen frames (see Figure 5.16).

Use ‘F1’ to start/stop data update process.

Use ‘F2’ to switch between FAS/NFAS and S-bits screens.

Figure 5.15: “FAS/NFAS” submenu

CAS/MFAS

The CAS/MFAS submenu (Figure 5.16) provides the ability to view the contents of CAS/MFAS words in last sixteen frames.

Use ‘F1’ to start/stop data update process.

Use ‘F2’ to switch between CAS and MFAS contents display screens.

Figure 5.16: “CAS/MFAS” submenu

Frame monitoring

The Frame monitoring submenu (see Figure 5.17) allows user to view frames content. To switch between frame contents screens use the cursor to move up and down.

Use ‘F1’ to start/stop displayed data update process.

Figure 5.17: “Frame monitoring” menu

Insert errors

The Insert errors menu (see Figure 5.18) provides the ability to insert errors or generate alarms of different types.

Figure 5.18: “Insert errors” menu

Error type

The Error type field allows the user to select the following type of error:

Bit: Generate bit errors
E-bit: Generate bit errors in PRBS
FAS: Generate errors in a FAS word
MFAS: Generate errors in a MFAS word
CRC: Generate CRC error
REBE: Generate REBE errors
CODE: Generate Coding Violation

Speed

The Speed field provides the ability to set up errors insertion rate.

Count

Select number of errors to insert from the following: Cont– continuous errors as set in speed insertion: 1, 10, 100, 500, 1000, and 5000.

Start/stop errors insertion

The Errors field allows the user to control the process of errors insertion.

Alarm type

The Alarm type field allows the user to select type of alarm to be generated.

LOS: Loss of Signal.
AIS: Alarm Indication Signal. The transmitter will send all ones.
LOF: Transmit loss of FRM synchronizing signal.
LOM: Transmit loss of multiframe synchronization in TS16 (loss of MFAS multiframe synchronizing signal (ITU-T G.704, sub clause 5.1.3.2)).
RDI: Remote Defect Indication (ITU-T G.706). The test set transmits “1” in every third bit of the timeslot in zero frame which does not contain frame synchronization signal. The FAS DISTANT alarm signal could be transmitted only in PCM-30 and PCM-31 systems.
RMA: Remote Multiframe Alarm (ITU-T G.732). The analyzer transmits “1” in every sixth bit of the timeslot in zero frame TS16. The MFAS DISTANT alarm signal could be transmitted only in PCM-30 systems.
LSS: Test Pattern synchronization loss.
ARTF: Transmission of unstructured alternating 1s and 0s.

Time

The Time field allows the user to select a duration of the alarm generating process:

0.1: 0.1 second
0.5: 0.5 second
1: 1 second
2: 2 seconds
5: 5 seconds
Cont.: Continuous generation.

Start/stop alarms generating

The Alarm field allows the user to control the process of alarms generating.

Pulse shape

This menu provides the ability to display and analyze the pulses produced by E1 equipment. The pulse height and overall shape are displayed against the ITU-T pulse mask conformance template.

Operation

1. Switch the analyzer on.
2. Connect the measuring cable #1 to the instrument.
3. In the “Line Interface” menu select the “Terminal” or “Monitor” operation mode.
4. Connect measuring cable to the tested equipment.

Pulse shape monitoring

Test set will automatically display the single pulse against the ITU-T G.703 pulse shape mask.

Figure 5.19: Pulse shape screen

Press ‘F1’ to update the screen.

Press ‘F2’ to move to the Oscilloscope screen.

Oscilloscope

This is an optional function, it provides the ability to display a one-shot sample of the signal for the 4 interval with the frequency passband of 0.01… 10 MHz.

An example oscillogram is shown on the figure below. Horizontal grid step is 250 ns; vertical grid step is displayed in upper left corner of the screen.

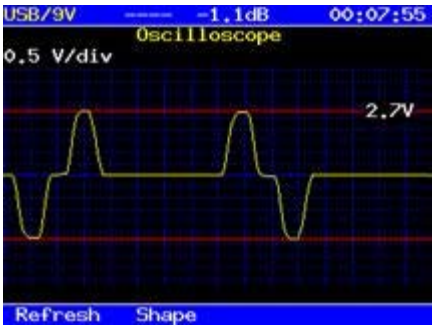

Figure 5.20: Oscilloscope screen

Press ‘F1’ to update displayed information.

Press ‘F2’ to switch back to the Pulse shape screen.

Jitter

Figure 5.21: “Jitter” menu

This optional menu provides the following jitter processing functions:

Jitter measurements: Measurements and analysis of jitter in received signal.
Maximum Tolerable Jitter: Measure maximum tolerable jitter (MTJ) according to ITU-T G.823 recommendation.
Jitter transfer function: Measure JTF characteristic.
Jitter generation: Generate harmonic jitter of user-defined level and frequency.

Jitter measurements

The Jitter measurements submenu allows the user to measure and analyze received signal jitter. The measurements example is shown at Figure 5.23 (the vertical grid spacing is 0.5 UIpp).

Figure 5.22: “Jitter Measurements” submenu

Press ‘F1’ to start measurements.

Press ‘F2’ to reset the screen.

To select the HP1+LP (20 Hz… 100 kHz) or HP2+LP (18 kHz...100 kHz) filter, press ‘F4.’

Maximum Tolerable Jitter

This menu allows user to measure and analyze the MTJ characteristic (ITU-T G.823) for a tested path.

Required measurement criteria:

1. Occurrence of the synchronization with PRBS (no LSS alarm signal).
2. Make sure the essential jitter is inserted into transmitted data stream. All currently performed measurements should be stopped or paused.

