

2016

Measuring Center 2.6

User Manual

Software for sound signal analysis



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General Information

Starting Operation

Please use the CD that is included with the Spl-Lab equipment distribution kit or download the latest Measuring Center version from the site: www.spl-lab.ru, www.spllabusa.com. Copy the contents of the SPL-LAB_MC folder from the CD or unpack the archive to the hard drive of your computer, for example, to the desktop. Check for updates in Support section of the Spl-Lab site from time to time. We care for our customers and constantly seek to improve and supplement the software.

Connect the necessary Spl-Lab equipment to your PC. Drivers will be installed automatically.

If the equipment of the NEXT-LAB series, LCD Bass Meter or USB-1208LS is used, install respective drivers from the CD or download them from the site.

When using equipment like WIRELESS BASS METER that utilizes Bluetooth, configure the device in Bluetooth Windows settings beforehand. **Pairing code “1234”**.

If you have a license for using Event-mode module, copy it into the “License” folder of the Measuring Center program catalog.

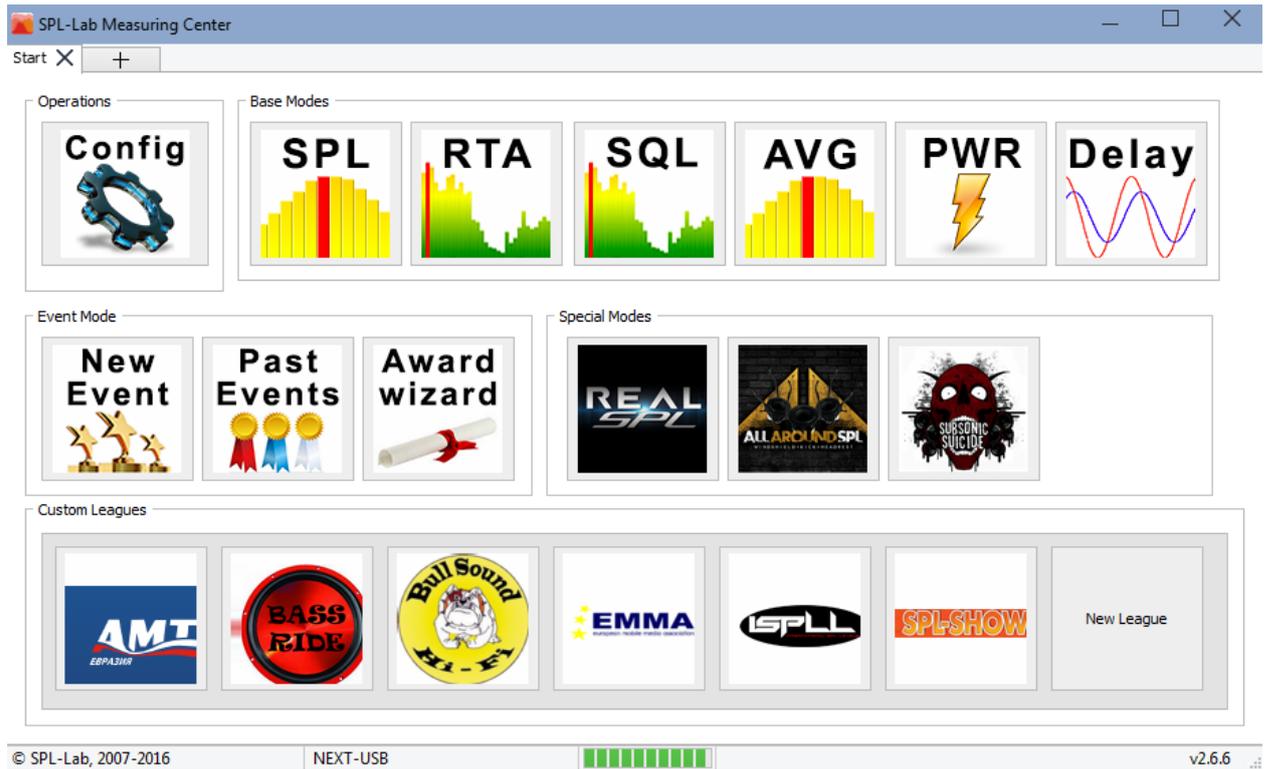
The Measuring Center will be unable to start operation unless the supported equipment is connected to the PC and configured in advance.

After installation and connecting the equipment, start the *Spl-Lab_MC.exe* executable file from the Measuring Center program catalog.

Program Interface

Measuring Center has the interface that is similar to modern internet browsers with tabs. Tabs can be added by using “+” in the upper tab toolbar. Each new tab initially contains the startup page. Tabs can be moved, swapped, added and closed using the cross in the corner of the tab name. If there is only one tab left and try to close it, it will automatically close the entire program.

After starting the Measuring Center, the Start tab is opened (depicted below):



“Start” tab has five groups of elements.

