

5. STRUCTURE OF THE DEVICE

5.1. The spectrum analyzers **Arinst SSA-TG R2**, **Arinst SSA Pro R2** and **Arinst SSA Lite R2** shown in Figures 1 - 3.



Figure 1 – Arinst SSA-TG R2



Figure 2 – Arinst SSA Pro R2 and Arinst SSA Lite R2

- | | |
|---|---|
| 1. The output of the signal generator TG OUT | 6. Indicator of the mode of operation of the device MODE |
| 2. Antenna input RF IN | 7. Battery charging indicator CHARGE |
| 3. Housing | 8. Connector mini-USB |
| 4. Color resistive screen 3,2” | 9. Control button block |
| 5. Button on / off POWER | |

5.2. The control button unit is shown in figure 3.

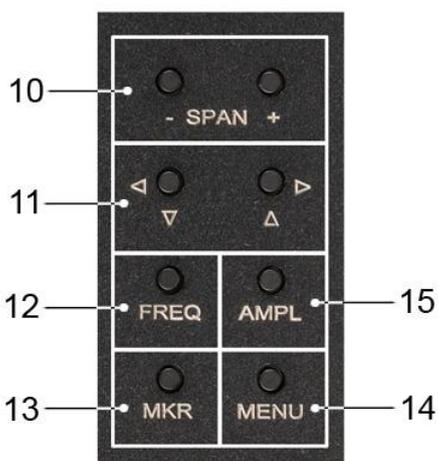


Figure 3 – The block of control buttons

10. « SPAN » (overview frequency range) - buttons " - " and " + " change the frequency range of the analyzed signal.
11. Buttons to move the screen scale grid and change the frequency.
12. « FREQ » - displays the frequency parameters on the screen. Long press (more than 2 seconds) to open the menu for setting the viewing frequency range.
13. « MKR » setting markers. Long (more than 2 seconds) button holding opens the menu of markers and peak values of the analyzed signal.
14. « MENU » - the button opens the main menu of the device.
15. « AMPL » - output amplitude parameters on the screen. Long (more than 2 seconds) holding the button opens the menu for setting the amplitude parameters.

5.3. The spectrum analyzer **Arinst SSA-TG LC R2** shown in Figure 4.



Figure 4 – Arinst SSA-TG LC R2

- | | |
|---|---|
| 1. The output of the signal generator TG OUT | 6. Indicator of the mode of operation of the device
POWER |
| 2. Antenna input RF IN | 8. Connector mini-USB |

Note. The device and the appearance of spectrum analyzers discontinued given in **APPENDIX B** to this instruction manual.

6. ACTIVATION

Attention! The use of the device in open spaces during snowfall or rain is prohibited. If the device is brought in the winter from a cold room, or from the street into a warm room, do not turn it on for a time sufficient to evaporate condensate from the device.

Attention! Match the voltage and power of the input signal with the maximum technical characteristics of the device listed in Tables 1 and 2.

6.1. Turning on the device

6.1.1. Ensure that the instrument is free from external damage and the battery is charged. Charge the discharged battery pack before using the device, following the instructions in section 10.2. of this "Manual".

6.1.2. To enable **Arinst SSA-TG R2, Arinst SSA Pro R2 and Arinst SSA Lite R2**, press and hold the «POWER» button (5) for 1-2 seconds. The operation mode LED (7) «MODE» will flicker a series of flashes. Screen (4) turns on and the signal's spectrum graph will be displayed on it.

6.1.3. The spectrum analyzer **Arinst SSA-TG LC R2** does not have its own independent power supply. The device is powered from a power source (battery) phone or tablet to which it is connected or the power supply from the PC or laptop.

6.1.4. The device is controlled by a smartphone or tablet running Android version 4.1 and above that support the USB OTG standard. Since the spectrum analyzer does not have its own power source, the device is powered from the power source (battery) of the smartphone or tablet to which it is connected. All measured data are transmitted in real time to a smartphone or tablet via USB OTG cable and displayed on the screen.

- Connect the spectrum analyzer to your smartphone or tablet. Make sure your smartphone or tablet is running Android OS version 4.1 or higher and supports USB OTG standard. You will need a USB OTG cable. Connect the USB OTG cable mini-USB connector of the device to the micro-USB connector of your smartphone or tablet. The glow of the instrument mode indicator (6) «POWER» confirms the power supply and activation of the analyzer.