The measurements result is an MTJ characteristic diagram. Horizontal axis corresponds to frequencies range of 20Hz... 100kHz; vertical axis– to generated jitter amplitude.

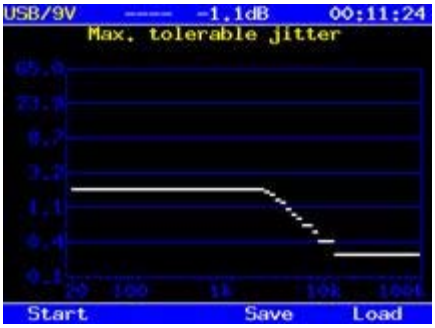

Figure 5.23: Maximum Tolerable Jitter

Press ‘F1’ to start/stop the measurement.

Colors on the graphical diagram denote the following:

White: White line displays the MTJ mask according to ITU-T G.823 recommendation.
Green: Range of jitter values which are valid for tested path.
Red: Range of jitter values which are not valid for tested path.
Magenta: Range of values which are not available for generating.

Jitter Transfer Function

To analyze JTF characteristic, relevant to MTJ mask jitter (see ITU-T G.823 recommendation, Figure G.823/13) is inserted into a specified channel and, then the received signal jitter value is measured.

JTF calculation formula:

$$JTF(f_i) = 20 \lg \frac{J_{out}(f_i) - J_{intr}(f_i)}{J_{in}(f_i)}$$

It is necessary to perform a calibration to increase the results accuracy.

The calibration must be performed in following cases:

- Changing the test pattern type.
- Changing the type of frame structure (PCM-30, PCM-31, unstructured data flow).

Calibration result is shown at figure below.

Figure 5.24: JTF calibration result

Jitter generation

The Jitter generation submenu provides the ability to insert a harmonic jitter of user-defined frequency and peak-to-peak amplitude into a signal transmitted by the analyzer.

In case of jitter generation, the “Sync” parameter in the “Line interface” menu must be set to “Intr” value.

Following functional buttons are used to configure jitter parameters:

- Reduce current value
- Increase current value
- Define parameter step value

Press ‘F1’ to start/stop the generating process.

Figure 5.25: “Jitter generation” submenu

The “Jitter generation” submenu shows following parameters:

Transmit
Generated jitter parameters:
Frequency – Transmitted jitter frequency (20Hz... 100 kHz).
Level – Maximum peak-to-peak jitter (UIpp).
Receive
Current jitter value received signal.

Configuration

The Configuration menu (see Figure 5.26) provides the ability to configure analyzer's basic parameters, line interface parameters.

Figure 5.26: “Configuration” menu

To view information about software versions, press button.

Basic settings

The Basic settings submenu screen is shown at Figure 5.27.

Figure 5.27: “Basic settings”

This submenu allows the user to set up following parameters:

Time: Current time
Date: Current date
Meas. time: Measurement session duration. This parameter allows the user to define the period for automatic measure stop. To disable this function set the measurement time value to 00:00 (HH : MM).
Beep alarms: To turn on/off the beep alarm.
Auto power off: Automatic power off modes is depended on several criterion:

- Off: Function is disabled.
- Type 1: Test set will automatically power off if the test set did not have any active measurement for test pattern and alarm generation for 10 minutes.
- Type 2: Test set will switch off if the test set does not have an active measurement at the moment for 10 minutes.
- Type 3: The test set will switch off if the test set was idle for 10 minutes and no key has been pressed.

LCD auto off: Automatically switch off the LCD to conserve battery power.
Language: English.

Line interface

The Line interface submenu screen is shown at Figure 5.28.

Figure 5.28: “Line interface” submenu

This submenu contains the following fields:

Ch value: Silence code content is inserted in every free of transmission timeslot.
Coding: Select the coding law (A-law or -law).
Elastic buf: Setting size of the elastic buffer used at measurement of parameters Clock Slip: CLSLIP+ and CLSLIP-.

> The elastic buffer with frequency of the signal receives the port Sync, and with frequency of the signal receives on port Rx. At overflow of the elastic buffer the device registering negative slippage CLSLIP-; at a devastation of the buffer --positive slippage CLSLIP+.
>
> If parameter “Elastic buf” is setting in “Off”, measurement of parameters CLSLIP+ and CLSLIP- not making.

Calibration mode

At a choice of the menu Calibration mode opens the menu shown on figure 5.29.

The calibration mode calibrates the internal clock generator against a precision clock and the same applies to the sync port. Note: This step is not recommended.

Figure 5.29: “Calibration mode” submenu

Warranty and software

Warranty Period: The warranty period for hardware, software and firmware are one (1) years from the date of shipment to the customer.

Hardware Coverage: VeEX Inc warrants hardware products against defects in materials and workmanship. During the warranty period, VeEX will, at its sole discretion, either

- Repair the products
- Replace the hardware which prove to be defective

provided that the products that the customer elects to replace is returned to VeEX Inc by the customer along with proof of purchase within thirty (30) days of the request by the customer, freight prepaid.

Software Coverage: VeEX Inc warrants software and firmware materials against defects in materials and workmanship. During the warranty period, VeEX will, at its sole discretion, either

- Repair the products
- Replace the software and/or firmware which prove to be defective

provided that the products that the customer elects to replace is returned to VeEX Inc by the customer along with proof of purchase within thirty (30) days of the request by the customer, freight prepaid.

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- Damage due to software installed by the customer on the unit without prior authorization (written) from VeEX Inc.
- Unauthorized alteration or misusage
- Damage occurred from operating the unit from outside of the environmental specifications for the product
- Improper installation by the customer

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