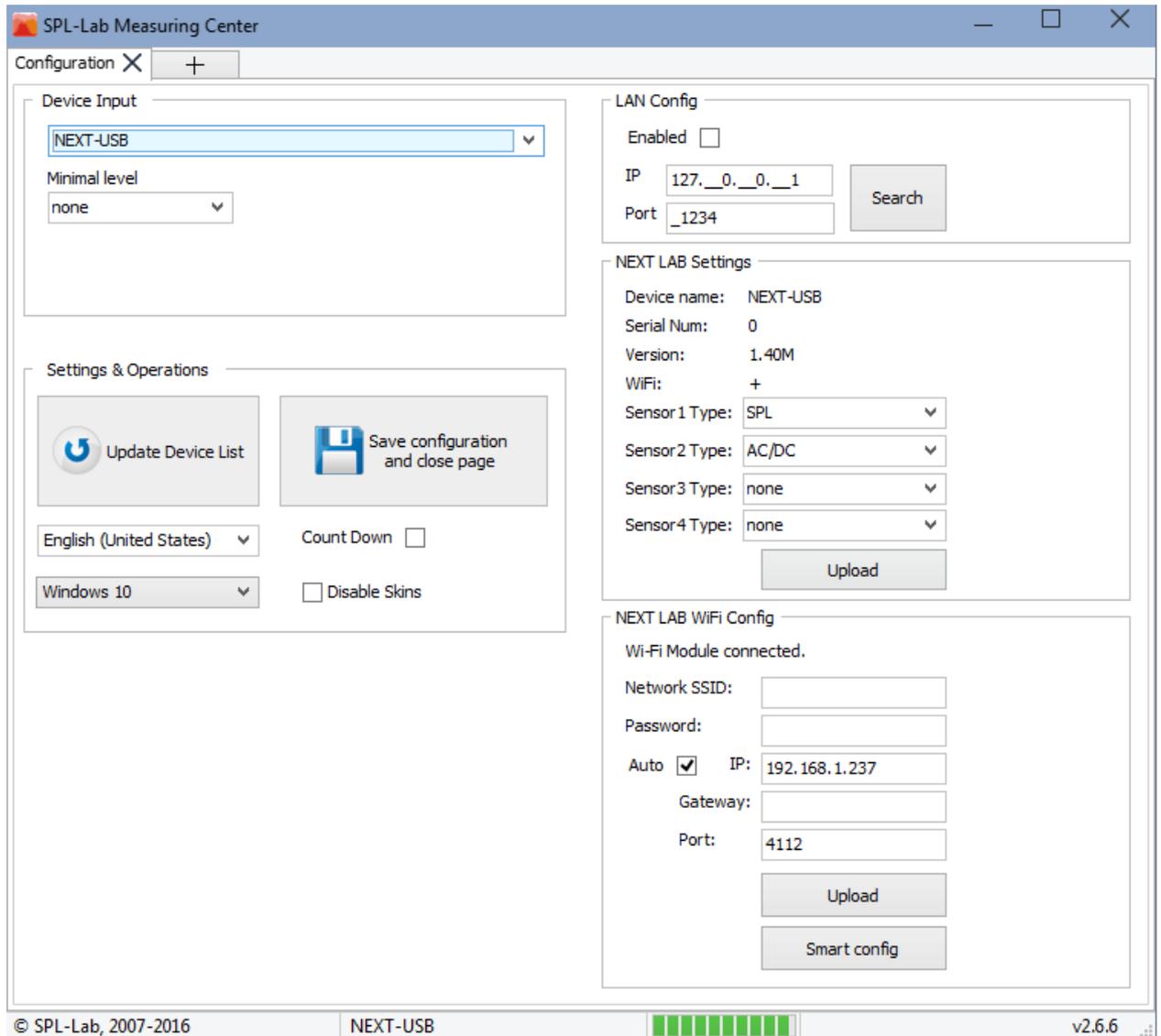
- “Operations” - the group that consists of Equipment Configuration Launcher for equipment used in Measuring Center. Operation should be started from this tab.
- “Base modes” - the group of basic measuring modes. Each mode has its unique measuring algorithm.
- “Event mode” – the group of buttons for working with Event-mode module - the software package for analysing, recording and processing the measurement results.
- “Special modes” - the group of specialized measuring modes. Each mode has its unique measuring algorithm.

- **“Custom leagues”** the group of buttons, for League Manager, for creating, using and editing the pre-configured measuring modes.

Start work with the Measuring Center by pressing “Configuration” button.

Configuration

The appearance of the Measuring Center Configuration tab is depicted below:



Designation of the interface elements (from left to right):

“**Device input**” - the dropdown list of the devices detected by the Measuring Center. Certain devices can have several types. In such case, the required type should be selected.

The currently used device is always displayed in the bottom line of Measuring Center window.

“**Minimal Level**” - the minimum value of the amplitude level. Values below the specified value will be ignored when displaying the main result. Also, the range of the displayed spectrum amplitude is limited from below with this value. If you change this setting with the mode tab open after saving configuration, refresh the tab with the mode for changes to take effect.

“**Reference value**” - the reference value for the used device. It is not applicable for all devices. Input the value indicated on your equipment. If USB-1208LS is used, it is necessary to input coefficients for two channels.

“**Update device list**” - button for updating/refreshing the device list. Use it if a new device was connected.

“**Save configuration**” - saving configuration and exiting the window.

“**English (United States)**” - dropdown list with Measuring Center interface languages. Usually language is set in accordance with the Windows regional settings. In case of mismatch, change this parameter manually.

