ST 100

NEARFIELD SEARCH RECEIVER

USER MANUAL

CONTENTS

1. GENERAL INFORMATION

The manual describes the principle of operation of the ST 100 (hereinafter "ST 100" or "Device"). The manual contains hyperlinks that allow you to go to the text fragments of interest.

1.1. PURPOSE AND CAPABILITIES

ST 100 is designed to search, identify and localize wireless eavesdropping devices.

Functionally the ST 100 consists of five components ("CHANNELS"):

1. CHANNEL#1 - SEARCH RECEIVER (20 MHz - 6 GHz).

2. CHANNEL#2 - SEARCH RECEIVER (6 GHz – 12 GHz).

3. CHANNEL#3 - SEARCH RECEIVER FOR MONITORING THE SELECTED RANGES (hereinafter in the text SELECTED RANGES). The term "SELECTED RANGES" refers to the frequency ranges of digital communications (GSM, LTE, Bluetooth, WiFi, etc.) and frequency ranges defined by the user.

4. CHANNEL#4 - INFRARED DETECTOR - designed to detect IR transmitters (eavesdropping devices using the IR frequency range for transmission).

5. CHANNEL#5 - PARAMETRIC DETECTOR - designed to detect active digital electronic devices (including those without a transmission channel).

Functionality:

1. Search and localization of radio transmitting eavesdropping devices:
- radio microphones, telephone radio repeaters, radio stethoscopes, etc .;
- video cameras with a radio channel;
- radio beacons of tracking systems.

2. Identification of digital protocols (GSM, CDMA, Bluetooth, LTE, WiFi) of the detected radio signals.
3. Identification of base stations signals and mobile digital communication devices.
4. Identification of radio signals from analogue television cameras.
5. Search for eavesdropping devices transmitting information in the infrared range.
6. Search for working electronic digital devices.

1.2. THE KIT

1. Main unit ……………………………………………………………..……………………………………………… 1
2. Telescopic antenna ……………………………………………………………………………………… 1
3. USB flash drive …………………………………………………………………………………………… 1
4. Headphones……………………………………………..……………………………………………………… 1
5. Charger for the main unit ……………………………………………………………………….. 1
6. Cable for connecting the main unit to the USB port of the PC …………………….. 1
7. Parametric detector ST 100 P…………………………………………………………………… 1
8. Screws for attaching the parametric detector to the main unit…………………… 1
9. Mini-antenna………………………………………………..……………………………………………… 1
10. Case ……………………………………………………………………………………………………… 1

Fig.1

For transportation and storage of the ST 100 the shockproof case is used.
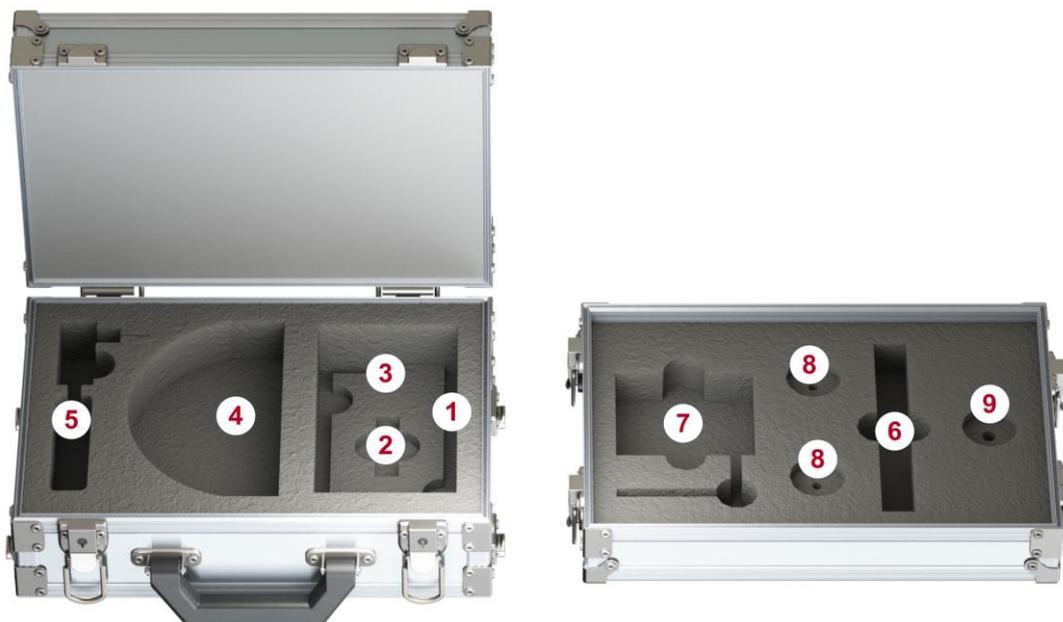
Fig.2

Numbers indicate the elements of the kit, laid in a certain place of the lodgment. The designations correspond to the numbering presented in item 1.2.

1.3. DESCRIPTION OF COMPONENTS

1.3.1. MAIN UNIT

Purpose of the main unit:

- analysis of received signals;
- information display;
- control of operating modes.

Main unit components:

- module for receiving and processing signals;
- display module;
- power supply module;
- governing bodies.

The main unit is shown in Fig. 3.
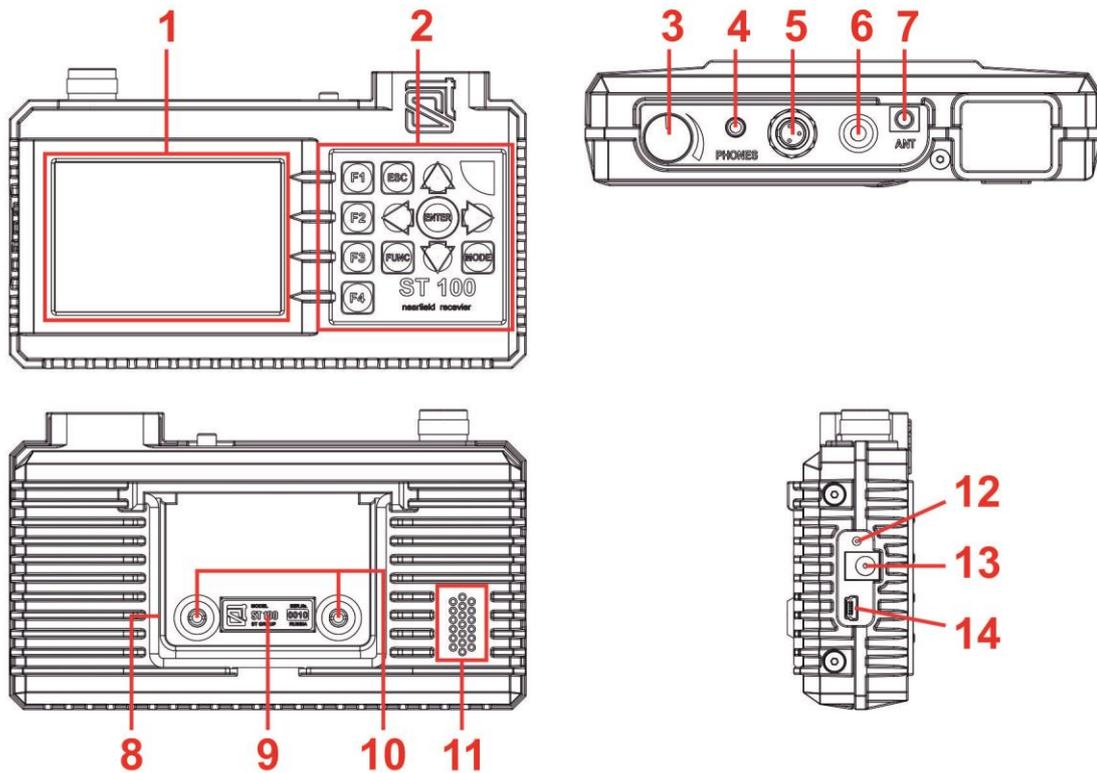
Fig.3

In fig.3	Component
1	Display
2	Keyboard
3	Power switch / volume control
4	Headphone jack
5	Parametric detector connector
6	IR detector sensor
7	Antenna connector
8	Support
9	Serial number plate
10	Connectors for attaching a parametric detector
11	Built-in speaker
12	Charger connection indicator
13	Charger socket
14	Mini-USB connector for PC connection

1.3.2. RECEIVERS ANTENNAS

For the operation of receivers, a telescopic (Fig.1, item 2) and mini-antenna (Fig.1, item 9) are used.

It is recommended to use a telescopic antenna to receive signals in the range of 20 MHz ÷ 3 GHz. It is recommended to use a mini-antenna to receive signals in the range of 2 GHz ÷ 6 GHz.

Any of these antennas can be used to receive signals in the range of 2 GHz ÷ 3 GHz.

Antennas are connected to the ANT socket on the top panel of the main unit (Fig.3, item 5).

1.3.3. PARAMETRIC DETECTOR ST 100P

ST 100P is a transceiver device that detects the modulation of the reflected RF sounding signal caused by low-frequency processes in working electronic devices.

The analysis of the detected signals is carried out on the basis of the acoustic information heard in the headphones.

1.3.4. MINI-USB CABLE

The cable (Fig.1, item 6) is used to connect the main unit to the USB port of the PC.

1.3.5. PLAYER OF THE TEST SOUND (PTS). The player is not included in the Kit.

A player is required to search for eavesdropping devices. Any portable device equipped with a speaker (smartphone, tablet, voice recorder) can be used. Purpose of the PTS:

- creation of an acoustic signal (the correlation of this signal and the information obtained using the ST 100 means that there is an active eavesdropping device with an unencrypted transmission channel in the tested room);
- forced inclusion of eavesdropping devices equipped with a VOX activation system;
- localization of detected eavesdropping devices;
- creation of the "masking noise" during the search operations.

MP3 files recorded on the USB flash drive. The user can use their own files (noise in the office, people talking, music, etc.).

1.3.6. USB FLASH DRIVE

MP3 files (for PTS), this Manual and the ST 100 software recorded on the USB flash drive.

1.4. POWER SUPPLY

The device operates on a built-in battery, the charge level of which displayed using an indicator in the information line (Fig.6, item 3). A fully charged battery provides 7 hours of operation. The battery charged using a charger (Fig.1, item 5).

To do this, insert the charger plug into the socket on the side panel (Fig.3, item 12) and connect the charger to the 220V/50Hz.

Charging is accompanied by a red or orange glow of the charger connection indicator (Fig.3, item 11) on the side panel of the device. Full charging time is no more than 7 hours. When charging is complete, the indicator will turn green.

It is allowed to use the device while charging the battery. In this case, the time required to fully charge the device increases.

1.5. SPECIFICATIONS

SEARCH RECEIVER (20 МГц – 6 ГГц)	
frequency range, MHz	20…6000
bandwidth, MHz	0,1/1/20
demodulation	FM
input impedance, Ohm	50
scanning speed, GHz/sec	18
uneven frequency response, dB	±6
minimum level of the detected signal, dB	-70
dynamic range, dB	50
gain control (fixed values), dB	0, 8, 16, 24, 32, 40
antenna	external
SEARCH RECEIVER (6 ГГц – 12 ГГц)	
frequency range, MHz	6000…12000
bandwidth, MHz	20
scanning speed, GHz/sec	18
uneven frequency response, dB	±3
minimum level of the detected signal, dB	-50
dynamic range, dB	50
antenna	built-in
IR DETECTOR	
spectral range, µm	0,75…1,1
detection bandwidth, MHz	5
angle of view, degrees	±20
minimum detectable signal strength, W/Hz1/2	10-13
PARAMETRIC DETECTOR ST 100P	
frequency range, MHz	2000…2100
emitted signal level, dBm	20
antenna directional diagram, deg	90
antenna polarization	elliptical
POWER SUPPLY	
built-in lithium-polymer accumulator with voltage, V	3,7
power consumption, W	<1
continuous operation time at max. power consumption, hour	>4
charging time of a fully discharged battery, hour	7
WEIGHT AND DIMENSIONS	
main unit dimensions, mm	165 x 100 x 40
main unit weight, kg	0,47
dimensions of the parametric detector, mm	99 x 83 x 29
parametric detector weight, kg	0,1
case dimensions, mm	360 x 255 x 195
kit weight in a case, kg	4,73

2. INTERFACE SETTINGS

2.1. TURNING ON/OFF

The device is turned on/off using the volume control knob (Fig.3, item 3). Screen view is in Fig.4.

Fig.4

On the screen: company logo, device name (ST 100) and firmware version. It is necessary to press any button on the keyboard for continue.

2.2. THE MAIN MENU

The MAIN MENU is shown in Fig.5

Fig.5

To turn on any of the menu items, use the ⬘ and ⬙ buttons to place the table cursor on the corresponding line and press the ENTER.

To turn on SEARCH RECEIVER (20 - 6000 MHz), SEARCH RECEIVER (6 - 12 GHz), SELECTED RANGES, PARAMETRIC DETECTOR you can use the buttons (F1, F2, F3, F4, respectively).

The SETTINGS menu item is intended to turn on the SERVICE mode (system settings).

2.3. INFORMATION LINE

In the upper part of the screen, there is an information line (Fig.6).
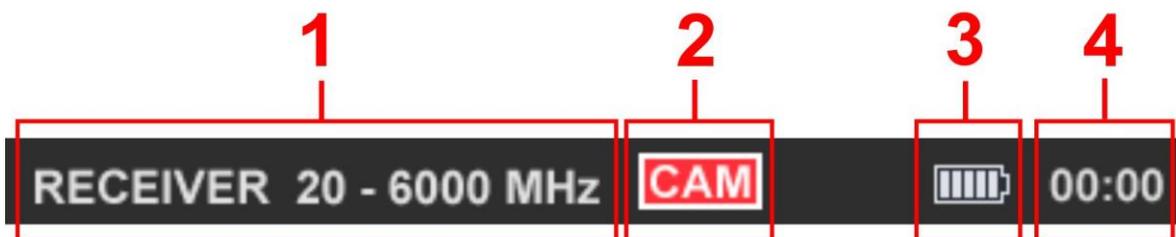
Fig.6

In Fig.6:

1 - Channel is on
2 - Videocamera signal detection indicator
3 - Accumulator charge level
4 - Current time in a format "HH:MM"

2.4. SETTINGS (SERVICE MODE)

This mode is design to set the date, time and interface language (Russian or English). To turn on the mode, use the ▽ or △ buttons or in the MAIN MENU to set the tabular cursor to the item SETTINGS and press ENTER.

For exit to the MAIN MENU, press ESC. Confirmed parameter changes after exiting the SETTINGS mode are saved, including when the power is turned off.

The screen of the SETTINGS mode is shown in Fig.7.
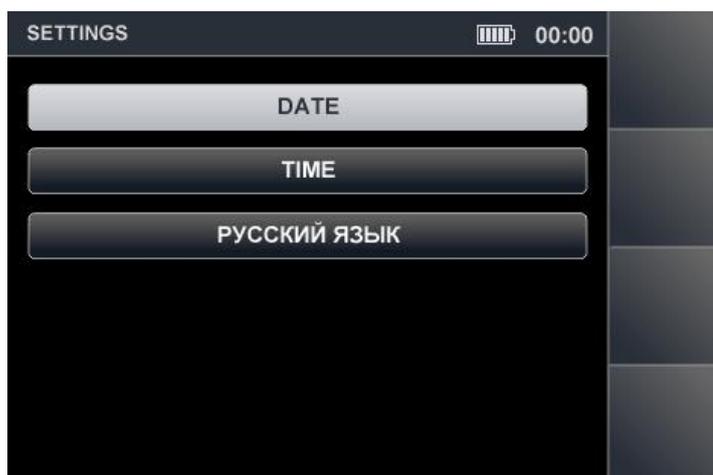
Fig.7

2.4.1. DATE SETTING

Using the ▽ or △ buttons, set the cursor to the "DATE" item and press ENTER. The date setting menu (Fig.8) in the "DD-MM-YYY" format will appear on the screen.