6.1.5. The device can be controlled by a PC or laptop running Windows 7 and above. Power supply, control of the device and data transfer is carried out via USB-cable.

- Connect the spectrum analyzer to a PC or laptop. Connect the USB cable supplied with the mini-USB connector of the device to the USB connector of your computer or laptop. The operating mode led (6) «POWER» will light up and the analyzer will turn on.

Note. Description of the instrument control software interface using devices based on Android and Windows operating system is placed in section 8 of this manual. The detailed algorithm of the spectrum analyzer to connect to devices running Windows operating system is set out in **APPENDIX A** of this manual.

6.2. Turning off the device

6.2.1. To turn off the devices **Arinst SSA-TG R2, Arinst SSA Pro R2 and Arinst SSA Lite R2**, press and hold the "POWER" button (5) for 1-2 seconds. The mode LED (7) "MODE" and the screen (4) are off. The device will turn off.

6.2.2. Information on the installation of automatic shutdown of the device is in section 7.9.6 of this "Manual".

6.2.3. To turn off the analyzer **Arinst SSA-TG LC R2**, disconnect it from your smartphone or tablet (or laptop computer). Mode indicator (6) «POWER» will go off, the device switches off.

7. THE SCREEN OF THE DEVICE

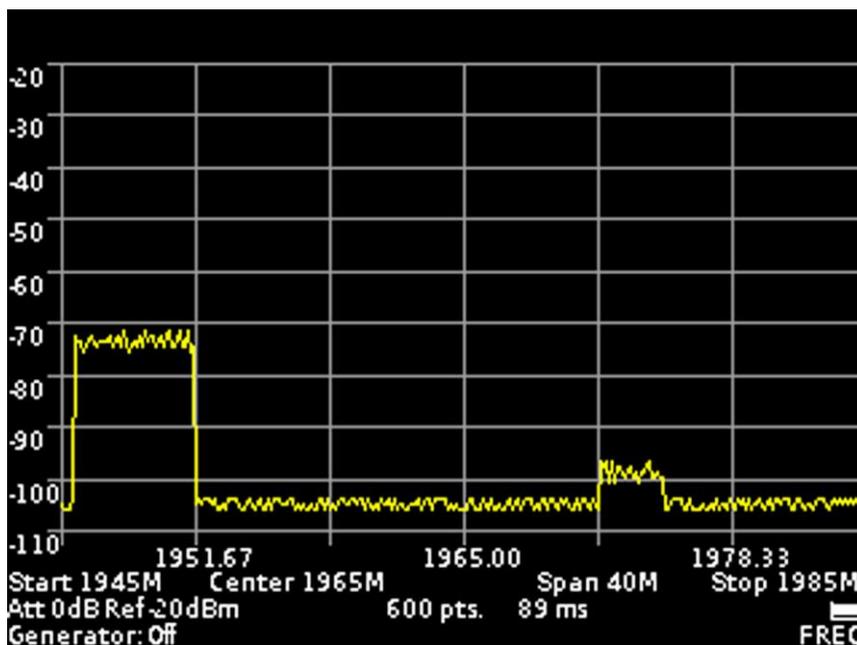


Figure 5 – Grid and information on the screen

7.1. Screen grid and information label

7.1.1. The screen of the device is divided by a scale grid consisting of horizontal and vertical lines. The horizontal axis is calibrated with a frequency that increases linearly from left to right. The vertical axis is calibrated in amplitude. A logarithmic scale is set, calibrated either in decibels per milliwatt (dBm) or in decibels per microvolt (dBuV).

7.1.2. At the bottom of the screen is an information label, which displays the current settings of the device and the parameters of the frequency range of the review, the analyzed signal.

For example, in figure 5, the initial frequency of the test signal «**Start**» is 1945 MHz, the final frequency «**Stop**» is 1985 MHz. Survey range frequency «**Span**» is 40 MHz, the central frequency «**Center**» is 1965 MHz. Internal attenuator «**Att**» is set to 0 dB, the maximum level of the input harmonic signal «**Ref**» is set at the level of -20 dBm, a built-in signal generator the «**Generator**» is disabled (**Off**). Also displayed on the screen: the number of scan points «**pts**» and the scan time in milliseconds «**ms**». In the lower right corner displays the degree of discharge of the battery.