“**Count Down**” - option that is used to switch between countdown and count up.

“**Windows 10**” - dropdown list for selecting Measuring Center interface style.

“**LAN Config**” Group

“**Enabled**” - option that enables search of WiFi Next-Lab devices in the local network.

“**IP**” - setting the IP-address of the device.

“**Port**” - setting the network port of the device. Default code – 4112. **Change only in case of network configurations conflict.**

“**Search**” - search of connected WiFi Next-Lab devices in the local network. Please take note that operation of this function depends on peculiarities of specific local network parameter settings.

For setting up a connection with devices in a local network, please save the configuration and open configuration tab again.

“**NEXT-LAB Settings**” group

This group of elements is available only when using Next-Lab series equipment.

“**Device Name:**” - data field displaying name of the connected device

“**Serial Num:**” - data field displaying serial number of the connected device

“**Version:**” - data field displaying firmware version of the connected device

“**WiFi:**” - data field displaying availability of WiFi module in the connected device

“**Sensor Type**” - the dropdown list for displaying and changing the type of pluggable sensor on the respective port of the device. When using the RTA type sensors, input, in the field on the right, its coefficient, which is indicated on the device. If the coefficient is not given, leave the “**Default**” value.

“**Upload**” - the button for transmitting changed port configuration to the device.

“NEXT-LAB WiFi Config” group

This group of elements is available only when using Next-Lab series equipment that has a WiFi module.

“WiFi module connected” - field that displays current status of the WiFi module. In case of successful connection to the network, the device IP address and port data will be displayed below in corresponding fields.

“Network SSID” - the name of the wireless network to which the device has to connect

“Auto” – option that sets automatic configuration of the device IP address and port data. In case this option is enabled, filling in the device IP address and port data is not required.

“IP” - the field that displays (if connected) or sets the device IP addresses

“Gateway” - the field that sets the network gateway IP-address

“Port” - the field that displays (if connected) or sets the device network port Default code – 4112. **Change only in case of network configurations conflict.**

“Upload” - the data transmission button for connecting the device to the wireless network.

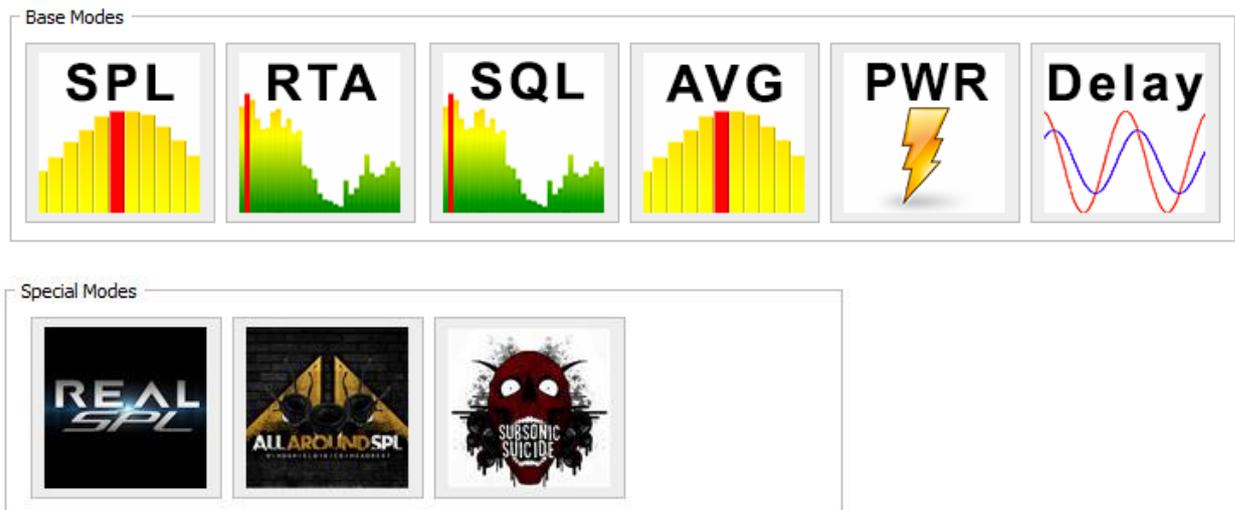
“Smart Config” - the button for starting the Smart Config procedure on the device. For successful completion, it is necessary to start the relevant procedure in the Measuring Center mobile application.

After configuring the equipment, save the configuration.

Measuring Modes

There are two major measuring mode groups in the Measuring Center: “**Base modes**” and “**Special modes**”. “**Base modes**” - is a group that consists of six basic measuring modes. “**Special modes**” - is a group that consists of three highly specialized measuring modes. Each mode has unique algorithm for conducting measurements. Different modes run with various types of equipment. In case the equipment mismatches the selected mode, the Measuring Center will inform about this and will suggest carrying out the reconfiguration of devices.

The list of the modes are depicted below:



“**SPL**” - is the mode used for measuring the peak value of the sound pressure level for signals with frequency ranging from 10 to 20 Hz with resolution of 1 Hz. In this mode, the waveform, spectrum and level of the measured signal are reflected. It is possible to measure up to 4 channels simultaneously. In this mode, it is possible to measure the voltage-current characteristics and the sound pressure simultaneously when using appropriate equipment.