SET THE DATE

01-01-2013

↔ - select
↕ - change
ENTER - save, ESC - cancel

Fig.8

Use the ◁ or ▷ buttons to set the cursor to the "DAY" menu item and use the ▽ or △ buttons to set the desired value. The values "MONTH" and "YEAR" are set in the same method.

To confirm the set values, press ENTER. Exit from the SETTINGS mode without save the changes - ESC.

2.4.2. TIME SETTING

Use the ▽ or △ buttons to set the cursor to the "TIME" menu item and press ENTER.
The time setting menu (Fig.9) in the "HH:MM" format will appear on the screen.

SET THE TIME

00-00

↔ - select
↕ - change
ENTER - save, ESC - cancel

Fig.9

The time setting is carried out by analogy with the date setting (item 2.4.1).

2.4.3. INTERFACE LANGUAGE SETTING

To set the interface language, use the ▽ or △ buttons set the cursor on the "ENGLISH" menu item and press ENTER. The interface language will change from Russian to English.

To choose the Russian language set the cursor on the item "РУССКИЙ ЯЗЫК" and press ENTER.

3. CHANNEL#1. SEARCH RECEIVER (20 MHZ - 6 GHZ)

The channel is designed to detect radio signals of analog and digital radio transmitting eavesdropping devices in the 20 MHz -6 GHz range.

To receive radio signals, two antennas are used: a telescopic antenna (Fig.1, item 2) and a mini-antenna (Fig.1, item 9). It is recommended to use the telescopic antenna for receiving signals in the range of 20 MHz - 3 GHz.

The mini-antenna is recommended for receiving signals in the 2 GHz - 6 GHz range.

Any of these antennas can be used to receive signals in the 2 GHz - 3 GHz range.

Antennas are connected to the ANT socket located on the top panel (Fig. 10).
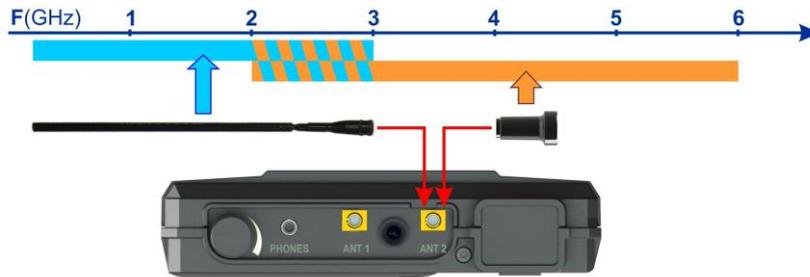
Fig.10

The analysis of the detected signals is performed using:

- graphic information (spectrogram, oscillogram, table of signals);
- acoustic information (headphones or built-in speaker).

Channel functional diagram
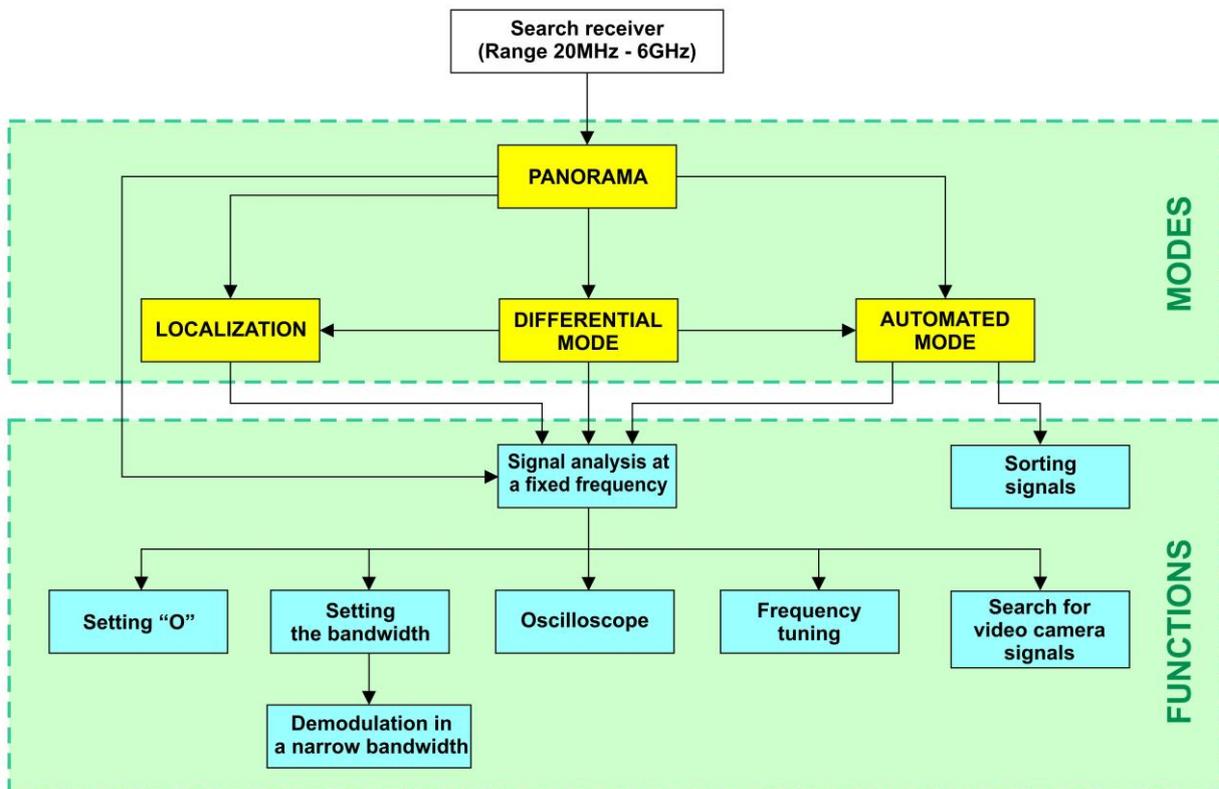
Fig.11

MODES:

- PANORAMA mode
- DIFFERENTIAL mode
- AUTOMATED mode
- LOCALIZATION Mode

3.1. PANORAMA MODE

Functionality:

- signal analysis in AUTOMATED mode;
- signal analysis in DIFFERENTIAL mode;
- search for a signal source using the LOCALIZATION mode;
- analysis of a signal at a fixed frequency;
- gain adjustment;
- changing the view bar.

The PANORAMA mode is automatically started after switching on the channel. A panorama of loading the frequency range is displayed on the screen (Fig.12).
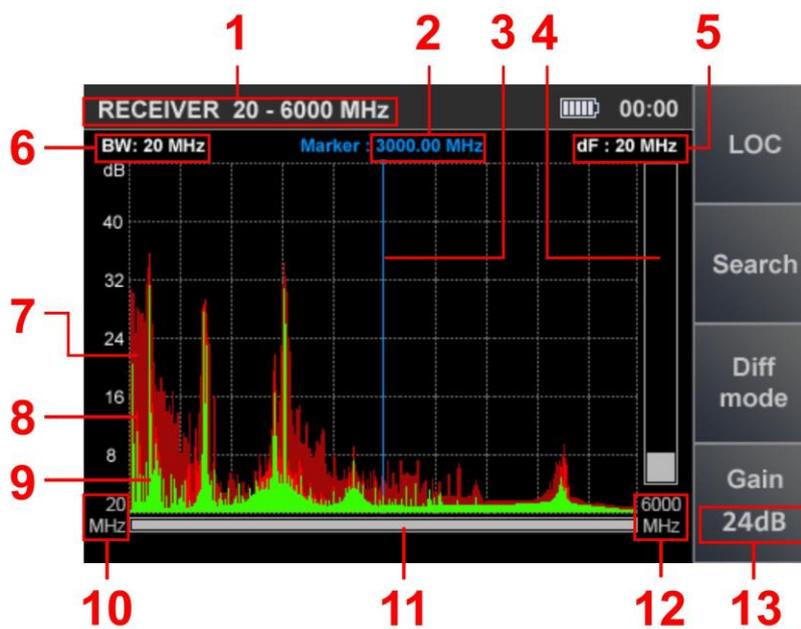
Fig.12

In Fig.12:

1. - SEARCH RECEIVER (20 MHz - 6 GHz) is on
2. - The value of the frequency at which the marker is set
3. - Marker
4. - Signal level at the marker frequency
5. - Scan step value
6. - Bandwidth
7. - The maximum signal level at this frequency for all cycles (burgundy)
8. - Pulse signals detected on the last cycle (red)
9. - Continuous signals detected on the last cycle (green)
10. - Lower limit of the set swath

11 - Scroll bar
12 - Upper limit of the set swath
13 - Set gain value

Controls:

Button	Action
ESC, MODE	Switch to MAIN MENU
ENTER	Turn on SIGNAL ANALYSIS AT A FIXED FREQUENCY function
◁ ▷	Marker control
△ ▽	Scaling a panorama relative to a marker
F1	Turn on LOCALIZATION mode
F2	Turn on AUTOMATED mode
F3	Turn on DIFFERENTIAL mode
F4	Turn on/off SETTING THE GAIN
FUNC	Not use

Gain setting:

1. Press F4. The Gain button field will become lighter.
2. Use the △ and ▽ buttons to set the gain in dB (0, 8, 16, 24, 32, 40). The set value is displayed on the indicator (Fig.13).
3. Press F4. The Gain button field will become darker.
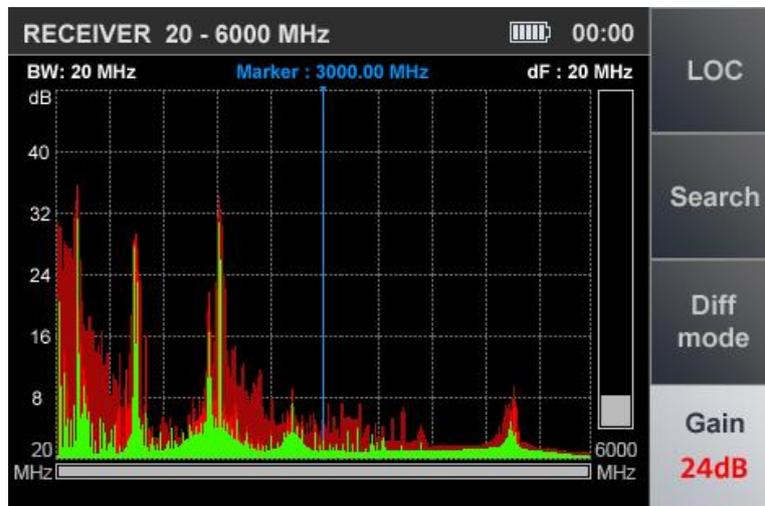
Fig.13

ATTENTION! Until the gain setting is completed, other modes and functions are unavailable, except for switching to the MAIN MENU (by pressing the MODE button).

3.2. DIFFERENTIAL MODE

In DIFFERENTIAL mode, the signal levels obtained in the previous scans in PANORAMA mode are taken as "0" and only signals with a higher level are displayed on the screen (differential panorama).

DIFFERENTIAL mode can be used to select signals whose sources are located in the tested room from external signals.

DIFFERENTIAL mode is turn on from the PANORAMA mode (Fig.12) by pressing the F3 button, the field of which will become lighter. The device screen is shown in Fig.14.
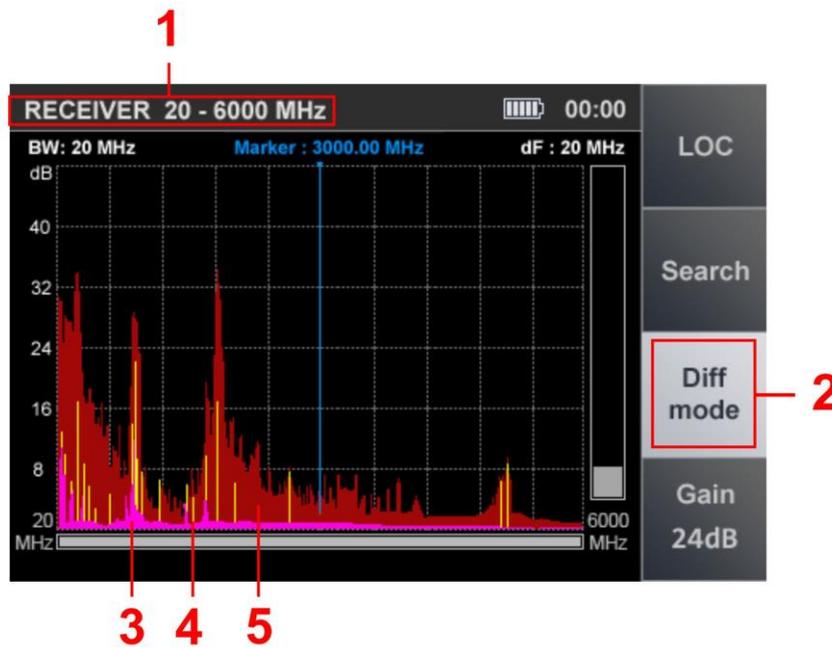
Fig.14

In Fig.14:

1 - SEARCH RECEIVER (20 MHz - 6 GHz) is on
2 - Indication of turn on of the DIFFERENTIAL mode
3 - Constant differential signal detected in the last scan cycle (purple)
4 - Pulse difference signal detected in the last scan cycle (yellow)
5 - Maximum signal level (at this frequency) for all cycles (burgundy)

Functionality:

- search in AUTOMATED mode;
- using LOCALIZATION mode;
- signal analysis at a fixed frequency;
- gain adjustment;
- change the view bar.

DIFFERENTIAL mode controls similar PANORAMA mode controls (item 3.1).

Turning off the DIFFERENTIAL mode and switching to the PANORAMA mode is made by pressing the F3 button, the field of which will become darker. The gain and range values set in DIFFERENTIAL mode are retained.

3.2.1. SIGNAL ANALYSIS AT A FIXED FREQUENCY FUNCTION

The function is designed to analyze signals detected in PANORAMA mode, DIFFERENTIAL mode and LOCALIZATION mode.

To turn on the function in PANORAMA or DIFFERENTIAL mode, use the ◁ and ▷ buttons to set the marker to the signal of interest and press the ENTER button;

To turn on the function in the LOCALIZATION mode, use the △ and ▽ buttons to position the cursor on the signal of interest and press ENTER.

The screen view is shown in Fig.15.
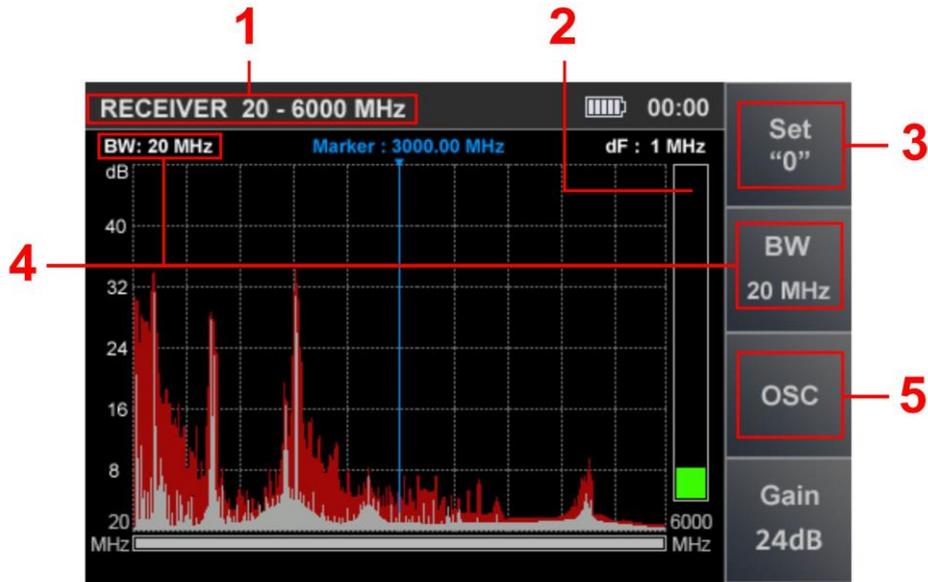
Fig.15

In Fig.15:

1 - SEARCH RECEIVER (20 MHz - 6 GHz) is on
2 - Signal level on fixed frequency
3 - SETTING "0" function indicator
4 - Bandwidth value
5 - OSCILLOSCOPE function indicator

Functionality:

- tuning to the frequency of the detected signal;
- bandwidth change (100 KHz, 1 MHz, 20 MHz);
- ability to use FM demodulator;
- listening to demodulated signal;
- signal analysis with an oscilloscope;
- localization of the signal source by the energy method.