7.1.3. To move the screen scale grid up and down (in amplitude), briefly press the «**AMPL**» button (15) on the button block. «**AMPL**» appears in the lower right corner of the screen. Use the navigation buttons (11) to move the screen grid up and down.

7.1.4. To move the scale grid of the screen left-right (in frequency), briefly press the «**FREQ**» button (12) on the button block. «**FREQ**» appears in the lower right corner of the screen. Use the navigation buttons (11) to move the screen grid left-right.

Note. When moving the scale grid left-right (in frequency), the specified span of the frequency «**Span**» does not change. The values of the initial «**Start**», the final «**Stop**» and the central «**Center**» frequencies of the measured signal change.

7.1.5. To move the markers (left-right) in frequency, briefly press the button (13) «**MKR**» on the block of buttons. In the lower right corner of the screen appears the inscription «**MK 1**» (the number is the ordinal number of the marker). Use the navigation buttons (11) to change the position of the marker. If there are more than one markers, then to switch between them, briefly press the «**MKR**» button. The designation of the active marker (**MK 1 ... MK 4**) will appear in the lower right corner of the screen. In the upper left corner of the screen information will appear on the signal power of the marked frequency.

7.2. Main menu

7.2.1. Turn on the instrument in accordance with section 6 of this «Manual». To enter the main menu, press the «MENU» button (14) on the button block. The menu appears on the screen, as in figure 6.

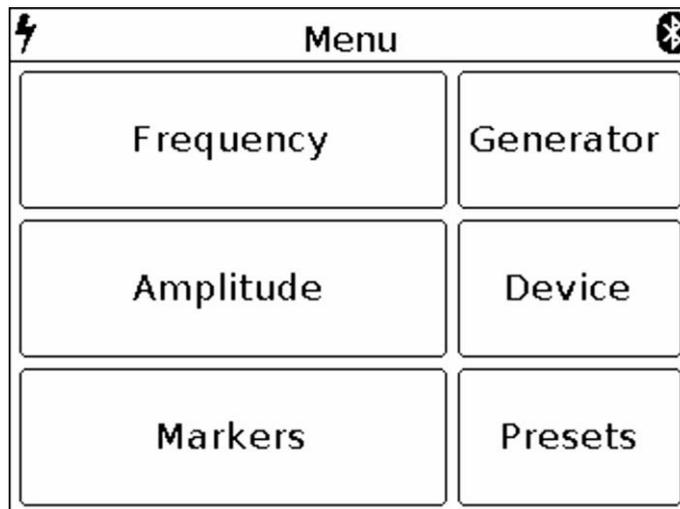


Figure 6 – Main menu

7.2.2. Each section of the main menu has its own purpose:

Frequency - subsection of the menu in which the frequency range of the analyzed signal is set.

Amplitude – the subsection of the menu in which the amplitude parameters are set (step and scale of the screen grid, input resistance, maximum level of the input harmonic signal).

Markers – a submenu in which visual amplitude markers are set at a fixed frequency or over the entire frequency range of the analyzed signal.

Generator – the menu for turning on the signal generator, setting the power and frequency of the signal generator. It also measures the standing wave ratio (SWR) and the amplitude-frequency response of the equipment under test.

Device - in this menu, the device shutdown timer, amplitude and frequency shift are set, the serial number of the device, its version and the settings for connecting the device via Bluetooth are specified.

Presets - menu to save custom presets.