This mode supports the following devices:

- Next-Lab SPL Sensor
- Next-Lab Power Sensor for measuring the voltage-current characteristics.
- USB Bass Meter
- USB Bass Meter (PRO Edition)
- LCD BASS Meter
- Wireless Bass Meter
- USB-1208LS

“**RTA**” – is the mode used for measuring the amplitude, distortion and frequency-response ripple of the sound signal with frequency ranging from 10 to 20000 Hz frequency with resolution of 2.7 Hz. In this mode, the waveform, spectrum, amplitude, distortion and frequency-response ripple are reflected. In this mode, it is possible to measure the voltage-current characteristics and the sound pressure simultaneously, when using appropriate equipment. This mode supports the following devices:

- Next-Lab Power Sensor
- Next-Lab RTA Microphone
- Next-Lab RTA Microphone (HIGH SPL 155 dB)
- USB RTA Meter (Pro Edition)
- USB Noise Meter (Pro Edition)

“**SQL**” – is the mode used for measuring weighted average sound pressure of signal with frequency ranging from 10 to 20000 Hz with resolution of 1/24 octave. In this mode, the waveform, spectrum and weighted average amplitude are reflected. This mode supports the following devices:

- Next-Lab Power sensor – a voltage channel is used
- Next-Lab RTA Microphone
- Next-Lab RTA Microphone (HIGH SPL 155 dB)
- USB RTA Meter (Pro Edition)
- USB Noise Meter (Pro Edition)

“**AVG**” is the mode used for measuring time-average peak value of the sound pressure level of the signal with frequency ranging from 10 to 120 Hz with resolution of 2 Hz. In this mode, the waveform, spectrum and level of the measured signal are reflected. It is possible to measure up to 4 channels simultaneously. In this mode, it is possible to measure the voltage-current characteristics and the sound pressure simultaneously.

This mode supports the following devices:

- Next-Lab SPL Sensor
- Next-Lab Power Sensor for measuring the voltage-current characteristics.
- USB Bass Meter
- USB Bass Meter (PRO Edition)
- LCD BASS Meter
- Wireless Bass Meter
- USB-1208LS

“PWR” – the mode used for measuring the voltage-current characteristics of alternating/direct current and voltage signals with frequency from 0 to 15000 Hz. In this mode, the voltage, current and power are reflected. This mode supports the following devices:

- Next-Lab Power Sensor

“Delay finder” – is the mode used for measuring delay and the phase of the sound signal with frequency ranging from 10 to 16000 Hz. In this mode, the waveform, delay and phase are reflected. This mode supports the following devices:

- Next-Lab RTA Microphone
- Next-Lab RTA Microphone (HIGH SPL 155 dB)
- USB RTA METER (Pro Edition)
- USB Noise Meter (Pro Edition)
- Windows audio devices for synchronisation

“REAL SPL” – specialized mode based on the SPL mode. In this mode, it is possible to measure the voltage-current characteristics and the sound pressure simultaneously, when using appropriate equipment.

This mode supports the following devices:

- Next-Lab SPL Sensor
- Next-Lab Power Sensor for measuring the voltage-current characteristics.
- USB Bass Meter
- USB Bass Meter (PRO Edition)
- LCD BASS Meter
- Wireless Bass Meter
- USB-1208LS

“ALL AROUND SPL” – specialized mode based on the AVG mode. The mode works **ONLY** with 2 channels! In this mode, it is possible to measure the voltage-current characteristics and the sound pressure simultaneously, when using appropriate equipment.

This mode supports the following devices:

- Next-Lab SPL Sensor – use of three transducers is obligatory.
- Next-Lab Power Sensor for measuring the voltage-current characteristics.

“SUBSONIC SUICIDE” – specialized mode based on the SPL mode. In this mode, it is possible to measure the voltage-current characteristics and the sound pressure simultaneously, when using appropriate equipment.

This mode supports the following devices:

- Next-Lab SPL Sensor
- Next-Lab Power Sensor for measuring the voltage-current characteristics.
- USB Bass Meter
- USB Bass Meter (PRO Edition)
- LCD BASS Meter
- Wireless Bass Meter
- USB-1208LS

Select the necessary mode and press the corresponding button. The page of the mode will be opened in the current tab of the program.

SPL Measuring Mode

Operation Principle

The SPL mode is intended for measuring the sound pressure level of the low frequency sound signals. The length of the analysed part of the signal equals to one second. The resultant value of the sound pressure level is calculated from several spectral components for each analysed part of the signal separately.

Control and Display Elements



Designation of the interface elements (from left to right):

“Start/Stop” – the button for starting/stopping a measurement process. It is impossible to close the program during the process of measuring: first you have to stop the measurement and then you can close the program.

“Reset” – the button for resetting the values on-screen. It includes also the values collected in the Peak Hold mode. This operation does not reset the collected data in the spectrum memory banks.