Controls:

Button	Action
ESC, ENTER	Turn off the function (return to the previous mode)
MODE	Switch to MAIN MENU
◁ ▷	Marker control
F1	Turn on SETTING "0" function
F2	Setting the bandwidth and turning on the FM demodulator
F3	Turn on OSCILLOSCOPE function
F4	Turn on/off gain setting
△ ▽ **FUNC**	Not used

Turn off the function (switch to previous mode) by pressing ENTER or ESC.

3.2.2. SETTING "0" FUNCTION

The function is intended to localize the signal source detected when using the SIGNAL ANALYSIS AT A FIXED FREQUENCY function.

The use of this function is especially effective when searching for sources of strong signals, when even with the minimum value of the gain the signal level indicator goes off scale and the localization of the signal source is difficult. After turned on the function, the signal level at the fixed frequency is zeroed and the difference level is displayed on the indicator.

To turn on the function, press the F1, the field of button will become lighter.

When using the SETTING "0" function, it is possible to:

- change the bandwidth value (F2);
- turn on OSCILLOSCOPE (F3);
- change the gain value (F4).

To turn off the function, press the F1 again. The F1 button field will become darker.

3.2.3. OSCILLOSCOPE FUNCTION

The OSCILLOSCOPE function is available when using:

- SIGNAL ANALYSIS AT A FIXED FREQUENCY function
- SETTING "0" function
- AUTOMATED mode

To turn on the OSCILLOSCOPE, press F3. OSC button will become lighter. The screen view is shown in Fig.16.
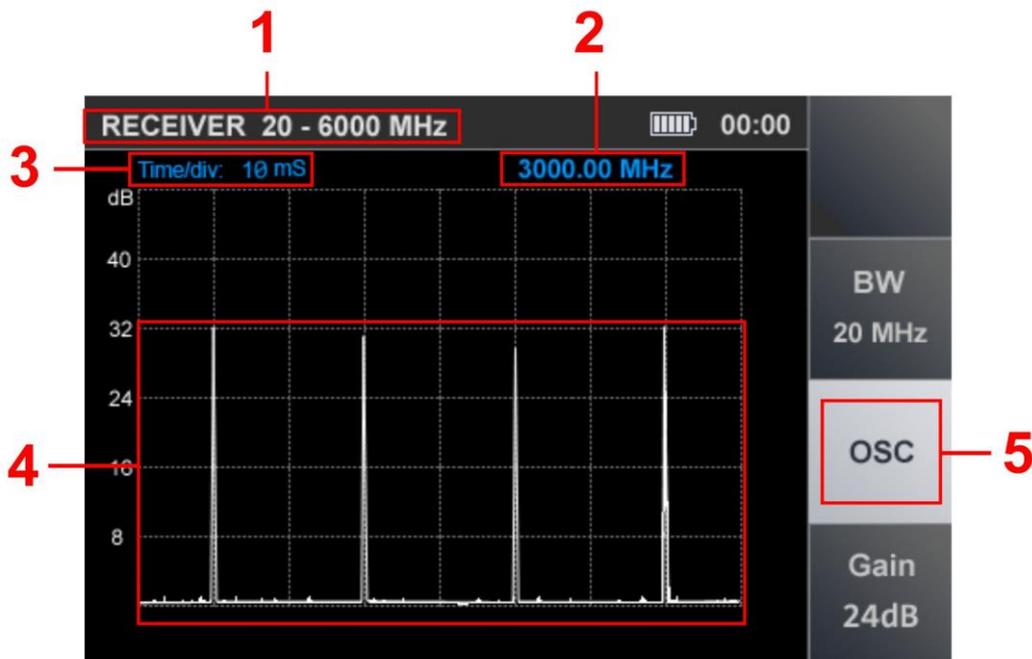
Fig.16

In Fig.16:

1 - SEARCH RECEIVER (20 MHz - 6 GHz) is on
2 - Fixed frequency
3 - Time division value
4 - Oscillogram of the demodulated signal at a fixed frequency
5 - Activity indicator OSCILLOSCOPE function

Functionality:

- determination of the time parameters of the demodulated signal;
- changing the scale of the time axis;
- changing the bandwidth value;
- gain adjustment.

Controls:

Button	Action
ESC, F3	Turn off OSCILLOSCOPE function
MODE	Switch to MAIN MENU
◁ ▷	Changing the horizontal division value 100μS/200μS/500μS/1mS/2mS/5mS/10mS
F2	Setting the bandwidth and turning on the FM demodulator
F4	Turn on/off gain setting
⬆ ⬇ FUNC, F1 ENTER	Not used

To turn off the OSCILLOGRAPH function, press the F3 or ESC.

3.2.4. SEARCH FOR VIDEO CAMERA SIGNALS FUNCTION

When moving the marker, the parameters of each detected signal are analyzed for their correspondence to the parameters of the signals from video cameras. If the comparison is positive, the video camera detection indicator appears in the information line (Fig.6, item 2).

3.3. LOCALIZATION MODE

The mode is intended for localization of radio signal sources in the tested room. Moving around the room, the user observes the change in the levels of several of the most powerful signals. In the mode, an adaptive change in the receiver gain is implemented. This increases the reliability of localizing the signal source.

The device monitors the increase, decrease and maximum values of signal levels relative to the levels obtained when the mode was turned on. This makes it possible to determine the position of the user relative to the signal source.

The mode allows you to distinguish external signals from signals, sources of which are located in the tested room.

Turning on the LOCALIZATION mode is possible from the PANORAMA mode or DIFFERENTIAL mode by pressing F1. The screen view is shown in Fig.17.
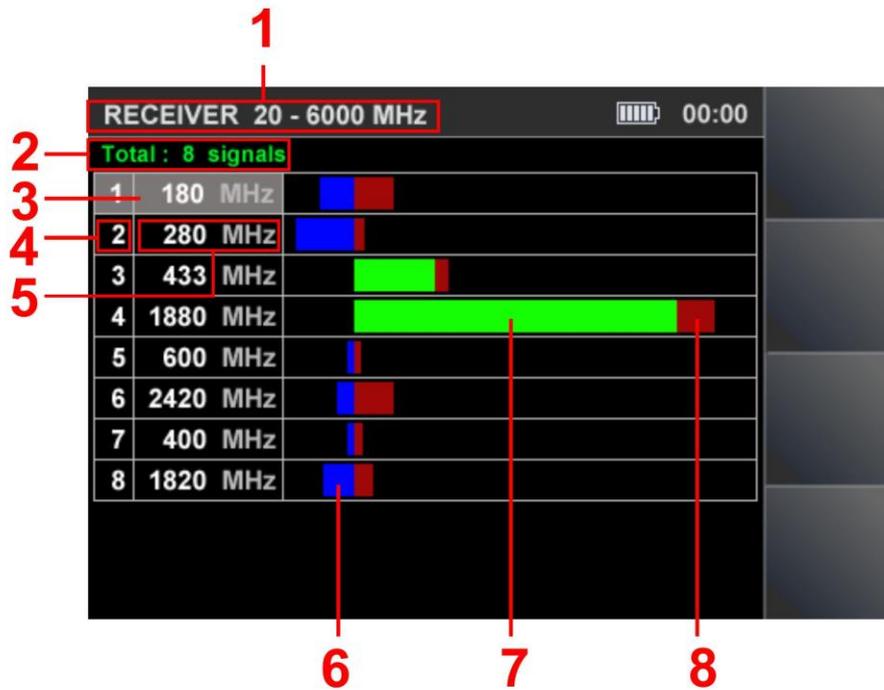
Fig.17

In Fig.17:

1 - SEARCH RECEIVER (20 MHz - 6 GHz) is on
2 - Quantity of signals detected
3 - Table cursor
4 - Detected signal number
5 - Signal frequency
6 - The current signal level, the value of which is lower than the level detected when the device was turned on ("0" level)
7 - Current signal level (green)
8 - The maximum signal level detected for the entire current session (burgundy).

3.4. AUTOMATED MODE

AUTOMATED mode detects signals whose amplitude exceeds the adaptive detection threshold. The mode is turn on from DIFFERENTIAL mode or PANORAMA mode by pressing F2 button. The search for signals is performed within the established range, taking into account the results obtained in the DIFFERENTIAL mode (if the AUTOMATED mode was switched on from the DIFFERENTIAL mode). All detected signals are assigned one of three attributes.

The default is:

- "NON-DANGEROUS" - signals from base stations of mobile communication systems;
- "DANGEROUS" - signals of wireless mobile devices;
- "UNKNOWN" - all other signals.

The ST 100 software allows you to assign a "DANGEROUS" or "NON-DANGEROUS" attribute to certain frequency bands.

If the received signals fall into these ranges, they are highlighted in the table with the corresponding color ("NON-DANGEROUS" - green, "DANGEROUS" – red, "UNKNOWN" – white).

The screen view after turning on the mode is shown in Fig.18.
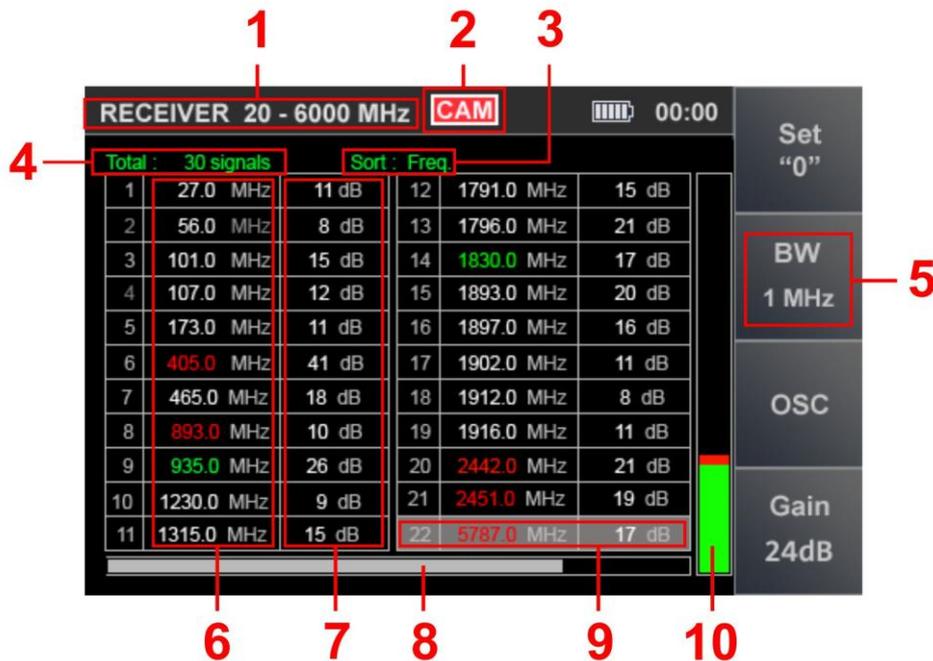
Fig.18

In Fig.18:

1 - SEARCH RECEIVER (20 MHz - 6 GHz) is on
2 - TV camera analog signal detection indicator
3 - Sorting the table (ascending signal level or frequency)
4 - Total quantity of signals detected
5 - Bandwidth
6 - Frequency of detected signals
7 - Levels of detected signals
8 - Indicator of the position of the table cursor relative to the number of rows
9 - Table cursor
10 - Signal level at which the table cursor is set

Functionality:

- sorting of detected signals (by frequency or by level);
- identification of analog signals from TV cameras;
- fine tuning the frequency;
- the ability to change the bandwidth;
- using the FM demodulator;
- using the SETTING "0" function;
- the ability to adjust the gain;
- using the OSCILLOSCOPE.

Controls:

Button	Action
ESC	Return to the previous mode
MODE	Switch to MAIN MENU
FUNC	Sorting signals
◁▷ △ ▽	Table cursor control
F1	Turn on SETTING "0" function
F2	Setting the bandwidth and turning on the FM demodulator
F3	Turn on OSCILLOSCOPE function
F4	Turn on/off gain setting
ENTER	Turn on FREQUENCY TUNING function

3.4.1. FREQUENCY TUNING FUNCTION

To tuning the frequency, move the cursor to the corresponding line and press ENTER.
A window for setting the frequency will appear on the screen (Fig.19).

Fig.19

Using the buttons ◁▷, the frequency value is set at which the signal level on the indicator (Fig. 18, item 10) will be maximum.
The frequency tuning step depends on the set bandwidth (BW):

Bandwidth	Frequency tuning step
20 MHz	1 MHz
1 MHz	100 KHz
100 KHz	10 KHz
FM	1 MHz

To complete the setting, press the ENTER or ESC.

3.4.2. SEARCH FOR VIDEO CAMERA SIGNALS FUNCTION

In AUTOMATED mode, the function of searching for video cameras signals is implemented. It turns on automatically when the table cursor is placed on a table row. If the signal matches certain parameters, the video camera detection indicator appears (Fig.18, item 2).

3.4.3. OSCILLOSCOPE FUNCTION

To analyze the demodulated signal using the OSCILLOSCOPE function, use the ▽ △ ◁ ▷ buttons to set the cursor on the corresponding line and press the F3 button. Functionality and controls are described in item 3.2.3 To turn off the OSCILLOSCOPE function, press the F3 or ESC.

3.4.4. SETTING "0" FUNCTION

To localize the source of the detected signal, the SETTING "0" function is implemented. To turn on it, use the ▽ △ ◁▷ buttons to set the cursor on the corresponding line and press F1. The functionality and controls are described in item 3.2.2. To turn off the function, press F3 or ESC.

4. CHANNEL#2. SEARCH RECEIVER (6 GHZ - 12 GHZ)

The channel is designed to detect analog and digital radio transmission eavesdropping devices in the frequency range 6 GHz - 12 GHz.

Signals are received by an antenna located inside the main unit.

Analysis of the detected signals is performed using:

- graphic information (spectrogram, oscillogram, table of signals, etc.);
- acoustic information (headphones or built-in speaker).