7.2.3. To exit the main menu, press (14) «MENU».

7.3. Setting the frequency range of the analyzed signal

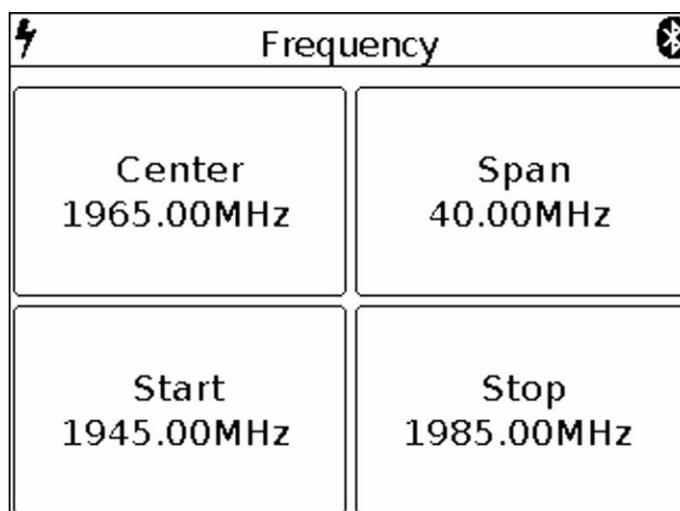


Figure 7 – Menu of setting the frequency of the overview

7.3.1. To set the frequency range, enter the main menu of the instrument (Figure 6) by pressing (14) «MENU». Select subsection «Frequency». The menu appears on the screen, as in figure 7.

Note. For quick access to the menu, press and hold the button (12) for about 2 seconds «FREQ».

7.3.2. Each of the options of the submenu has its own purpose:

Center – setting the center frequency of the frequency range of the overview of the analyzed signal.

Span – setting the frequency range.

Start – setting the initial frequency of the measured frequency range.

Stop - setting the final frequency of the measured frequency range.

7.3.3. Each of the parameters is set by entering a numerical value in the opened submenu, as in Figure 8. Enter the numeric value of the frequencies and press **Enter**. To delete erroneous or previously entered values, press **Del**. To refuse to enter a value, press **Cancel**. *In our example, in Figure 8, setting the frequency range of the survey is 40 MHz wide.*

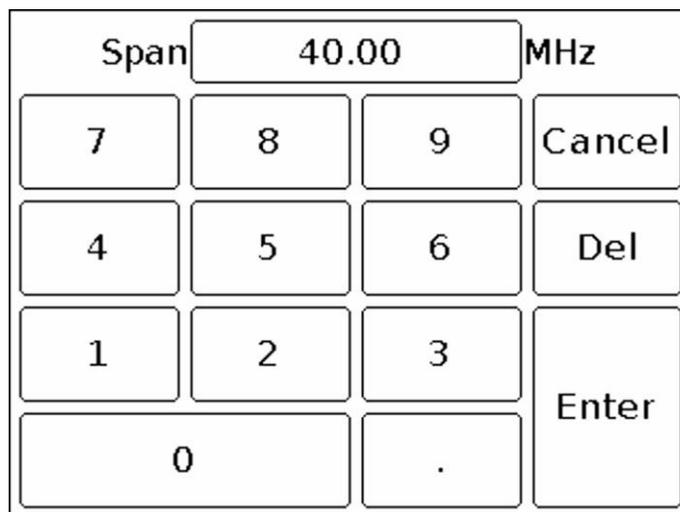


Figure 8 – Entering numeric values.

7.3.4. In the analysis of wide frequency ranges (**Span**) more than 40 MHz, to reduce the analysis time, the frequency scan is performed with a maximum step. In this case, the error in measuring the signal power can reach 6 dB. This mode is used for rapid detection of signals and is not intended for accurate power measurements. To increase the measurement accuracy to 3 dB, it is necessary to reduce the width of the span to values less than 40 MHz. Further reduction of the span will lead to a decrease in measurement error.

7.3.5. Setting the frequency parameters in three ways:

a) By entering the initial **Start** and final **Stop** frequencies, the center **Central** frequency is automatically assumed to be equal to their half-sum. The frequency range of the overview **Span** is automatically taken equal to the difference between the final and initial frequencies.

b) Setting the center frequency **Center** and the frequency range of the overview **Span**. In this case, the initial Start and final Stop frequencies will be set automatically, as **Center ± Span / 2**.

c) By loading custom settings from the **Presets** menu (see section 7.10).

7.3.6. To exit the menu of setting the frequency range to the main menu, press the button (14) «MENU».

7.4. Setting the main parameters of the amplitude of the analyzed signal

7.4.1. To set the amplitude parameters of the analyzed signals, enter the main menu of the device (figure 6) by pressing the button (14) «MENU». Select the subsection **Amplitude**. The menu will appear on the screen, as in Figure 9.