“Peak hold” – the checkbox that enables/disables the Peak hold mode. The panel in the main area holds the maximum amplitude reached during the entire time of measurement and in the frequency area - the frequency at which the maximum amplitude value was reached. Only the peak component at the corresponding frequency is marked on the spectrum, and the amplitude values for each frequency change only in case they exceed the previous maximum. Disabling the Peak Hold Mode automatically resets the collected data. Values on the oscilloscope are not retained.

“Default” – the button that sets the default values for all control elements of the mode.

“Channels” – selecting a number of channels used if the equipment used supports operation in multichannel mode. In case several channels are used, the screen is divided into corresponding number of equal parts.

“Common settings” – the checkbox for switching on the use of common settings for all channels. In such case, the settings of the first channel are accepted as the common settings. This option is available only in multichannel mode.

“Rounding to” – the dropdown list for selecting up to how many digits the measurement results on the panel will be rounded. **“One decimal”** – rounding to 1 decimal, **“Two decimal”** – rounding to 2 decimals.

“Noise reduction” – the checkbox that enables/disables noise reduction system when measuring the voltage-current characteristics. This option is available only when using the appropriate equipment.

“Measure period” – the dropdown list for selecting time of the measurement in seconds. In case the “none” value is selected, the measurement will continue until it is stopped manually.

“Freq, bound” – the dropdown list for setting the threshold frequency of the measured signal. The signals with frequency that exceeds the specified one will not be considered. The spectrum will be delimited by the selected value.

“Peak detection” – the checkbox that enables/disables the detection of the threshold frequency overstepping. In case the measured signal frequency oversteps the threshold frequency, the amplitude and frequency will be fixated on the panel with red background. Further measurement will be possible only after resetting the results or stopping the measurement.

“**Cal type**” - the dropdown list for selecting the type of calibrations used in measurement - “**Classic**” or “**Magnum**”. The measurement results will differ depending on the selected calibrations.

“**Score**” - the element group responsible for operation of the numeric panel.

“**Roll up**” - the checkbox that enables/disables displaying the numeric panel.

“**Windowed**” - the checkbox that enables/disables displaying the numeric panel in a separate window. In case the second monitor is connected to the system, the window will be automatically displayed on it.

“**Show ex**” - the checkbox that enables/disables displaying the panel bottom line with additional information such as current frequency, measuring time and current amplitude.

“**Mode AC**” - the dropdown list for selecting the type of the measured signal when measuring the voltage-current characteristics. “**AC**” - alternating current/voltage, “**DC**” - direct current/voltage. This option is available only when using the appropriate equipment.

“**Total, VA**” - the dropdown list for selecting the type of reflected power values when measuring the voltage-current characteristics. “**Total, VA**” - total power, “**Active, W**” - active power. This option is available only when using the appropriate equipment.

“**Hold**” - the dropdown list for selecting the type of hold of reflected values when measuring the voltage-current characteristics. “**None**” - no hold, “**Max**” - peak figures of voltage, current and power are retained. “**Min**” - minimum values of voltage, current and power are retained. “**Max SPL**” - figures of voltage, current and power corresponding to highest reached sound pressure are retained. This option is available only when using the appropriate equipment.

“**Calibration**” - the button for opening calibration parameters when measuring the voltage-current characteristics. More detailed information is available in the description of “**PWR**” mode. This option is available only when using the appropriate equipment.

“**Oscilloscope**” - the element group responsible for operation of the oscilloscope. After stopping the measurement, the required wave segment can be zoomed in by selecting it left to right with the mouse.

“**Roll up**” - the checkbox that enables/disables displaying of the oscilloscope.

“**View**” - the dropdown list for selecting the displaying type in Oscilloscope.

“**Wave form**” - the signal waveform is displayed.

“**Value in time**” - the measurement of the main value in time is displayed on the panel.

“**THD=1.1%**” - display area of the harmonic distortion of the present part of the signal.

“**Spectrum**” - the element group responsible for operation of the spectrograph. You can specify values in any graph point by clicking it with the mouse. The peak component of a spectrum is marked in red.

“**Roll up**” - the checkbox that enables/disables displaying of the spectrograph.

“**Logarithmic scale**” - the checkbox that enables/disables displaying the logarithmic view of the spectrum frequency axis.

“**Auto**” - the checkbox that enables/disables the automatic zoom option for spectrum amplitude axis. With this option enabled, the lower value corresponds to the specified one and the upper value - is being set in accordance with the spectrum peak component.

“**Memory banks**” – the memory bank control elements for saving and comparing measurement results. For saving current measurement results, press one of the color buttons: current result will be outlined by the corresponding color graph and saved into the memory. To enable/disable displaying of the saved result, check the checkbox next to the color button of the required bank. For saving data from all the banks, press “**Save**” button and specify a file name. For loading the previously saved memory bank, press “**Load**” button and select the required file. For exporting data into the text format, press “**Export**” button and specify a file name.

“**dB plot range**” - two dropdown lists defining the spectrum amplitude display range. The lower value is delimited by the parameter “**Minimal value**” that is set in the configuration tab.