Channel functional diagram
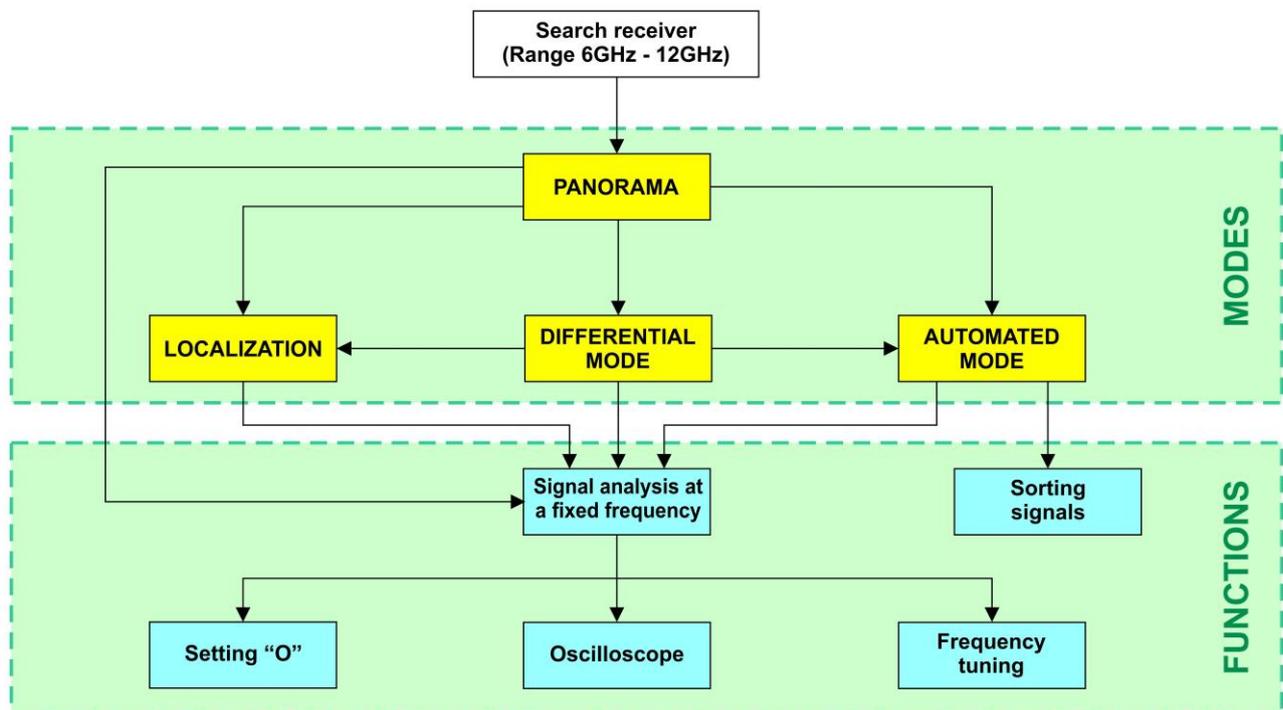
Fig.20

SEARCH RECEIVER (6 GHZ - 12 GHZ) modes are similar to SEARCH RECEIVER (20 MHZ - 6 GHZ) modes (Fig.11), except:

There is no possibility:

- changing the gain;
- changing the bandwidth (fixed bandwidth - 20 MHz);
- automatic detection of analog TV cameras.

Information display and controls are described in item3.

5. CHANNEL#3. SEARCH RECEIVER FOR MONITORING THE SELECTED RANGES (SELECTED RANGES)

The channel is designed to detect signals from the most common digital communication standards and in user-defined frequency ranges.

Channel functional diagram
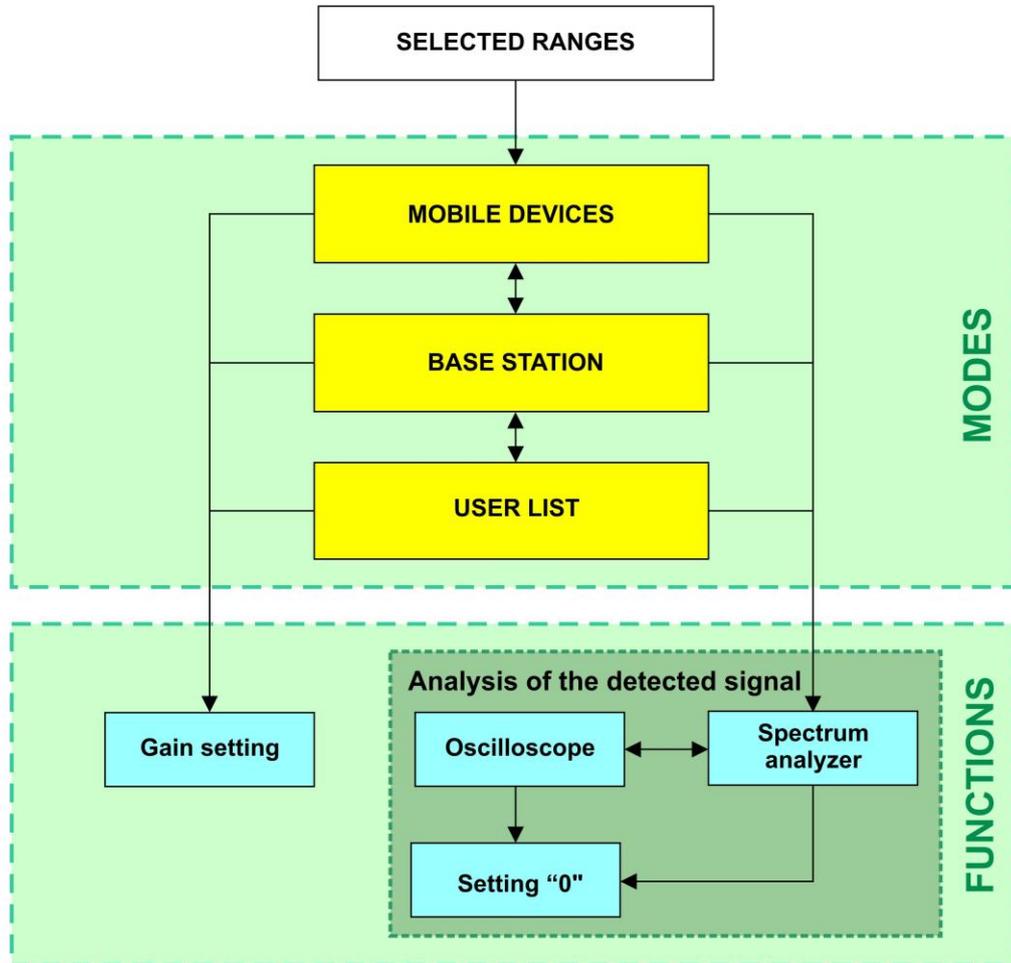
Fig.21

MODES:

- MOBILE DEVICES - monitoring of signals of mobile digital communication devices;
- BASE STATIONS - monitoring of signals from base stations of digital communication;
- USER LIST - monitoring signals in the ranges specified by the user.

There is a possibility of separate monitoring of the ranges of mobile devices and base stations (if such frequency division is provided by the communication standard). By default, the ranges of mobile communication systems used in Russia are set, the composition and parameters of which can be changed using the software.

The USER LIST mode allows you to monitor predefined frequency ranges in which the use of radio transmitting eavesdropping devices is most likely. The number of these ranges and their boundaries are also set using software.

In each mode, the functions ANALYSIS OF THE DETECTED SIGNAL and GAIN SETTING are available

To receive signals, antennas are used (item 3), connected to the ANT 1 socket on the top panel of the main unit (Fig.10).

The channel is turned on from the MAIN MENU, while the MOBILE DEVICES mode is automatically activated.

5.1. MOBILE DEVICES MODE

The mode allows detecting active mobile devices of digital communication systems and analyzing their signals. The mode turns on automatically when you turn on Channel#3.

Alternatively, the mode can be activated from the BASE STATIONS or USER LIST mode by pressing the F1 button.

The device screen in MOBILE DEVICES mode is shown in Fig.22.
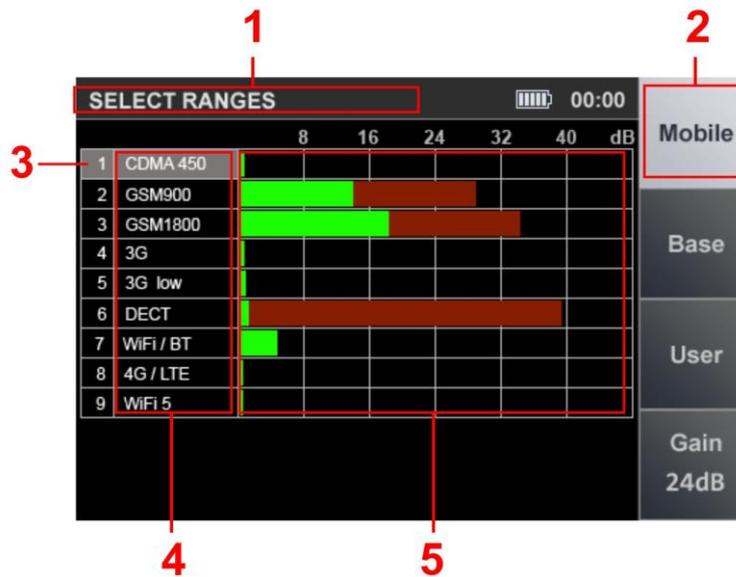
Fig.22.

In Fig.22:

1 - SELECTED RANGES is on
2 - MOBILE DEVICES mode is on (light background)
3 - Table cursor
4 - List of digital communication standards
5 - Signal levels. The current signal level is green. The maximum signal level in the range for the entire operating time is burgundy.

Controls:

Button	Action
ESC, MODE	Switch to MAIN MENU
ENTER	Turn on ANALYSIS OF THE DETECTED SIGNAL function
⬆ ⬇	Table cursor control
F2	Turn on BASE STATIONS mode
F3	Turn on USER LIST mode
F4	Turn on/off GAIN SETTING function
FUNC, F1 ◁ ▷	Not used

5.2. BASE STATIONS MODE

The mode allows you to determine the signal levels of digital communication base stations in real time and analyze them.

The mode can be turn on from the MOBILE DEVICES mode or USER LIST mode. To turn on the mode, press F2.

The device screen in BASE STATION mode is shown in Fig.23.

Fig.23

Controls:

Button	Action
ESC, MODE	Switch to MAIN MENU
ENTER	Turn on ANALYSIS OF THE DETECTED SIGNAL function
△ ▽	Table cursor control
F1	Turn on MOBILE DEVICES mode
F3	Turn on USER LIST mode
F4	Turn on/off GAIN SETTING function
FUNC, F2 ◁ ▷	Not used

5.3. USER LIST MODE

The mode allows to detect the activity of radio transmitters in the preset frequency ranges and analyze the detected signals.

The mode can be turn on from modes MOBILE DEVICES and BASE STATIONS by pressing F3.

The device screen in USER LIST mode is shown in Fig.24.

Fig.24

Controls:

Button	Action
ESC, MODE	Switch to MAIN MENU
ENTER	Turn on ANALYSIS OF THE DETECTED SIGNAL function
△ ▽	Table cursor control
F1	Turn on MOBILE DEVICES mode
F2	Turn on BASE STATIONS mode
F4	Turn on/off GAIN SETTING function
FUNC, F3 ◁ ▷	Not used

5.4. ANALYSIS OF THE DETECTED SIGNAL FUNCTION

MOBILE DEVICES, BASE STATIONS and USER LIST modes allow you to fix signals and determine their level.

However, it is impossible to accurately determine the quantity of signals in each band and the frequency of signals.

The ANALYSIS OF THE DETECTED SIGNAL function is designed to determine frequencies in the standard bands and analyze them using the OSCILLOSCOPE function.

To localize the signal source, use the SETTING "O" option, which can be turn on from any mode. To do this, place the cursor on the corresponding line in the table and press ENTER.

The device screen after turning on the function is shown in Fig.25

Fig.25

In Fig.25:

1 - SELECTED RANGES is on
2 - Digital communication standard
3 - Time division value
4 - White frame of active window (OSCILLOSCOPE or SPECTRUM ANALYZER)
5 - OSCILLOSCOPE
6 - Lower limit of the range
7 - Frequency value on the SPECTRUM ANALYZER marker
8 - SPECTRUM ANALYZER
9 - SPECTRUM ANALYZER marker
10 - Upper limit of the range
11 - Bandwidth
12 - Signal level (at marker frequency)

The screen is divided into three windows:

- SIGNAL LEVEL INDICATOR (Fig.25, item 12);
- OSCILLOSCOPE (Fig.25, item 5);
- SPECTRUM ANALYZER (Fig.25, item 8).

The INDICATOR window displays the signal level at the marker frequency (Fig. 25, item 7) of SPECTRUM ANALYZER.

The other two windows (Fig. 25, item 5 and item 8) display the oscillogram and the spectrogram. Only one window is active at a time, which is highlighted with a white frame (Fig. 25, item 4).

Switching between the OSCILOGRAPH and SPECTRUM ANALYZER windows is carried out using the ⬘ and ⬙ buttons. The SETTING "0" function is used to localize the source of the detected signal.

When it is turned on, the level of the detected signal is taken as "0" and the LEVEL INDICATOR shows the difference value of the signal (the indicator color will turn purple).

Use the ENTER button to turn the SETTING "0" function on or off.

Controls:

Button	Action
MODE	Switch to MAIN MENU
ESC	Return to the previous mode
ENTER	Turn on/off SETTING "0" function
△ ▽	OSCILLOSCOPE / SPECTRUM ANALYZER switching
◁ ▷	Scaling the horizontal axis (in OSCILLOSCOPE) or Marker Control (in SPECTRUM ANALYZER)
FUNC, F1, F2, F3, F4	Not used

5.5. GAIN SETTING FUNCTION

The gain setting procedure is described in

6. CHANNEL#4. INFRARED DETECTOR

The channel is designed to detect eavesdropping devices transmitting information in the IR-range. The detector sensor is located on the top panel of the main unit (Fig. 3, item 6).

The analysis of the detected signals is carried out using:

- graphic information (oscillogram and received signal level indicator);
- acoustic information (headphones or built-in speaker).

Switching on is carried out from the MAIN MENU (item 2.2).
The device screen after switching on the channel is shown in Fig.26.
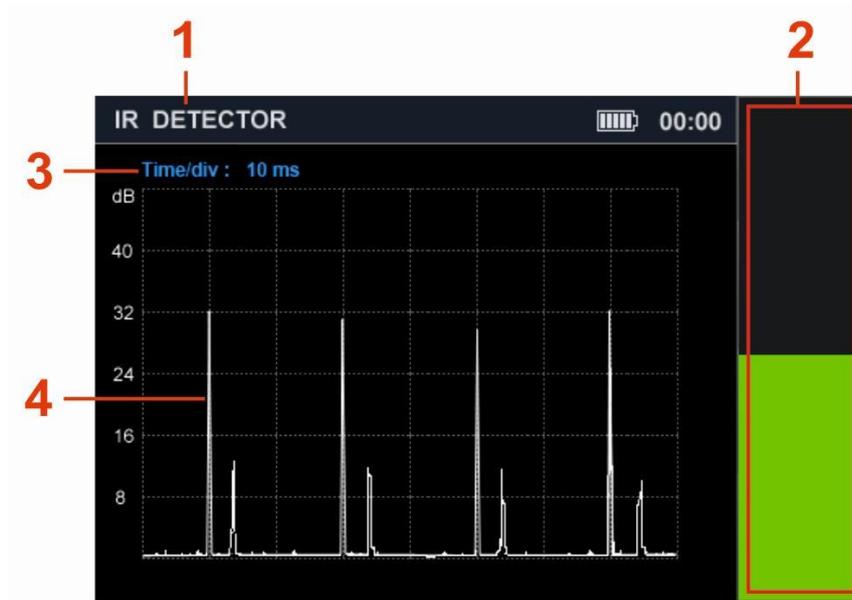
Fig.26

In Fig.26:

1 - INFRARED DETECTOR is on
2 - Received signal level indicator
3 - Division value of the time axis (horizontal axis)
4 - Oscillogram

Controls:

Button	Action
ESC, MODE	Switch to MAIN MENU
ENTER	Turn on/off DIFFERENTIAL mode
◁ ▷	Scaling oscillogram along the horizontal axis
F1 - F4 **FUNC** ▽ △	Not used

6.1. DIFFERENTIAL MODE

DIFFERENTIAL mode is designed to localize the source of the detected IR signal. When the mode is turned on, the level of the detected signal is taken as "0" and the differential signal level is displayed on the level indicator (Fig.25, item 2).