Note. For quick access to the menu, press and hold the button (15) «AMPL» for about 2 seconds.

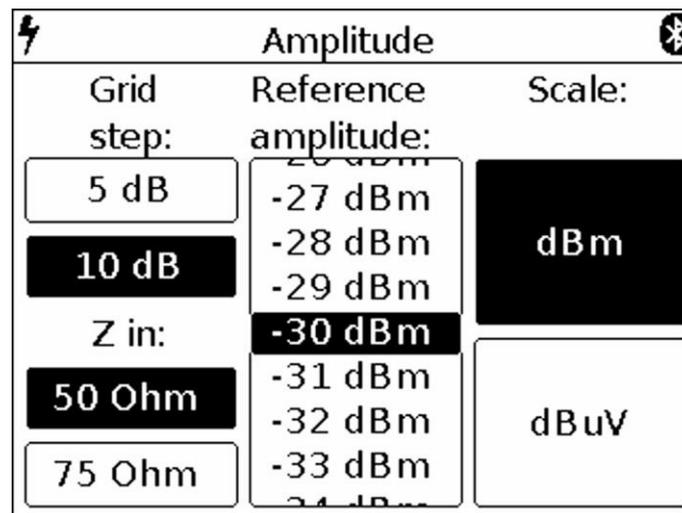


Figure 9 – Amplitude parameters setup menu

7.4.2. In this menu, the following parameters are set:

Grid step – parameter that sets the step of the scale grid of the screen, along the vertical axis. It is possible to set the grid in increments of 5 dB or 10 dB.

Z in – The parameter that determines the input / output impedance. It is used when calculating the input signal level of the receiver and the generator output signal (if any). At the same time, the real value of impedances is 50 Ohm. The value of 50 or 75 Ohm must be chosen depending on the wave impedance of the connected antenna / load.

Scale – change of vertical scale graduation in dBm or dBuV values.

Reference amplitude – the parameter that sets the maximum level of the input harmonic signal does not cause overload of the receiver (the maximum displayed value of the amplitude). It is set depending on the selected parameter calibration of the vertical scale (**Scale**) range from 10 to -75 dBm or in the range of 117 to 32 dBuV.

7.4.3. Each parameter is set by pressing the corresponding menu value or by "scrolling" the values to a fixed selected area.

7.4.4. The level of attenuation of the input signal (the value of the internal attenuator) is set automatically, depending on the set value **Reference amplitude**.

Attention! If the input signal level is much higher than the **Reference amplitude** value, a warning message **Dynamic range exceeded** appears on the device screen. In this case, the correct display of the input signal level is impossible. In this case it is necessary:

- increase the value **Reference amplitude** (the internal attenuator will be activated);
- to use an external attenuator.

7.4.5. To exit to the main menu, press the button (14) «MENU».

7.5. Menu for setting markers and signal peaks

7.5.1. To enter the menu of setting markers and peaks, enter the main menu of the device (Figure 6) by pressing the button (14) «MENU». Select subsection **Markers**. The menu appears on the instrument screen, as in Figure 10.

Note. To quickly access the menu, press and hold the button for about 2 seconds (13) «MKR».

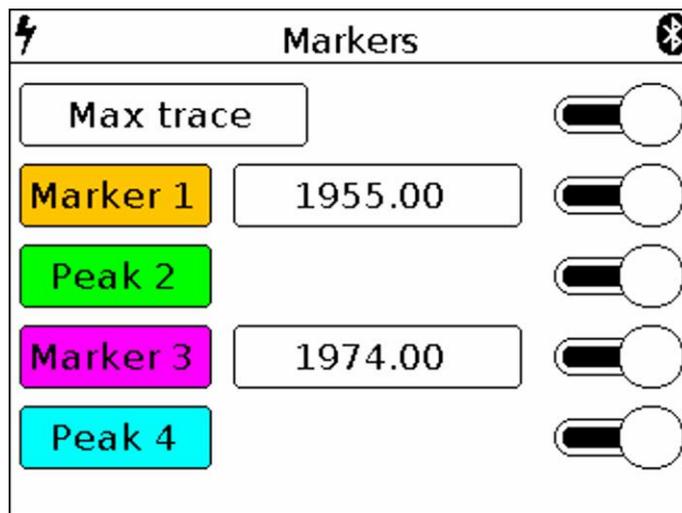


Figure 10 – The menu of markers and peak values of the signal. Max trace mode is on

7.5.2. In this menu are installed:

Max trace – when this mode is enabled, the maximum values of the signal are displayed on the screen and a red line is drawn along the points of the maximum values. In order to fix the track include a pause, touching the screen of the device.