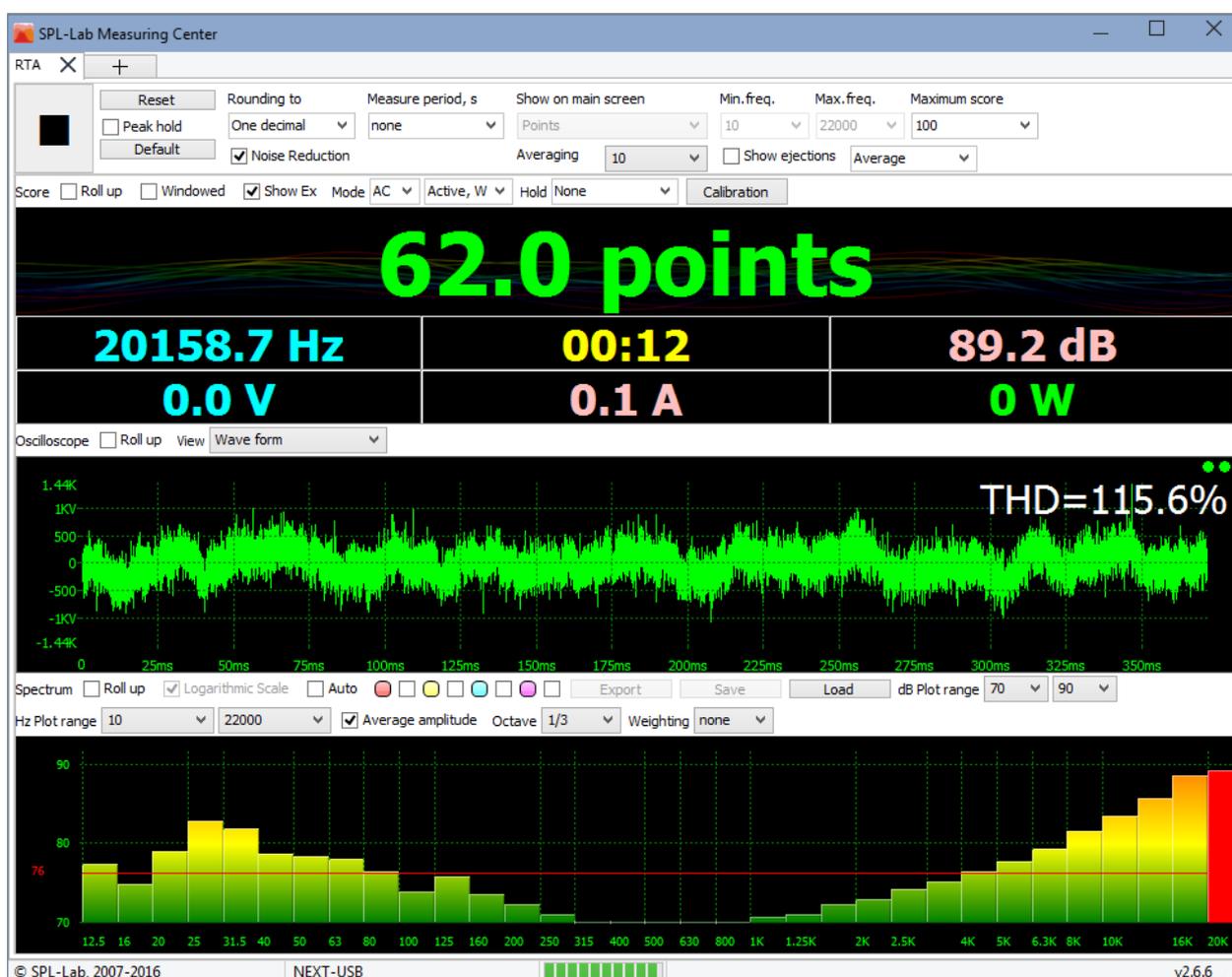
“**Hz plot range**” - two dropdown lists defining the spectrum frequency display range. The upper value is limited by “**Freq, bound**” parameter.

RTA Measuring Mode

Operation Principle

The multifunctional RTA mode is intended for measuring different sound signal characteristics through the entire audible frequency range. The length of the analysed part of the signal approximately equals to 1/2.7 second. In the RTA mode, the amplitude of spectral peak component, nonlinear distortion coefficient and frequency-response ripple of the analysed signal can be measured.

Control and Display Elements



Designation of the interface elements (from left to right):

“Start/Stop” – the button for starting/stopping a measurement process. It is impossible to close the program during the process of measuring: first you have to stop the measurement and then you can close the program. In the AVG mode, the measurement begins after a 5 second countdown.

“Reset” – the button for resetting the values on-screen. This operation does not reset the collected data in the spectrum memory banks.

“Peak hold” – the checkbox that enables/disables the Peak hold mode. The panel in the main area holds the maximum amplitude reached during the entire time of the measurement and in the frequency area - the frequency at which the maximum amplitude value was reached. On the spectrum for all components, the amplitude values for each frequency change only in case they exceed the previous maximum. Disabling the Peak Hold Mode automatically resets the collected data. Values on the oscilloscope are not retained.

“Default” – the button that sets the default values for all control elements of the mode.

“Rounding to” – the dropdown list for selecting up to how many digits the measurement results on the panel will be rounded. **“One decimal”** – rounding to 1 decimal, **“Two decimal”** – rounding to 2 decimals.