To turn on the DIFFERENTIAL mode, press the ENTER. The indicator color will turn purple.
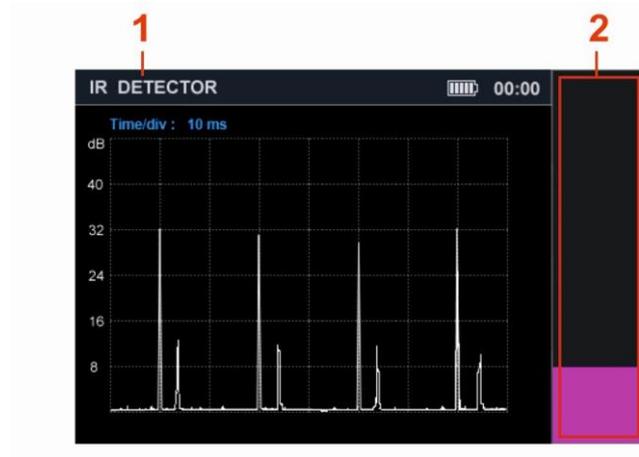
Fig.27

To turn off the DIFFERENTIAL mode, press the ENTER button again.

7. CHANNEL#5. PARAMETRIC DETECTOR

PARAMETER DETECTOR is designed to detect working electronic devices, including those that do not transmit information during a search.

These devices include:

- eavesdropping devices using digital channels for transmitting information;
- cell phones;
- digital TV cameras;
- tracking GPS devices.

Search functions are implemented by the ST 100P module (Fig. 1, item 7). It is a transceiver device that records the modulation of the reflected HF signal caused by low-frequency processes in working electronic devices.

The analysis of the detected signals is carried out on the basis of the acoustic information heard in the headphones. The directional antenna allows you to locate the source of the reflected signal. The distance to it is determined by the change in the signal volume level (the closer to the source, the louder the signal). The detection range of working digital devices is from 30 to 100 cm.

Composition of the ST 100P module:

- transmitter forming a high-frequency probing signal;
- a receiver that receives and detects the reflected modulated signal;
- directional transmitting and receiving antenna.

The module components are located in a radio-transparent plastic case. The detector is connected to the socket (Fig. 3, item 5) on the top panel of the main unit using a cable with a connector. The appearance of the ST 100P parametric detector is shown in Fig. 26.

Fig.28

The parametric detector is attached to the main unit with two screws (Fig.1, item 8), as shown in Fig.29 (A). In Fig.29 (B), the parametric detector is installed on the main unit.

Fig.29(A)   **Fig.29(B)**

Attention! The parametric detector cable connector is equipped with a clamp. To disconnect the connector, press the button (Fig. 30).

Fig.30

The detector antenna has an elliptical 90° radiation pattern (Fig. 31).

90⁰

Fig.31

The channel is turn on from the MAIN MENU. The screen of the device after switching on is shown in Fig. 32.

Fig.32

At the same time, the transmitter and receiver of the parametric detector are turned on, the sound is heard in the headphones.

Controls:

Button	Action
ESC, MODE	Switch to MAIN MENU
◁ △ ▷ ▽ **F1, F2, F3, F4** **ENTER** **FUNC**	Not used

8. RECOMMENDATIONS FOR USE

8.1. RECOMMENDATION FOR USING THE SEARCH RECEIVERS (20 MHZ - 6 GHZ AND 6 GHZ - 12 GHZ)

There are two options for searching for eavesdropping devices:

- search in the AUTOMATED mode;
- search in manual mode (PANORAMA and DIFFERENTIAL mode).

There are three stages of searching for eavesdropping devices:

1. Signal detection;
2. Identification of the detected signal ("DANGEROUS"/"NON-DANGEROUS");
3. Localization of the source of the "DANGEROUS" signal.

8.1.1. SEARCH IN THE AUTOMATED MODE

AUTOMATED mode is used when the frequency range is lightly loaded in the tested room.

Search algorithm:

1. In the tested room:

- turn on the player of the test sound (PTS) and adjust the volume level;
- connect the antenna and headphones to the main unit (when searching in the 6 GHz -12 GHz range, you do not need to connect the antenna);
- turn on the device.

2. Turn on the search receiver (20 MHz - 6 GHz or 6 GHz - 12 GHz).
3. Set the optimal gain without overscaling (only for receiver 20 MHz - 6 GHz).
4. Turn on the AUTOMATED mode.
5. Sort the table in ascending order of signal level and set the cursor on the first row.
6. Analyze the demodulated signal:

- listen to the signal at different values of the bandwidth (only for receiver 20 MHz - 6 GHz);
- analyze the signal on an oscilloscope;
- fine-tune the frequency, if necessary.

Signs of "DANGEROUS" signals:

- at the frequency of the detected signal, a test sound is heard in the headphones;
- the test sound is not audible, the oscillogram of the demodulated signal changes when the test sound changes;
- the detected signal is highlighted in the table in red. This means that a mobile digital communication device is detected or a signal is received in the range used by radio transmitting eavesdropping devices;
- the signal level decreases significantly when the device is moved from the tested room;
- in the 20 MHz - 6 GHz frequency range, the CAM indicator appears in the information line (a TV camera transmission channel is detected).

7. Analyze other signals in the same way.

8.1.2. SEARCH IN THE PANORAMA MODE AND IN THE DIFFERENTIAL MODE

PANORAMA mode and DIFFERENTIAL mode are used to search for eavesdropping devices in a difficult electromagnetic environment in the search area.

1. In the tested room turn on the player of the test sound (PTS) and adjust the volume level.
2. Outside the tested room, connect the required antenna (when searching in the 6 GHz - 12 GHz range, you do not need to connect the antenna) and headphones to the main unit. Turn on the device.
3. Turn on the receiver in PANORAMA mode.
4. When searching in the 20 MHz - 6 GHz range, set the optimal gain without overscaling (gain adjustment is not possible in the 6 GHz - 12 GHz range). Get a difference panorama.
5. Observing the difference panorama, enter the room. Fix the appearance of new signals or an increase in the level of previously detected signals.
6. When new signals are detected, set the marker to the mark of the strongest signal.
7. Turn on SIGNAL ANALYSIS AT A FIXED FREQUENCY function.
8. Analyze this signal:

- listen to the signal with headphones at different values of the bandwidth;
- analyze the signal on an oscilloscope;
- fine-tune the frequency, if necessary.

Signs of "DANGEROUS" signals:

- the test sound is heard at the frequency of the detected signal;
- the test sound is not audible, the oscillogram of the demodulated signal changes when the test sound changes;
- the level of the detected signal increases when entering the tested room.

8. Analyze other signals in the same way.

8.1.3. SIGNAL SOURCE LOCALIZATION

Acoustic method or Energy method is used to localize the source of the uncoded signal.

Only the Energy method is used to localize the source of the encoded signal.

When using the Acoustic method, the user turns on the PTS, moves it around the tested room (listening to the demodulated signal in headphones) and looks for a place where the signal is heard best.

For a more accurate localization, it is recommended to lightly knock on interior items located near this place. The knocking will be heard well enough through the headphones.

The SIGNAL ANALYSIS AT A FIXED FREQUENCY function is used to implement the Acoustic method (item 3.2.1).

The energy method is to determine the place in the room where the signal level will be maximum.

The search is performed using the signal level indicator, in the SIGNAL ANALYSIS AT A FIXED FREQUENCY function (item3.2.1) and in the LOCALIZATION mode (item 3.3).

Features of the energy method when using SIGNAL ANALYSIS AT A FIXED FREQUENCY function

After defining the frequency of "DANGEROUS" signals in DIFFERENTIAL mode, AUTOMATED mode or in PANORAMA mode, the user must turn on SIGNAL ANALYSIS AT A FIXED FREQUENCY function.

The device displays the current signal level. By moving the device around the room, the user determines the place where this level is maximum and turns on the SETTING "0" function.

This will allow you to more accurately determine the location of the eavesdropping device.

The algorithm of actions is shown in Fig.33
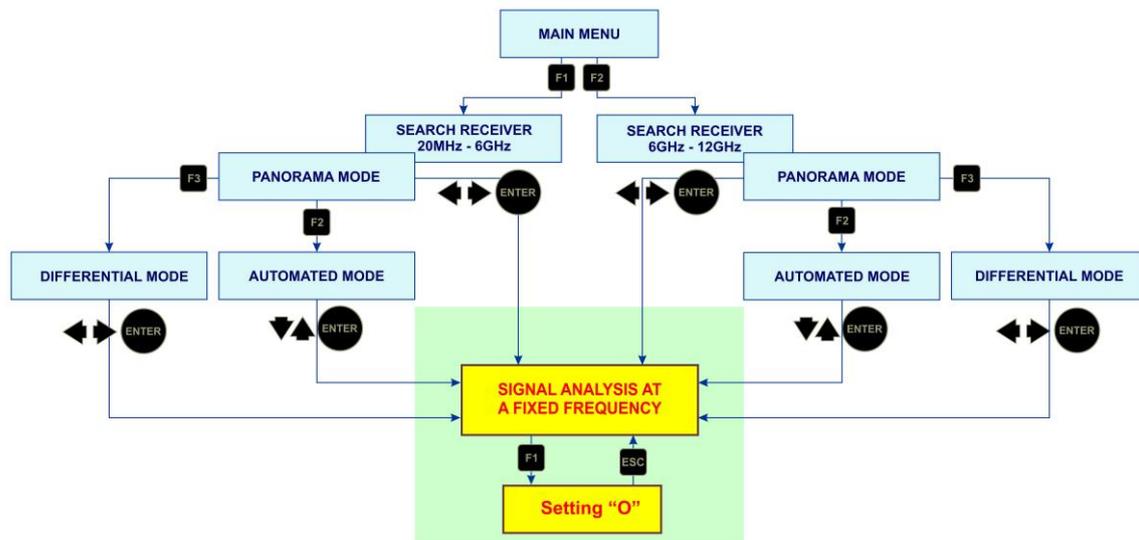
Fig.33

To localize the source of a broadband pulse signal (GSM, WiFi, DECT, etc.), it is difficult to use the energy method, since the signal level in different places in the room is approximately the same.

It will be difficult to determine where the signal strength is at its maximum. Setting the gain to minimum will also not solve this problem.

It is recommended to carry out localization with the antenna turned off. In most cases, this will allow you to determine the location of the GSM device.

Features of the energy method when using the LOCALIZATION mode:

- the ability to simultaneously monitor in real time the levels of several of the most powerful signals;
- more accurate localization of signal sources using adaptively variable receiver gain;
- the ability to observe not only an increase, but also a decrease in the signal level relative to the level fixed when the mode is turned on (impossible in other modes).

LOCALIZATION mode is turned on from PANORAMA or DIFFERENTIAL mode when using any of the search receivers (20 MHz - 6 GHz or 6 GHz - 12 GHz). In this mode it is possible to use the SIGNAL ANALYSIS AT A FIXED FREQUENCY function.

The algorithm of actions is shown in Fig.34
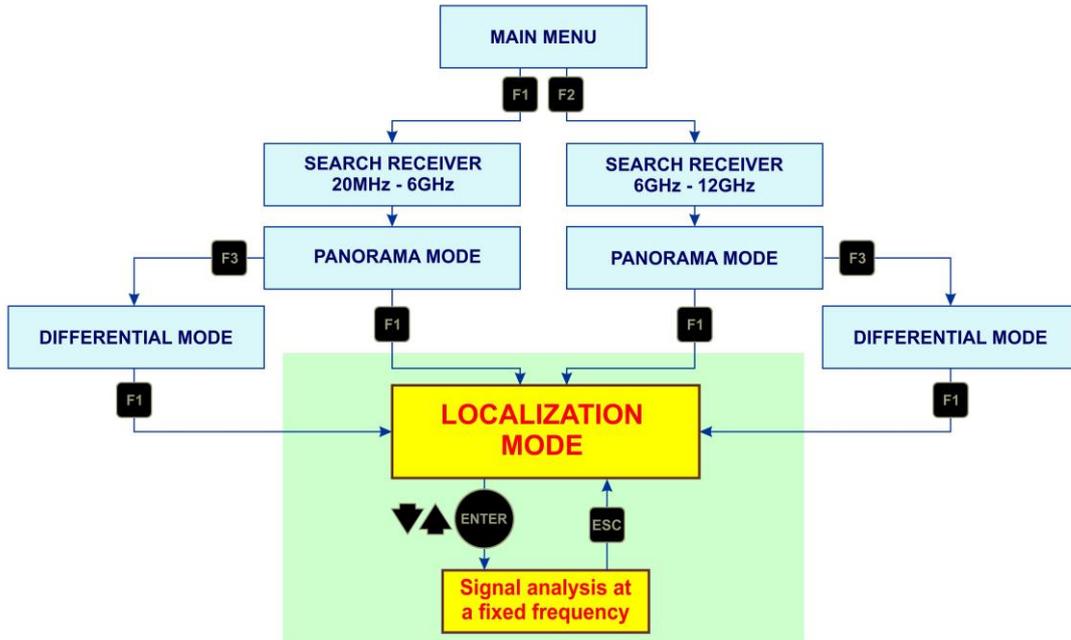
Fig.34

INTERPRETATION OF DEVICE READINGS IN THE LOCALIZATION MODE

In the LOCALIZATION mode, the energy method is used (analysis of the change in the level of the detected signal when the device is moved around the tested room).

After turning on the mode and scanning the entire range, a table (Fig.17) with information about the detected signals is displayed on the screen, which displays their serial numbers, frequencies and siugnal levels (in graphical form).

Signal levels fixed when the device is turned on are taken as "0" (as in the DIFFERENTIAL mode). When the device move around the room, the signal levels will change depending on the distance to their sources.

The level of one of the detected signals at different positions of the device relative to its source is shown in Fig.35.
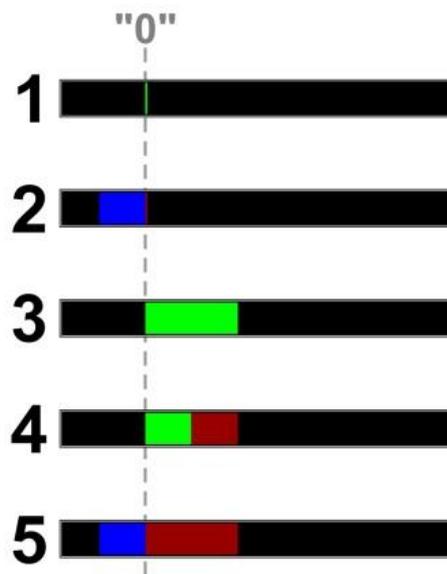
Fig.35

The dotted line indicates the "0" (initial) signal level, fixed when the mode was turned on.

Ideally, when the mode is turned on, the level of the detected signal should not be displayed in the table, but the signal frequency will be determined (Fig.35, item 1).

However, in a real environment, insignificant signal levels can be observed (green indicator).

As you move the device around the room, the signal level will change:

With distance from the signal source, the signal level relative to "0" level will decrease. It will be displayed in blue (Fig.35, item 2).

As you approach the signal source, the signal level relative to the "0" level will increase. The width of the green sector will increase (Fig.35, item 3).

The maximum signal level fixed in the current session is displayed in burgundy.

In Fig.35, item 4 - the current level (green) is below the previously fixed maximum level (burgundy).

In Fig.35, item 5 - the current level (blue) is below the maximum and below "0".