Min trace – when this mode is enabled, the minimum values of the signal are displayed on the screen and a green line is drawn along the points of the minimum values. In order to fix the track include a pause, touching the screen of the device.

When you turn on the **Avg trace (Average)** mode, the signal will be averaged on the screen. The number of measurements in this mode is limited in the range from 4 to 16. In order to fix the track include a pause, touching the screen of the device.

In **Waterfall** mode, a spectrogram is displayed below the spectrum graph. The spectrogram allows you to analyze the background of the signal for a certain time interval. Due to the selectivity of color perception of a person, it is possible to detect signals at the noise level with the help of spectrogram.

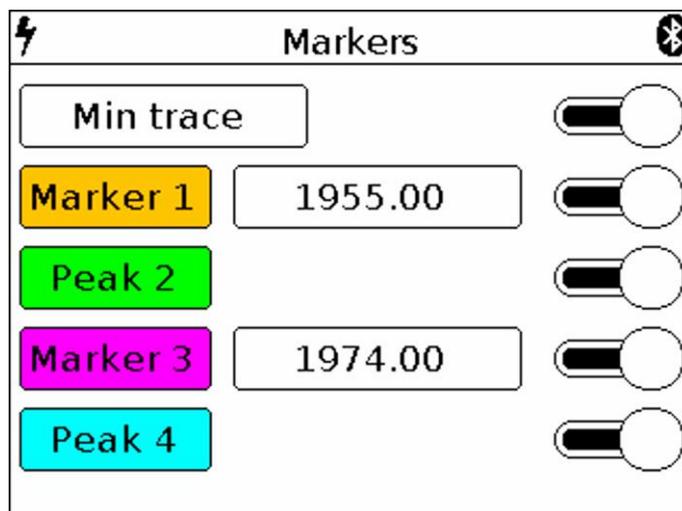


Figure 10.1 – The menu of markers and peak values of the signal. Min trace mode is on

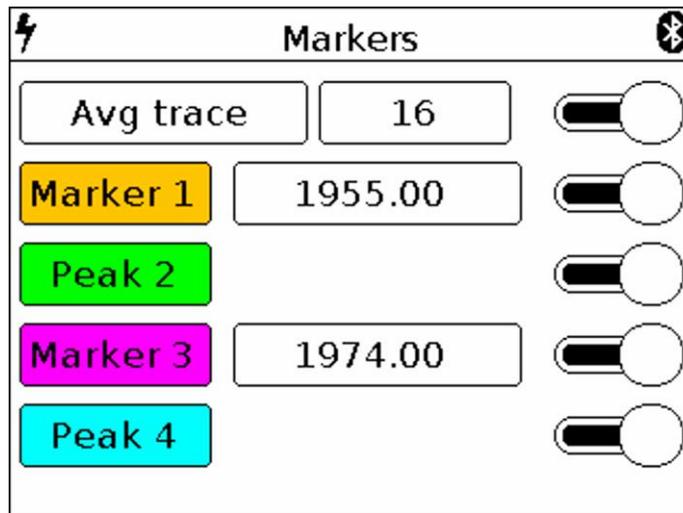


Figure 10.2 – The menu of markers and peak values of the signal. Avg trace mode is on