“Noise reduction” – the checkbox that enables/disables noise reduction system when measuring the voltage-current characteristics. This option is available only when using the appropriate equipment.

“Measure period” – the dropdown list for selecting time of the measurement in seconds. In case the “none” value is selected, the measurement will continue until it is stopped manually.

“Show on main screen” – the dropdown list for selecting the type of value displayed on-screen. The following types are available:

- **“Peak amplitude”** - amplitude of the peak component of the spectrum.
- **“Points”** - frequency-response ripple in arbitrary units
- **“THD”** - coefficient of harmonic distortion
- **“Average amplitude”** - time-average amplitude of the spectrum peak component

“Min.freq” + **“Max.freq”** - two dropdown lists defining the analysed frequency range of the measured signal. The spectrum will be delimited by the specified values. The spectrum components that do not fit into the range will not be taken into the consideration.

“Maximum score” - the dropdown list for selecting the basic value for frequency-response ripple calculation. This setting is active only if the corresponding type of displayed value is used.

“Averaging” - the dropdown list for selecting the spectrum smoothing in time. This setting is useful for stabilizing the results when measuring sound signals.

“**Show ejections**” - the checkbox responsible for displaying the Setup panel for algorithm of the frequency-response ripple calculation. This setting is active only if the corresponding type of displayed value is used. The Setup panel appearance is depicted below:

Ejection	Type	Substraction
6.	Any	3.
4.	First	3.
4.	Not first	1.

Add	Delete	Default
Save	Up	Down

You can change a value in a cell by pressing the necessary cell. The execution sequence by the algorithm is computed from top downward within the table.

Designation of the interface elements (from left to right):

“**Ejection**” - the size of overshoot (ejection) against the amplitude reference value. At first, all the overshoot values that are higher or equal to the specified value are detected.

“**Type**” - type of overshoot. Further, all found overshoots are checked against the specified type. Overshoots are searched along the spectrum from left to right. Available definitions of type are listed below:

- “**First**” - the first overshoot detected.
- “**Last**” - the last overshoot detected.
- “**Not first**” - all overshoots, except for the first detected.
- “**Not last**” - all overshoots, except for the last detected.
- “**Minimal**” - the smallest overshoot detected.
- “**Maximal**” - the largest overshoot detected.
- “**Not minimal**” - all overshoots, except for the smallest detected.
- “**Not maximal**” - all overshoots, except for the largest detected.
- “**Any**” - any one of the overshoots detected.

“**Substation**” - the amount that is subtracted from the value specified in “**Maximum score**” for all overshoots that are bigger or equal to “**Ejection**” value and correspond to conditions of “**Type**”.

“**Add**” - the button for adding a line below the current one.

“**Delete**” - the button for deleting a current line.

“**Default**” - the button for loading the default algorithm.

“**Save**” - the button for saving current table.

“Up” - the button for moving the current line up.

“Down” - the button for moving the current line down.

The control panel will be hidden when the checkbox unchecked.

“Average” - the dropdown list for selecting amplitude reference value for frequency-response ripple calculation. When the specified value equals to **“Average”**, the reference value is automatically calculated from spectrum by finding the arithmetic average of all its components. This setting is active only if the corresponding type of displayed value is used.

“Score”, “Oscilloscope” - groups of elements responsible for operation of the numeric panel, oscilloscope and spectrograph, similar to **“SPL”** mode.

“Spectrum” - the element group responsible for operation of the spectrograph. You can specify values in any graph point by clicking it with the mouse. The peak component of a spectrum is marked in red.

“Roll up” - the checkbox that enables/disables displaying of the spectrograph.

“Logarithmic scale” - the checkbox that enables/disables displaying of the logarithmic view of the spectrum frequency axis.

“Auto” - the checkbox that enables/disables the automatic zoom option for spectrum amplitude axis. With this option enabled, the lower value corresponds to the specified one, and the upper value - is being set in accordance with the spectrum peak component.

“Memory banks” – the memory bank control elements for saving and comparing measurement results. For saving current measurement results, press one of the color buttons: current result will be outlined by the corresponding color graph and saved into the memory. To enable/disable displaying of the saved result, check the checkbox next to the color button of the required bank. For saving data from all the banks, press **“Save”** button and specify a file name. For loading the previously saved memory bank, press **“Load”** button and select the required file. For exporting data into the text format, press **“Export”** button and specify a file name.

“dB plot range” - two dropdown lists defining the spectrum amplitude display range. The lower value is delimited by the parameter **“Minimal value”** that is set in the configuration tab.

“Hz plot range” - two dropdown lists defining the spectrum frequency display range. The upper value is limited by **“Freq, bound”** parameter.

“Average amplitude” - the checkbox that enables/disables displaying of the average amplitude as a red line on spectrum.

“Octave” - the dropdown list for enabling and selecting the detailing of octave view of spectrum. The octave view is effective for use when measuring the pink noise. In this case, the

AFC should tend to a flat line. With disabled octave view for getting the flat AFC, use a sweep-tone or white noise.