EXAMPLE OF USING THE LOCALIZATION MODE

The user at the entrance to the tested room has turned on the LOCALIZATION mode. User detected a weak signal at 433 MHz and began to move around the room, observing the level of this signal. Movement around the room and the signal level at each point are shown in Fig.36.
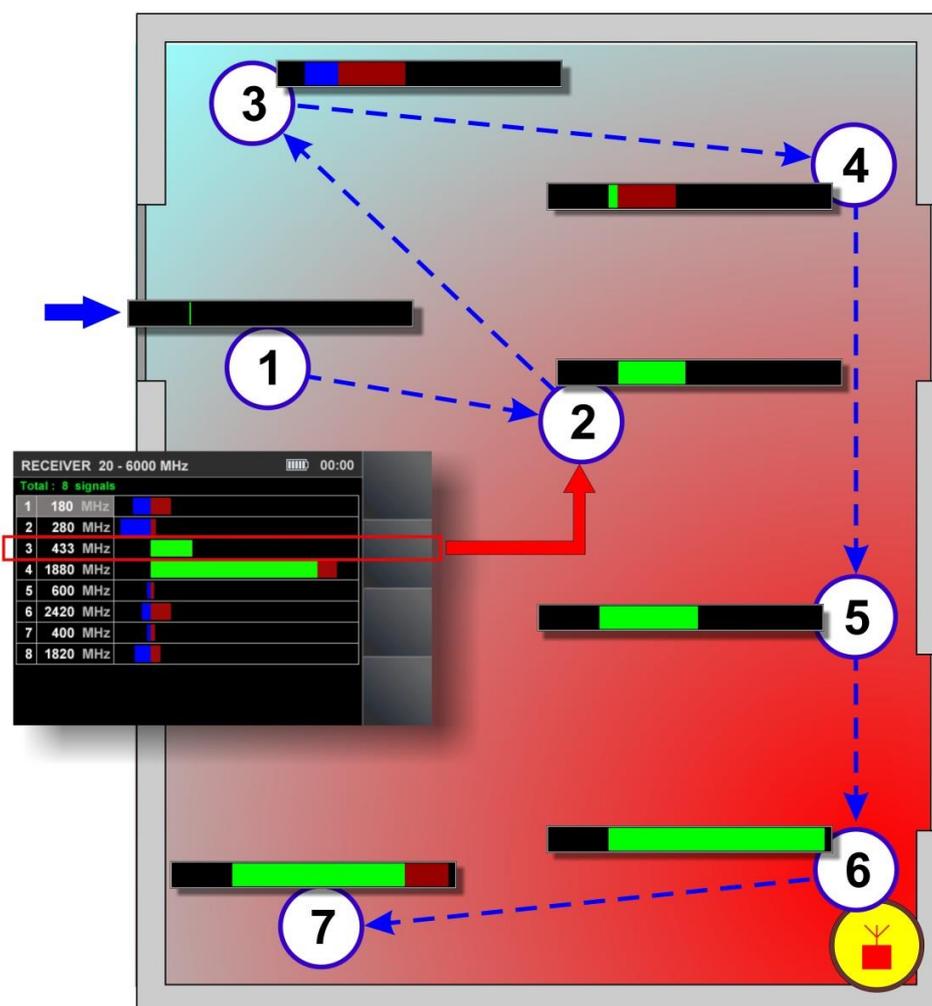
Fig.36

In fig.36	User actions	Indication	Interpretation
1	Turn on the LOCALIZATION mode	The received signal level is taken as "0".	
2	Move the device to the center of the room	The current signal level has increased compared to the level at point #1	The device is approaching the signal source
3	Move the device to one of the corners of the room	The current signal level has decreased compared to the levels at point #2 and at point #1 (displayed in blue)	The signal level is less than "0". The device moves away from the signal source
4	Move the device to an adjacent corner	Signal level is higher than at points #1 and #3, but lower than at point 2	The device is approaching the signal source
5	Move the device along the wall towards the center of the room	Signal level higher than any previously checked point	The device is approaching the signal source
6	Move the device in the direction of increasing signal strength	Highest signal level	The device is approaching the signal source
7	Move the device along the wall from point #6	Signal level is lower than point #6	The device moves away from the signal source

The maximum signal level was fixed at point #6. Further searches should be continued at this point with the SIGNAL ANALYSIS AT A FIXED FREQUENCY function (in this case at 433 MHz) by decreasing the gain value and using the SETTING "0" function.

8.2. RECOMMENDATIONS FOR USING SELECTED RANGES CHANNEL

The SELECTED RANGES channel analyzes ranges that conform to digital communication standards and user-defined ranges.

Preset settings

MOBILE DEVICES	Frequency range, MHz
CDMA450	453 - 458
GSM900	899,5 - 915
GSM1800	1710 - 1785
3G	1920 - 1980
3G low	2010 - 2025
DECT	1880 - 1900
WiFi/BT	2400 - 2480
4G/LTE	2500 - 2700
WiFi 5	5200 - 5800
BASE STATIONS	**Frequency range, MHz**
CDMA450	463 - 468
GSM900	935 - 960

GSM1800	1805 - 1880
3G	2110 - 2170
3G low	2010 - 2025
DECT	1880 - 1900
USER LIST	**Frequency range, MHz**
----	88 - 108
----	430 - 450

Using the software, you can correct the composition and parameters of the ranges of mobile devices, base stations and ranges of the user list.

8.2.1. SEARCH FOR SIGNALS IN THE SELECTED RANGES

The search algorithm is the same for all modes:

1. In the tested room:
- connect antenna and headphones to the main unit;
- turn on the PTS and adjust the volume (only when using USER LIST mode);
- turn on the Device.
2. Turn on SELECTED RANGES channel.
3. Turn on one of the modes.
4. Monitor the presence of a signal (by level indicators in the table).
5. If activity is fixed in any range, it is necessary to analyze the observed signals. To do this, set the cursor on the corresponding line and turn on the ANALYSIS OF THE DETECTED SIGNAL function.

Signs of a "DANGEROUS" signal in MOBILE DEVICES mode:

- high level of the detected digital signal (in the absence of legal communication devices in the near zone);
- the time-frequency structure of the signal does not correspond to the standard structure (when analyzing the signal using an oscilloscope);
- detected analog signal correlated with PTS.

Signs of a "DANGEROUS" signal in BASE STATIONS mode:

- the time-frequency structure of the signal does not correspond to the standard structure (when analyzing the signal using an oscilloscope);
- detected analog signal correlated with PTS.

Signs of a "DANGEROUS" signal in USER LIST mode:

- the test sound is heard at the frequency of the detected signal;
- the test sound is not audible, the oscillogram of the demodulated signal changes when the test sound changes;
- the level of the detected signal increases when entering the tested room.

8.2.2. SIGNAL SOURCE LOCALIZATION

When using the SELECTED RANGES channel, the signal source is localized using the ANALYSIS OF THE DETECTED SIGNAL function (item 5.4).

To turn on this function, set the cursor on the required line in the table of the current mode and press ENTER.

Further, on the basis of the indicator readings (Fig. 25, item 12), search a place in the room where the maximum signal level is fixed.

If necessary, for further search, you can use other search devices (nonlinear locator, inspection mirrors, etc.).

8.3. RECOMMENDATIONS FOR USING AN INFRARED DETECTOR

The IR DETECTOR is designed to detect and localize eavesdropping devices transmitting information in the infrared frequency range to a special IR receiver. The range of such a system is several hundred meters and the IR transmitter and IR receiver must "see" each other.

As a rule, the receiver is located outside the tested room, and the IR transmitter is opposite the window.

8.3.1. SEARCH FOR SIGNALS

The search for the eavesdropping device must be started from the window, directing the IR sensor towards the intended location of the IR transmitter.

It should be borne in mind that the detection range of the IR detector is 50-70 cm.

Search algorithm:

1. Turn on the the PTS in tested room.
2. Turn on the IR DETECTOR.
3. Direct the IR sensor towards the intended location of the eavesdropping device.
4. Commit changes:
- signal level on the indicator (Fig. 26, item 2),
- oscillogram (Fig. 26, item 4),
- headphone volume.

An increase in the signal level indicates the appearance of an active source of the IR signal in the field of view of the IR sensor ($\pm20^0$).

Signs of a "DANGEROUS" signal:

- High signal level. A test sound is heard in the headphones;
- High signal level. The test sound is not heard in the headphones. The oscillogram is typical for a digital signal.

Signal localization is carried out using the signal level indicator (Fig. 26, item 2). The IR source is installed where the signal strength is at its maximum. For more accurate localization, the DIFFERENTIAL mode is used (item 6.1).

8.3.2. SELECTION OF "FALSE" SIGNALS

When approaching radio signal sources (WiFi router, DECT base, etc.), the received signal level may increase due to interference to the input circuits of the device.

To select "FALSE" and IR signals, cover the IR sensor with your hand (Fig.3, item 6). A significant decrease in the signal level on the indicator (Fig.26, item 2) means that a signal is being received in the IR range.

When a "FALSE" signal is received, the level on the indicator does not change.

8.4. RECOMMENDATIONS FOR USING PARAMETRIC DETECTOR

Search algorithm:

1. Fix the parametric detector on the main unit (Fig.29, A and B).
2. Connect the connector of the detector cable to the socket (Fig.3, item 5) of the main unit.
3. Connect headphones to the "PHONE" jack on the main unit.
4. Switch on the device, switch on the PARAMETRIC DETECTOR.
5. Use the volume control to set a comfortable sound level in the headphones.
6. Aim the antenna towards the probed area (Fig. 31).
7. Moving the device in space, monitor the signal with headphones.

If there are no working digital devices in the probed area, acoustic background will be heard in the headphones. If various signals are heard in the headphones (crackling, clicks, whistling, etc.), then a working digital device has been detected in the probed area. Samples of demodulated response sounds from various devices are recorded on USB flash drive (Fig.1, item 3).

If you hear a weak or indistinct signal, it is recommended to either move the ST100 closer to the signal source or increase the volume level.

ATTENTION!

The efficiency of using a parametric detector can be affected by background signals in the tested room and in adjacent rooms. The sources of such signals can be:

- routers WIFI, GSM and other sources of powerful digital radio signals;
- fluorescent lighting lamps;
- switching power supplies (chargers).

It is recommended to turn off the specified devices.

9. SOFTWARE

9.1. PURPOSE

1. Preparation and loading to ST 100 information for analysis of received signals when using the "SEARCH RECEIVER (20 MHz - 6 GHz)", "SEARCH RECEIVER (6 GHz - 12 GHz)" and "SELECTED RANGES":

- adjustment of the "DANGEROUS" and "NON-DANGEROUS" frequency ranges
- adjustment of the ranges of mobile digital communication devices
- adjustment of the ranges of base stations of mobile communications
- correction of the user list

2. Updating the firmware.

9.2. FUNCTIONALITY

The user has the ability to:

1. Correct the factory settings and download the data to the ST 100 and/or save them as a file on the HDD.
2. Download data from ST 100 to the HDD, modify it, and then download the corrected data to the ST 100.

Files on the HDD are saved in the xxx.dat format (xxxx is the file name assigned by the user when saving). Only one file can be loaded into the ST 100.
An unlimited number of files can be saved to the HDD.

9.3. PC SYSTEM REQUIREMENTS

Operating system: Windows 7, 8, 10 (64-bit);
Free space on hard disk: at least 100 Mb

9.4. INSTALLATION

The software distribution kit is located in the Prog_ST100 folder on the USB flash drive.

Installation procedure:

1. Copy the folder "Prog_ST100" to the HDD.
2. Install the ST 100 driver on the PC (run CDM21228_Setup.exe)
3. Run ST100.exe.
4. Using the USB cable (Fig.1, item 5) connect the ST 100 main unit to the PC.
5. Turn on the main unit.

On the indicator (Fig.37, item 7) and the screen should show the inscription: **"USB connected".** After that, the software is considered to be successfully installed. The PC screen after launching the software is shown in Fig.37.
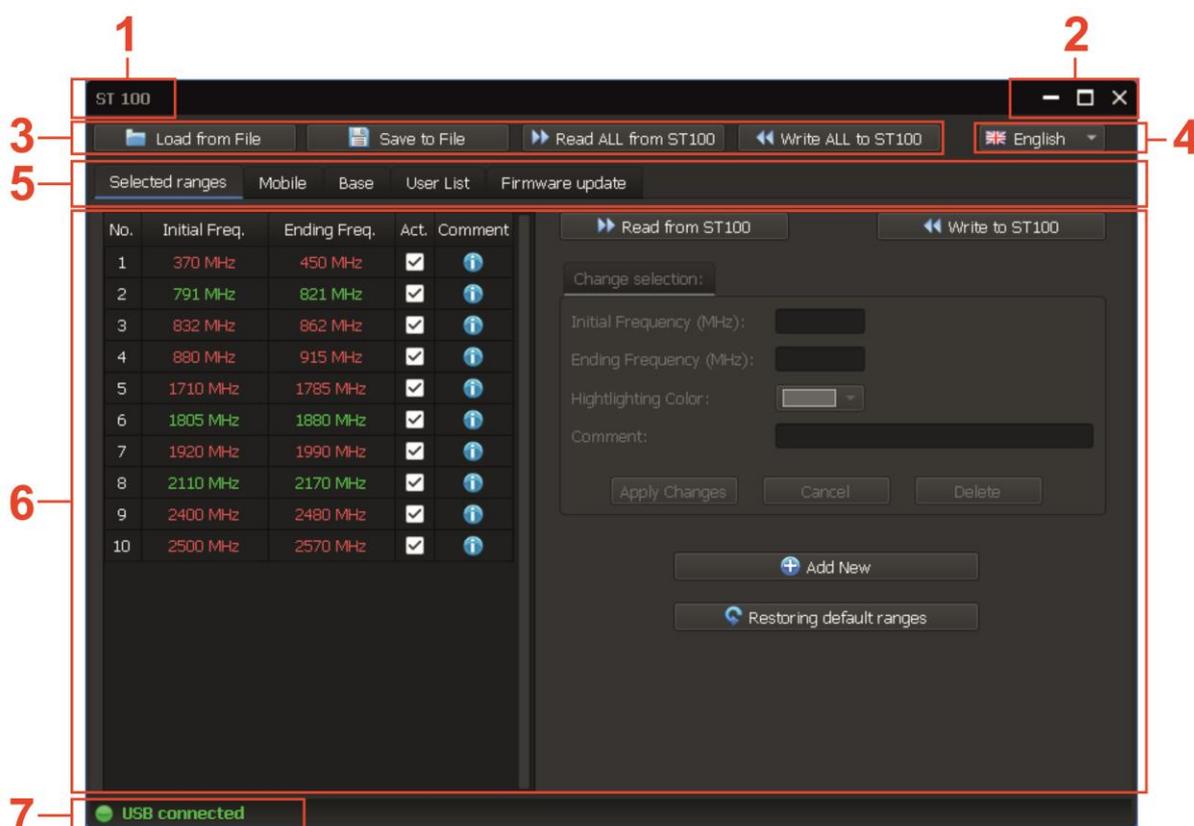
Fig.37

In Fig.37:

1 - software name
2 - window control (maximize, minimize, close)
3 – tabs to switch to the corresponding modes
4 - setting the interface language (Russian / English)
5 – tabs for switching to software modes
6 - information field and controls in the set mode
7 - indicator of connection to ST 100

Indicator of connection to ST 100:

1. **"USB connected"** – the main unit is turned on and connected to the PC;
2. **"Request to connect to ST500..."** – the PC sends a request to connect the main unit (the driver is installed, the main unit is turned off and connected to the PC);
3. **"No response from ST500!"** – there is no response from ST 100 (the main unit is not connected to the PC or it is turned off or the driver is not installed).

MODES:

1. SELECTED RANGES
2. MOBILE DEVICES (MOBILE)
3. BASE STATIONS (BASE)
4. USER LIST
5. FIRMWARE UPDATE

The mode is on by switching to the corresponding tab (Fig. 37, item 5).