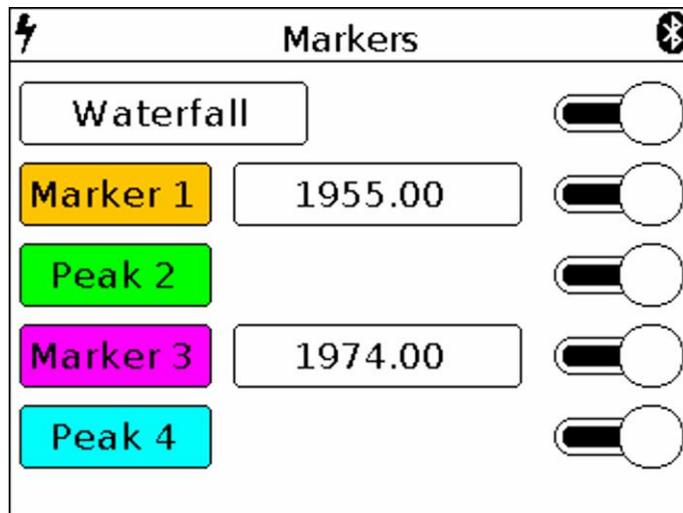


Figure 11 – The menu of markers and peak values of the signal. Waterfall mode is on

When **Waterfall** mode is enabled, a spectrogram is displayed on the instrument screen below the spectrum graph (figure 11.1).

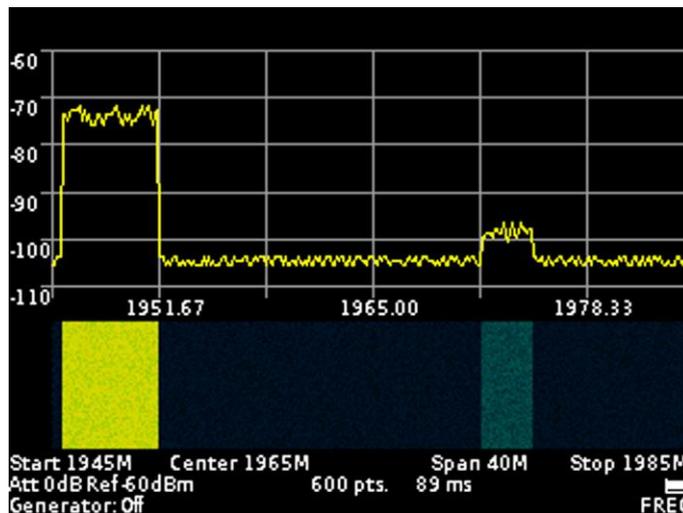


Figure 11.1 – Displaying the spectrogram below the spectrum graph

Turning on / off the **Max trace**, **Min trace**, **Avg trace** and **Waterfall** modes is performed by moving the “slider” to the right / left opposite the corresponding mode.

Marker - visual indicator of signal amplitude at the frequency of marker location specified by the operator. The design of the device allows the use of up to four multi-colored markers at the same time to monitor the change in the amplitudes of the analyzed signal at four frequencies given by the operator.

Note. Also, the marker can be switched to the maximum signal tracking mode (**Peak mode**). Up to four simultaneous tracking peaks on a chart.

Peak – visual indicator of the maximum value of the signal amplitude over the entire frequency range. The design of the device allows the use of up to four multi-colored peak indicators to monitor changes in the amplitudes of the analyzed signal over the entire range of the specified frequency range.

7.5.3. Setting the specified marker frequency is performed by entering a numeric value in the opened submenu, as in figure 12. Enter a numeric frequency value and press **Enter (enter data)**. To delete erroneous or previously entered values, press **Del (Delete)**. To refuse to enter a value, click **Cancel**. In our example, in figure 12, we set the frequency to 1960 MHz for marker.

7.5.4. Moving the included markers on the screen in real time, make in accordance with paragraph 7.1.5. of this «Manual».

7.5.5. If it is necessary to search and track the maximum (peak) amplitude values over the entire range of the signal under analyze, one or several **Marker** indicators must be switched to the **Peak** value as shown in figure 10.