9.5. "SELECTED RANGES" MODE

The mode is designed to set the boundaries of the ranges in which the appearance of "DANGEROUS" and "NON-DANGEROUS" signals is most likely.

"DANGEROUS" RANGES:

- ranges of operation of mobile digital communication devices and mobile radio stations;
- known ranges used by eavesdropping devices.

"NON-DANGEROUS" RANGES:

- ranges of operation of digital communication base stations;
- operating ranges of broadcast television and radio stations;
- ranges of operation of various standard radio equipment, etc.

After downloading to the ST 100 information about the "DANGEROUS" and "NON-DANGEROUS" ranges, the signals displayed in the AUTOMATED mode table (item 3.4) will be highlited with the corresponding colors.

Signals detected in the "DANGEROUS" range are highlighted in red, in the "NON-DANGEROUS" range - in green. The rest of the signals are classified as "UNKNOWN" and are highlighted in white.

For objects where work on detecting eavesdropping devices is carried out regularly, it is recommended to have files with selected ranges.

To enable the mode, go to the "Selected ranges" tab.

The PC screen after turning on the mode is shown in Fig. 38.
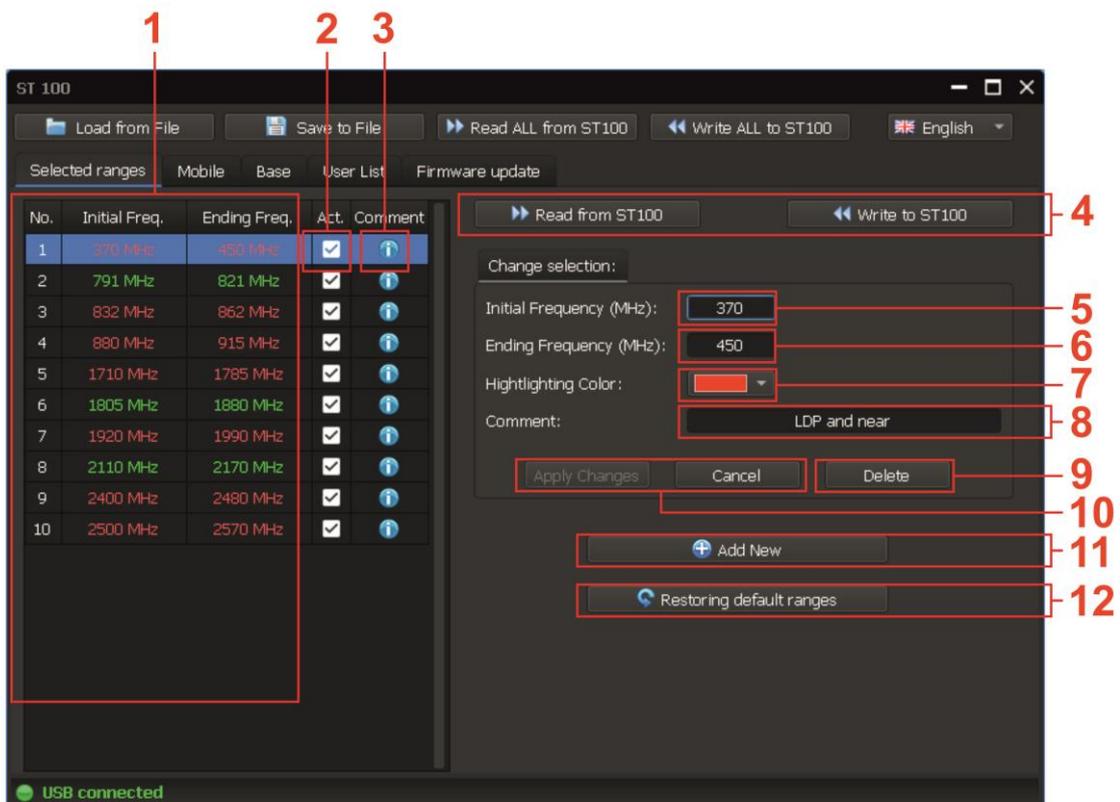
Fig.38

In Fig.38:

1 - list of selected ranges (number, initial and ending frequencies, range designation). The line of the range to be adjusted is highlighted in blue)

2 - activity selection checkbox. If the checkbox is checked, all signals from this range will be marked according to the "DANGEROUS" or "NON-DANGEROUS" range classification.

3 - the field for viewing the comment that was entered during the adjustion

4 - buttons for control of data exchange with ST 100

5 - initial frequency of the range input field

6 - ending frequency of the range input field

7 - choice of highlighting color (red or green)

8 - comment input field (only numbers and Latin letters)

9 - range delete button (deletes the line highlighted in blue)

10 - buttons for confirmation and cancellation of the adjustments

11 - button for adding the new range

12 - button for download factory settings "SLECTED RANGES" mode

OPERATION IN "SELECTED RANGES" MODE

1. Go to the "Selected Ranges" tab.
2. Download data in any of the following ways:

- From the HDD. Press "Load from File" button and specifying the path to the required file. All information will be downloaded (including data on the selected ranges).
  From ST100:
- Press "Read ALL from ST100" button. All information will be downloaded (including data about the selected ranges).
- Press "Read from ST100" button. Only information about the selected ranges will be downloaded.
- Press "Restoring default ranges" button. The list of ranges set by the manufacturer will be loaded.

1. Adjustion of data:

1. To adjust the range, set the cursor on the corresponding line, which will be highlighted in blue.
2. Adjust the parameters of the range:

- initial and/or ending frequency (Fig.38, item 5 and item 6)
- select the highlight color (Fig.38, item 7)
- enter a comment (Fig.38, item 8)
- sign of activity (Fig.38, item 2)

3. Press the "Apply Changes" button to save the information about the new range or the "Cancel" button to exit without saving.

2. Adding a new range:

1. If necessary, add a new range, click the "Add New" button

2. Enter the parameters of the new range:

- initial and/or ending frequency (Fig.38, item 4 and item 5)
- select the highlight color (Fig.38, item 7)
- enter a comment (Fig.38, item 8)
- sign of activity (Fig.38, item 2)

3. Press the "Apply Changes" button to save the information about the new range or the "Cancel" button to exit without saving.

Restrictions when adjusting and adding ranges:

1. The boundaries of the range must not coincide with the boundaries of another range.
2. Ranges should not overlap.

If this condition is violated, a warning appears on the screen:

"Initial Frequency is in a different range № xx (xxxx - xxxx)"
"Ending Frequency is in a different range № xx (xxxx - xxxx)"

3. The bandwidth should not exceed 200 MHz.
If this condition is violated, a warning appears on the screen:

"The range should be no more 200 MHz!"

3. Deleting the range:

To delete the range, move the cursor on the corresponding line and press the "Delete" button. After confirming the deletion, the line is removed from the list.

Shutting down:

Before completing, you must save the changes in any of the following ways:

- Save to the PC HDD. Press the "Save to File" button and specifying the path for saving and the file name (information about the selected ranges and information from other modes will be saved);
- Download to ST 100 only information about the corrections of the selected ranges. Press the "Write to ST100";
- Download to ST 100 information about all lists (available in all modes). Press the "Write ALL to ST100" button.

9.6. "MOBILE DEVICES" MODE

The mode is intended for creating and adjusting the list of frequency ranges in which mobile devices of digital communication systems operate (used in the region where prospecting works are carried out).
This information, downloaded to the ST 100 memory, is used when the channel "SELECTED RANGES" is operating in the "MOBILE DEVICES" mode.
To enable the mode, go to the "Mobile" tab. The PC screen after that is shown in Fig. 39.
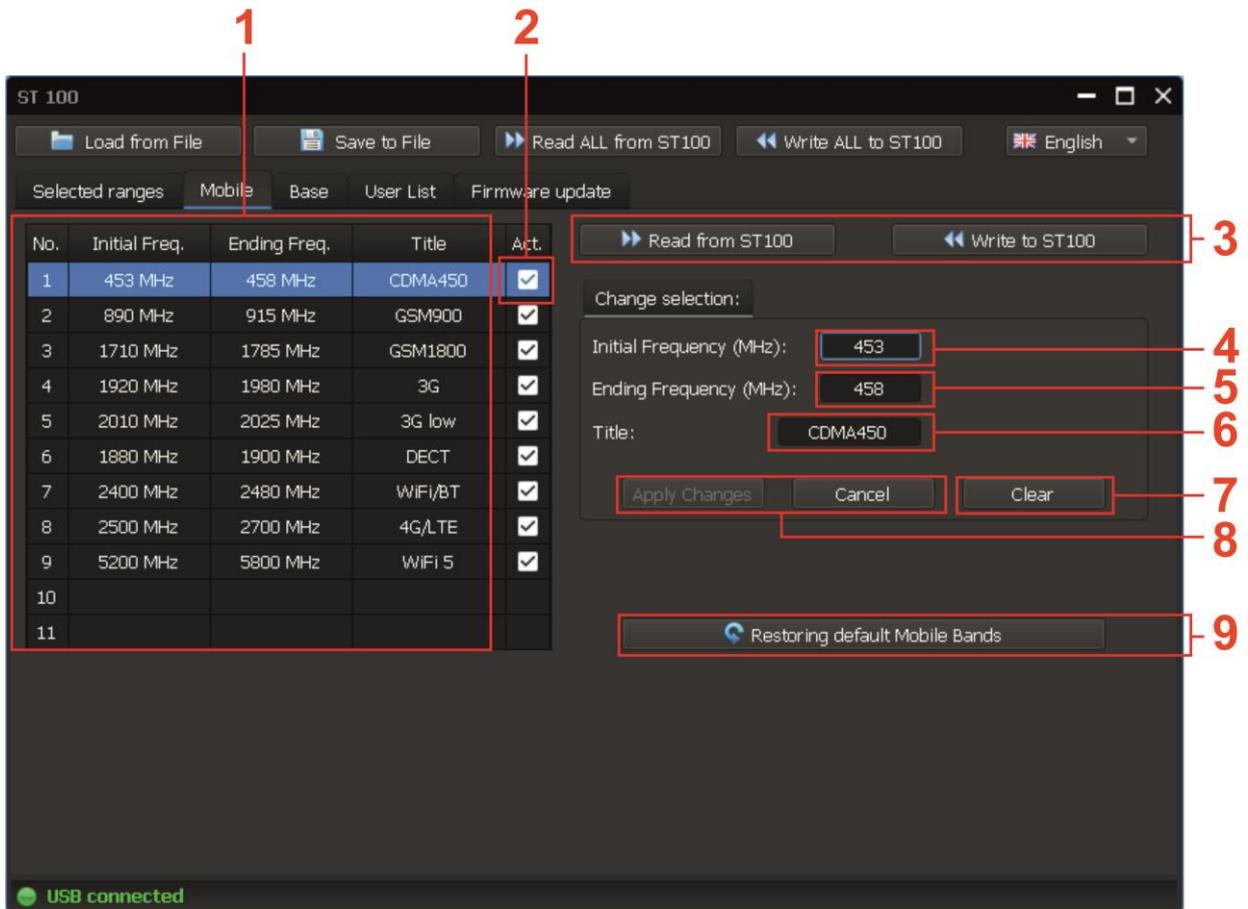
Fig.39

In Fig.39:

1 - list of ranges of mobile devices (number, initial and ending frequencies, range designation). The line of the range to be adjusted is highlighted in blue)

2 - activity selection checkbox (if the checkbox is not checked, after downloading data into the device memory, this range will not be displayed in the list on the screen)

3 - buttons to control the exchange of data with ST 100 (read and write data relating only to the "Mobile devices" mode

4 - initial frequency of the range input field

5 - ending frequency of the range input field

6 - range title input field (only numbers and Latin letters)

7 - range delete button

8 - buttons for confirmation and cancellation of the adjustments

9 - button for loading factory settings (the list of ranges of digital communication mobile devices used in Russia is loaded)

OPERATION IN "MOBILE DEVICES" MODE

1. Go to the "Mobile" tab.

2. Download data in any of the following ways:

- From the HDD. Press "Load from File" button and specifying the path to the required file. All information will be downloaded (including data on the selected ranges).

From ST100:

- Press "Read ALL from ST100" button. All information will be downloaded (including the list of ranges of mobile devices).
- Press "Read from ST100" button. Only the list of mobile ranges will be downloaded.
- Press "Restoring default Mobile Bands" button. The list of ranges of mobile devices used in Russia, set by the manufacturer, will be downloaded.

1. Range adjusting:

1. To adjust the range in the list, place the cursor to corresponding line highlighted in blue.
2. Adjust the data:

- initial and/or ending frequency (Fig. 39, item 4 and item 5)
- title of the range (Fig. 39, item 6)
- sign of activity (Fig. 39, item 2)

3. Press the "Apply Changes" button to save the made adjustments, "Cancel" button to exit without saving the adjustments.

2. Adding a new range:

1. Place the cursor on an "empty" line.
2. Enter data on the parameters of the new range:

- initial and/or ending frequency (Fig. 39, item 4 and item 5)
- title of the range (Fig. 39, item 6)
- sign of activity (Fig. 39, item 2)

3. Press the "Apply Changes" button to save the information about the new range or the "Cancel" button to exit without saving.

Restrictions when adjusting and adding ranges:

1. The maximum number of ranges (lines in the list) is 11.
2. The range should not exceed 600 MHz. If this condition is violated, a warning appears on the screen:

"The band should be no more 600 MHz!"

3. Ranges should not "overlap". If this condition is violated, warnings appear on the screen:

"Initial Frequency > Ending Frequency"

3. Deleting a range:

To delete a range, place the cursor on the corresponding line and press the "Clear" button.

Shutting down:

Before completing, you must save the changes in any of the following ways:

- Save to the PC HDD. Press the "Save to File" button and specifying the path for saving and the file name (the list of mobile devices and information from other modes will be saved);

- Download only information about the corrections made to the ranges of mobile devices into the ST 100 memory. Press the "Write to ST100";
- Download to ST 100 information about all lists (available in all modes). Press the "Write ALL to ST100" button.

9.7. BASE STATIONS MODE

The mode is intended for creating and updating the list of frequency ranges in which the base stations of digital communication systems used in the region where the search operations are carried out operate.

This information, downloaded to the ST 100 memory, is used when the channel "SELECTED RANGES" is operating in the "BASE STATIONS" mode.

To enable the mode, go to the "Base" tab.

The procedure for loading, correcting, saving data and restrictions are the same as described in the "OPERATION IN MOBILE DEVICES MODE" section.

9.8. USER LIST MODE

The mode is intended for creating and correcting the list of frequency ranges in which the signals of interest to the user are located.

This information, downloaded to the ST 100 memory, is used when the channel "SELECTED RANGES" is operating in the "USER LIST" mode.

To enable the mode, go to the "User List" tab.

The procedure for loading, correcting, saving data and restrictions are the same as described in the "OPERATION IN MOBILE DEVICES MODE" section.

9.9. FIRMWARE UPDATE MODE

The firmware version number is displayed on the screen when the ST 100 is turned on (Fig. 40).