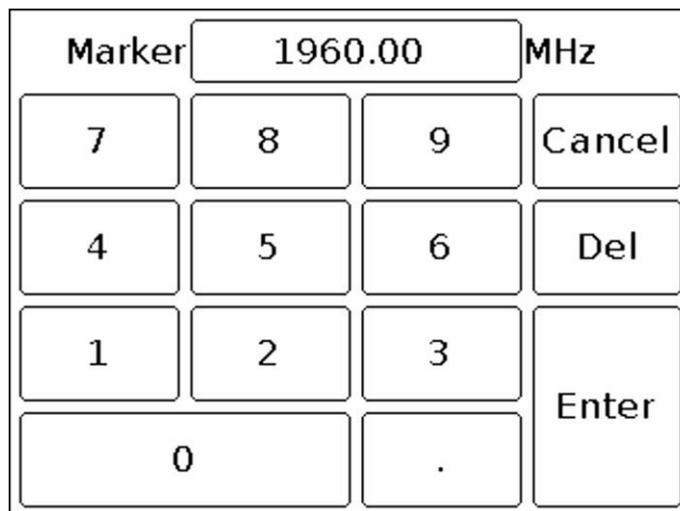


Figure 12 – Entering numerical values of marker frequencies

Switching on / off the **Marker** and **Peak** modes is made by moving the “slider” to the right / left opposite the corresponding mode.

7.5.6. To exit the setup menu of markers and peak values of the signal, press the button (14) «**MENU**».

7.6. Signal generator frequency and power setting menu

7.6.1. To set the values of the frequency and output power of the built-in generator, go to the main menu of the device (Figure 6) by pressing the button (14) «**MENU**». Select subsection **Generator**, menu will appear on the screen as in figure 13.

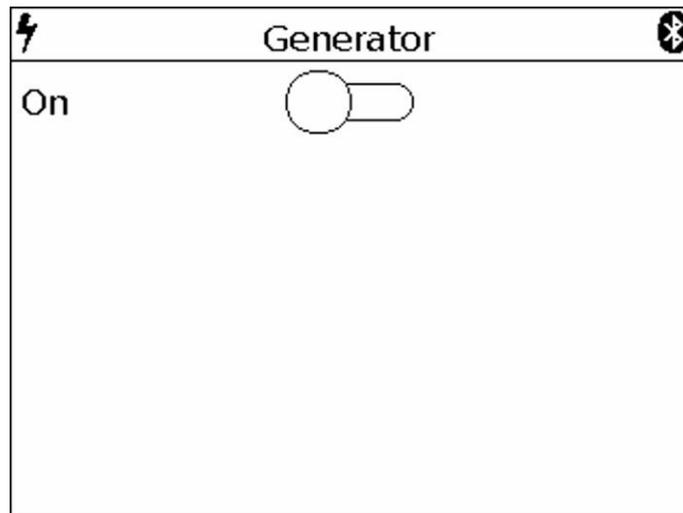


Figure 13 – Switching on the internal signal generator

7.6.2. To turn on the internal output generator, move the “slider” across the screen to the right. On the screen will open the window for setting the frequency of the **Frequency** and the power of the **Power** of the generator output signal, as in Figure 14.

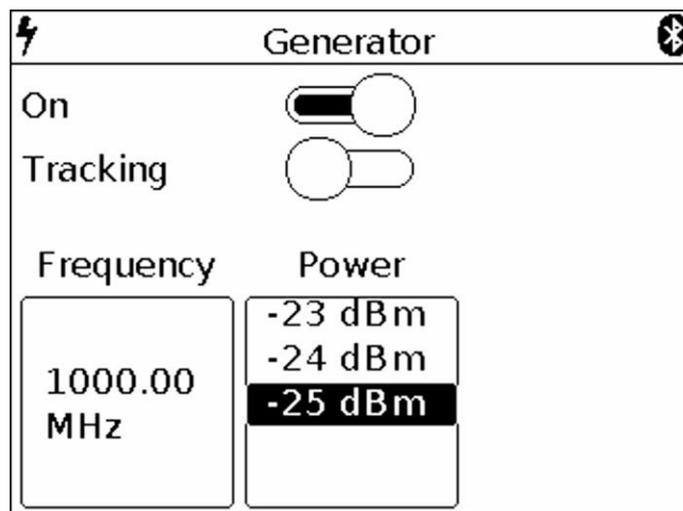


Figure 14 – Setting the frequency and power output of the generator

7.6.3. Setting the frequency of the output signal of the internal generator, **Frequency**, is done by entering a numeric value in the opened submenu, as in Figure 15. Enter a numeric value for the generator output frequency, between 35 and 6200 MHz, and press **Enter**. To delete erroneous or previously entered values, press **Del**. To refuse to enter a value, click **Cancel**. In our example, in figure 15, the output frequency of the generator is set to 1000 MHz.