Fig.40

You can download the current version of the firmware on the website http://spymarket.com/tp
The screen view in the "FIRMWARE UPDATE" mode is shown in Fig.41.
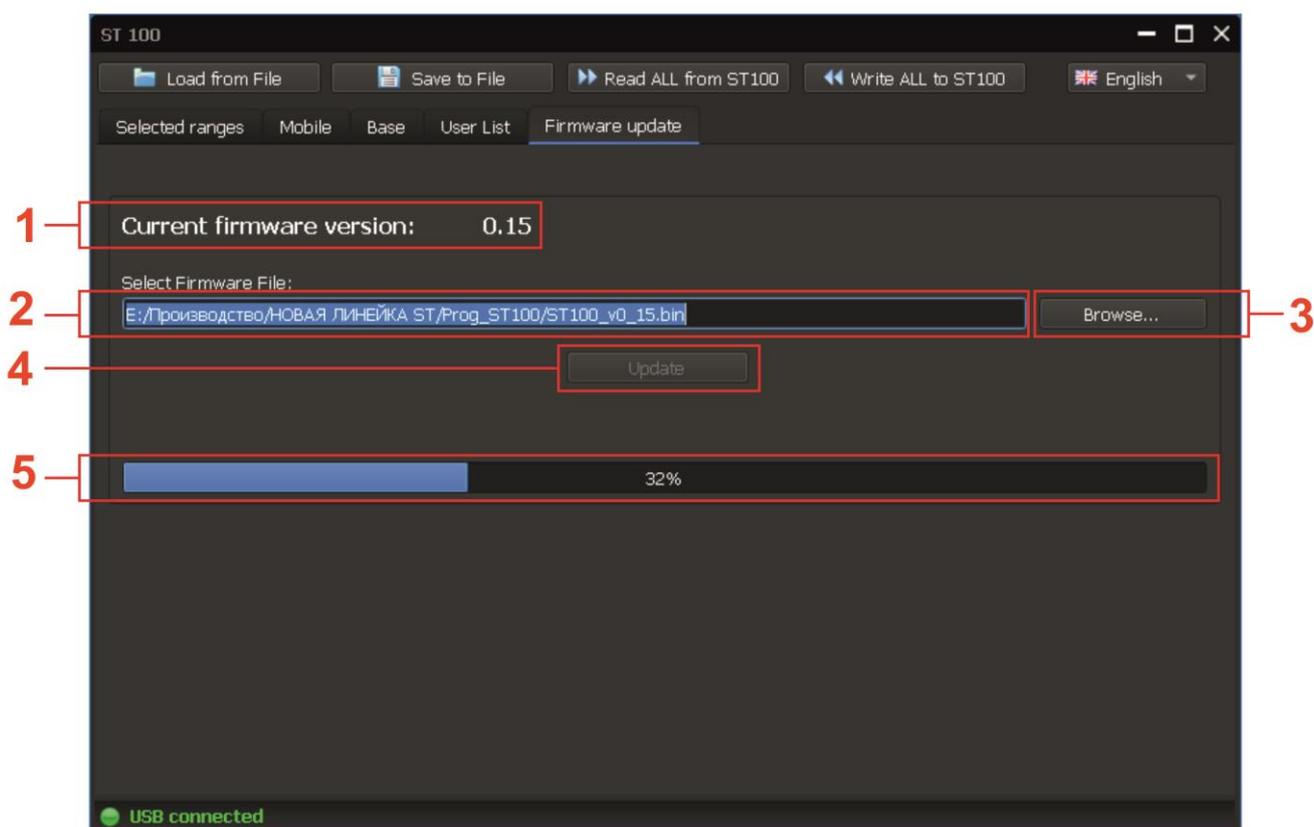
Fig.41

In Fig.41:

1 – current firmware version
2 – path to the file with the new firmware version
3 – button for selecting the path to the file with the new firmware version
4 – button to start the firmware update process
5 – firmware update progress indicator

Firmware update procedure:

1. Download from the "ST Group" Ltd. website ("ПОДДЕРЖКА" tab) http://spymarket.com/tp the firmware file ST 100_vx_xx.bin, (x_xx - version number) to the HDD of the PC.
2. Run the ST 100 program on the PC.
3. Connect the ST 100 main unit to the PC.
4. Go to the "FIRMWARE UPDATE" tab.
5. Press «Browse» button.
6. In the window that appears, specify the path to the file with the new firmware and press the "OPEN" button. The field (Fig. 41, item 2) will display the file name and path to it.
7. Press "UPDATE" button. The progress of the update is shown on the indicator (Fig. 41, item 5). When the update is complete, the message "UPDATE COMPLETE" appears.
8. Press "OK".

On the screen (Fig. 41, item 1) will display the updated firmware version number.

10. REFERENCE INFORMATION

CONTROLS

INITIAL SETTINGS

MAIN MENU

	F1	Turn on SEARCH RECEIVER (20 MHZ - 6 GHZ)
	F2	Turn on SEARCH RECEIVER (6 GHZ – 12 GHZ)
	F3	Turn on SELECTED RANGES
	F4	Turn on PARAMETRIC DETECTOR
	△ ▽	Table cursor control
	ENTER	Confirm action

SETTINGS
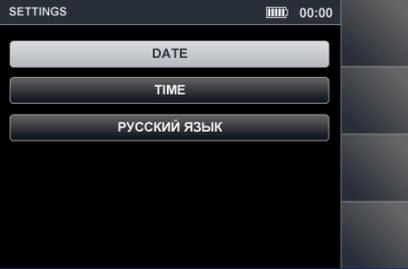
	△ ▽	Table cursor control
	ENTER	Confirm action
	ESC	Exit to MAIN MENU
		To change the interface language, set the cursor on the ENGLISH or РУССКИЙ menu item and press ENTER

SETTING THE DATE

	▷ ◁	Choice of a position
	△ ▽	Correction of value
	ENTER	Save and exit
	ESC	Exit without saving

SETTING THE TIME

	▷ ◁	Choice of a position
	△ ▽	Correction of value
	ENTER	Save and exit
	ESC	Exit without saving

CHANNEL#1. SEARCH RECEIVER (20 MHZ - 6 GHZ)
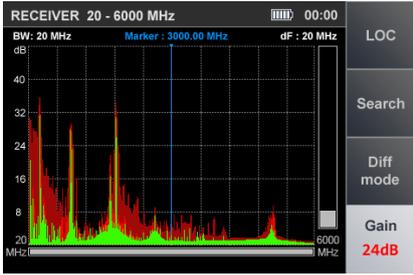
Gain setting		
	⇧ ⇨	Increase gain
	⇩ ⇦	Reducing gain
	F4 **ENTER**	Turn off Gain setting
	MODE	Switch to MAIN MENU
	ESC **FUNC** **F1-F3**	Not used

PANORAMA mode (DIFFERENTIAL mode)

PANORAMA mode (DIFFERENTIAL mode)		
	ESC **MODE**	Switch to MAIN MENU
	⇧	Scaling (Zoom +)
	⇩	Scaling (Zoom -)
		Scaling occurs relative to the set frequency (on the marker)
	⇦ ⇨	Frequency tuning
	F1	Turn on LOCALIZATION mode
	F2	Turn on AUTOMATED mode
	F3	Turn on/off DIFFERENTIAL mode
	F4	Turn on Gain setting
	ENTER	Turn on SIGNAL ANALYSIS AT A FIXED FREQUENCY function
	FUNC	Not used
SIGNAL ANALYSIS AT A FIXED FREQUENCY function		
	MODE	Switch to MAIN MENU
	ESC **ENTER**	Turn off the function (step back)
	⇦ ⇨	Frequency tuning
	F1	Turn on/off SETTING "0" function
	F2	Setting the bandwidth and turning on the FM demodulator
	F3	Turn on the OSCILLOSCOPE function
	F4	Turn on Gain setting
	FUNC ⇧ ⇩	Not used
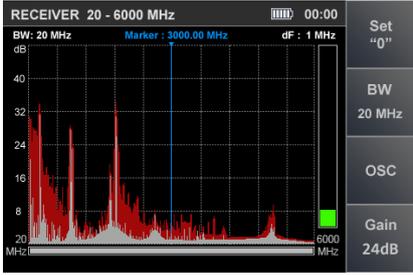
PANORAMA mode, SIGNAL ANALYSIS AT A FIXED FREQUENCY, OSCILLOSCOPE functions

	MODE	Switch to MAIN MENU
	ESC **F3**	Turn off the OSCILLOSCOPE function
	⇦ ⇨	Time axe scaling
	F2	Setting the bandwidth and turning on the FM demodulator
	F4	Turn on Gain setting
	F1 **ENTER** ⇧ ⇩ **FUNC**	Not used

AUTOMATED MODE

AUTOMATED mode, main table of signals

	MODE	Switch to MAIN MENU
	ESC	Return to the previous mode
	FUNC	Sorting the table (ascending frequency or signal level)
	ENTER	Turn on FREQUENCY TUNING function
	⇦ ⇨ ⇧ ⇩	Cursor control
	F1	Turn on/off SETTING "0" function
	F2	Setting the bandwidth and turning on the FM demodulator
	F3	Turn on the OSCILLOSCOPE function
	F4	Turn on Gain setting

AUTOMATED mode, FREQUENCY TUNING function

	MODE	Switch to MAIN MENU
	ESC **ENTER**	Turn off FREQUENCY TUNING function
	⇦ ⇨	Frequency tuning
	F1	Turn on/off SETTING "0" function
	F2	Setting the bandwidth and turning on the FM demodulator
	F3	Turn on the OSCILLOSCOPE function
	F4	Turn on Gain setting
	FUNC ⇩ ⇧	Not used

AUTOMATED mode, OSCILLOSCOPE function		
	MODE	Switch to MAIN MENU
	ESC, F3	Turn off the OSCILLOSCOPE function
	⇦ ⇨	Time axe scaling
	F2	Changing of bandwidth (1 or 20 MHz)
	F4	Turn on Gain setting
	F1 **ENTER** △ ▽ **FUNC**	Not used

LOCALIZATION MODE

MODE	Switch to MAIN MENU	
	MODE	Switch to MAIN MENU
	ESC	Off mode (step back)
	△ ▽	Cursor control
	ENTER	Вкл. SIGNAL ANALYSIS AT A FIXED FREQUENCY function
	F1-F4 ⇦ ⇨ **FUNC**	Not used

CHANNEL#2. SEARCH RECEIVER (6 GHZ - 12 GHZ)

PANORAMA mode (DIFFERENTIAL mode)		
	ESC **MODE**	Switch to MAIN MENU
	△	Scaling (Zoom +)
	▽	Scaling (Zoom -)
		Scaling occurs relative to the set frequency (on the marker)
	⇦ ⇨	Frequency tuning
	F1	Turn on LOCALIZATION mode
	F2	Turn on AUTOMATED mode
	F3	Turn on/off DIFFERENTIAL mode
	ENTER	Turn on SIGNAL ANALYSIS AT A FIXED FREQUENCY function
	F4 FUNC	Not used

PANORAMA (DIFFERENTIAL) mode, SIGNAL ANALYSIS AT A FIXED FREQUENCY function

	MODE	Switch to MAIN MENU
	ESC **ENTER**	Turn off function (step back)
	⬅️➡️	Frequency tuning
	F1	Turn on/off SETTING "0" function
	F3	OSCILLOSCOPE function
	F2 F4 **FUNC** ⬆️ ⬇️	Not used

PANORAMA mode, SIGNAL ANALYSIS AT A FIXED FREQUENCY, OSCILLOSCOPE functions

	MODE	Switch to MAIN MENU
	ESC **F3**	OSCILLOSCOPE function
	⬅️ ➡️	Time axe scaling
	F1 F2 F4 **ENTER** ⬆️ ⬇️ **FUNC**	Not used

AUTOMATED MODE

AUTOMATED mode, MAIN TABLE

	MODE	Switch to MAIN MENU
	ESC	Return to the previous mode
	FUNC	Sorting the table (ascending frequency or signal level)
	ENTER	Turn on FREQUENCY TUNING function
	⬅️➡️ ⬆️ ⬇️	Cursor control
	F1	Turn on/off SETTING "0" function
	F3	Turn on the OSCILLOSCOPE function
	F2 F4	Not used

AUTOMATED mode, FREQUENCY TUNING function

	MODE	Switch to MAIN MENU
	ESC **ENTER**	Turn off FREQUENCY TUNING function
	◁ ▷	Frequency tuning
	F1	Turn on/off SETTING "0" function
	F3	Turn on the OSCILLOSCOPE function
	F2 F4 **FUNC** ▽ △	Not used

AUTOMATED mode, OSCILLOSCOPE function

	MODE	Switch to MAIN MENU
	ESC **F3**	Turn off the OSCILLOSCOPE function
	◁ ▷	Time axe scaling
	F1 F2 F4 **ENTER** △ ▽ **FUNC**	Not used

LOCALIZATION MODE

	MODE	Switch to MAIN MENU
	ESC	Off mode (step back)
	△ ▽	Cursor control
	ENTER	Turn on the SIGNAL ANALYSIS AT A FIXED FREQUENCY function
	F1-F4 ◁ ▷ **FUNC**	Not used

CHANNEL#3. SEARCH RECEIVER FOR MONITORING THE SELECTED RANGES

MOBILE DEVICES mode

	MODE **ESC**	Switch to MAIN MENU
	▽ △	Cursor control
	ENTER	Turn on ANALYSIS OF THE DETECTED SIGNAL function
	F2	Turn on BASE STATIONS mode
	F3	Turn on USER LIST mode
	F4	Turn on Gain setting
	F1, FUNC ◁ ▷	Not used

BASE STATIONS mode

	MODE ESC	Switch to MAIN MENU
	▽ △	Cursor control
	ENTER	Turn on ANALYSIS OF THE DETECTED SIGNAL function
	F1	Turn on MOBILE DEVICES mode
	F3	Turn on USER LIST mode
	F4	Turn on Gain setting
	F2, FUNC ◁ ▷	Not used

USER LIST mode

	ESC MODE	Switch to MAIN MENU
	▽ △	Cursor control
	ENTER	Turn on ANALYSIS OF THE DETECTED SIGNAL function
	F1	Turn on MOBILE DEVICES mode
	F2	Turn on BASE STATIONS mode
	F4	Turn on Gain setting
	F3, FUNC ◁ ▷	Not used

ANALYSIS OF THE DETECTED SIGNAL function, OSCILLOSCOPE function
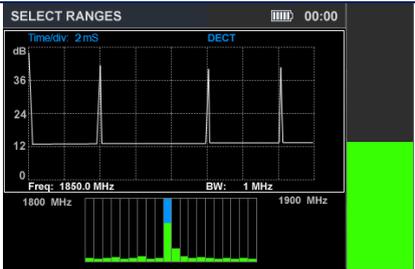
	MODE	Switch to MAIN MENU
	ESC	Off mode (step back)
	▽ △	Turn on SPECTRUM ANALYZER function
	ENTER	Turn on/off SETTING "0" function
	◁ ▷	Time axe scaling
	F1-F4 FUNC	Not used

ANALYSIS OF THE DETECTED SIGNAL function, SPECTRUM ANALYZER function

	MODE	Switch to MAIN MENU
	ESC	Turn off the mode (step back)
	▽ △	Turn on the OSCILLOSCOPE function
	ENTER	Turn on/off SETTING "0" function
	◁ ▷	Frequency tuning
	F1-F4 FUNC	Not used

CHANNEL#4. INFRARED DETECTOR
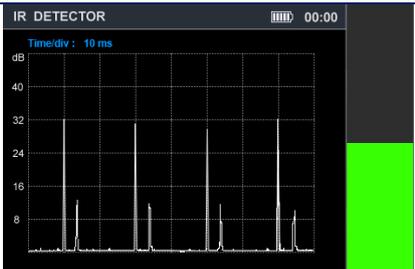
	MODE ESC	Switch to MAIN MENU
	ENTER	Turn on/off DIFFERENTIAL mode
	◁ ▷	Time axe scaling
	F1-F4 FUNC ▽ △	Not used
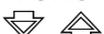
CHANNEL#5. PARAMETRIC DETECTOR

PARAMETRIC DETECTOR ▥ 00:00	**MODE** **ESC**	Switch to MAIN MENU
Connect parametric detector! Connect headphones!	◁ ▷ ▽ △ **ENTER** **F1-F4** **FUNC**	Not used