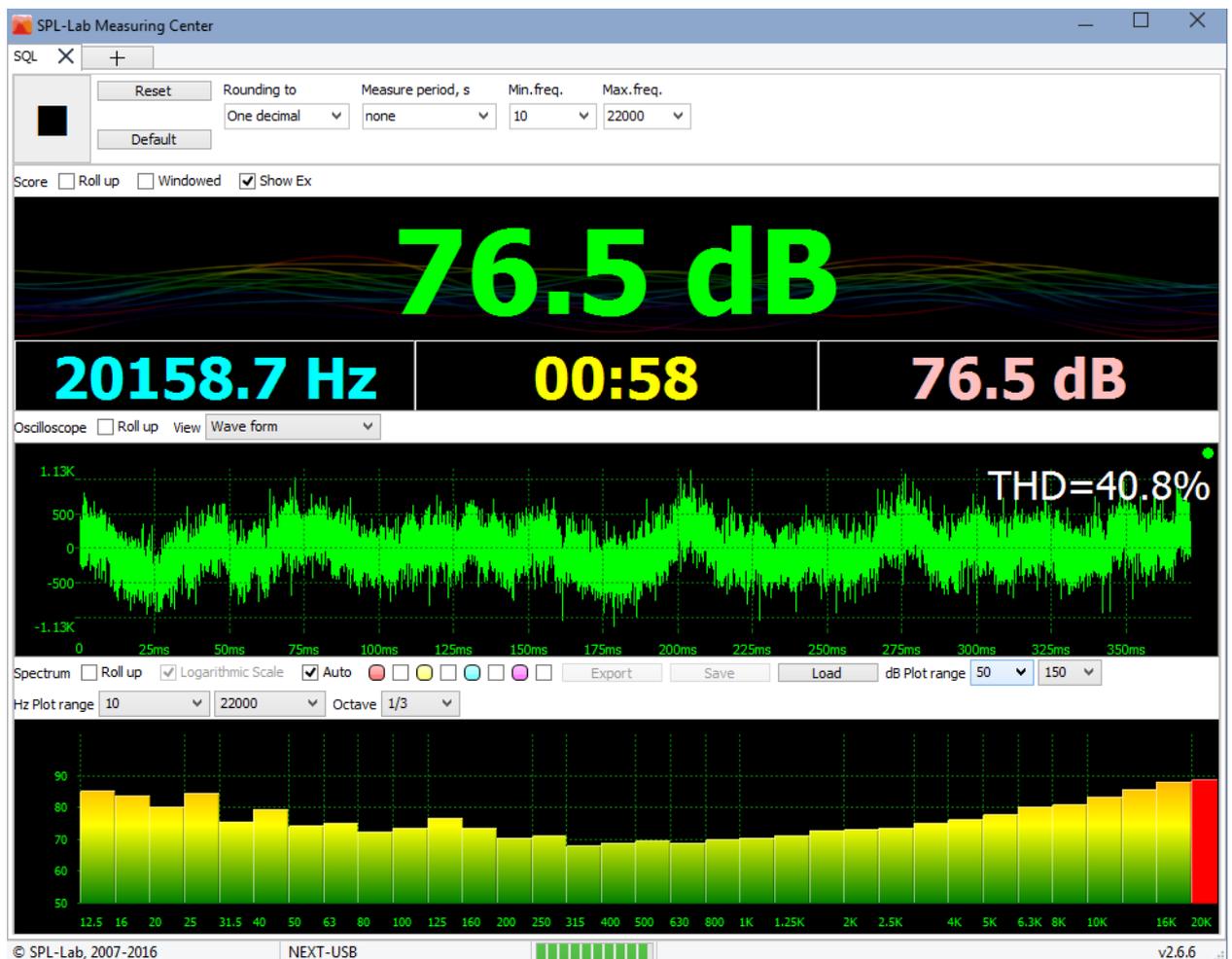
“Weighting” - the dropdown list for selecting the type of weighting function applied to spectrum (A, B, C, or D).

SQL Measuring Mode

Operation Principle

The specialized SQL mode is intended for measuring the averaged sound pressure level of sound signals through the entire audible frequency range. The length of the analysed part of the signal equals to 1/2.7 seconds. Current value of the sound pressure level is calculated from the entire spectrum for each analysed part of the signal separately. The resultant value is an arithmetic average of all current values. For getting good result, the measured signal should have high density both in time and through the entire spectrum.

Control and Display Elements



Designation of the interface elements (from left to right):

“Start/Stop” – the button for starting/stopping a measurement process. It is impossible to close the program during the process of measuring: first you have to stop the measurement and then you can close the program. In the AVG mode, the measurement begins after 5 second countdown.

“Reset” – the button for resetting the values on-screen. This operation does not reset the collected data in the spectrum memory banks.

“Default” – the button that sets the default values for all control elements of the mode.

“Rounding to” – the dropdown list for selecting up to how many digits the measurement results on the panel will be rounded. **“One decimal”** – rounding to 1 decimal, **“Two decimal”** – rounding to 2 decimals.

“Measure period” – the dropdown list for selecting time of the measurement in seconds. In case the “none” value is selected, the measurement will continue until it is stopped manually.

“Min.freq” + **“Max.freq”** - two dropdown lists defining the analysed frequency range of the measured signal. The spectrum will be delimited by the specified values. The spectrum components that do not fit into the range will not be taken into the consideration.

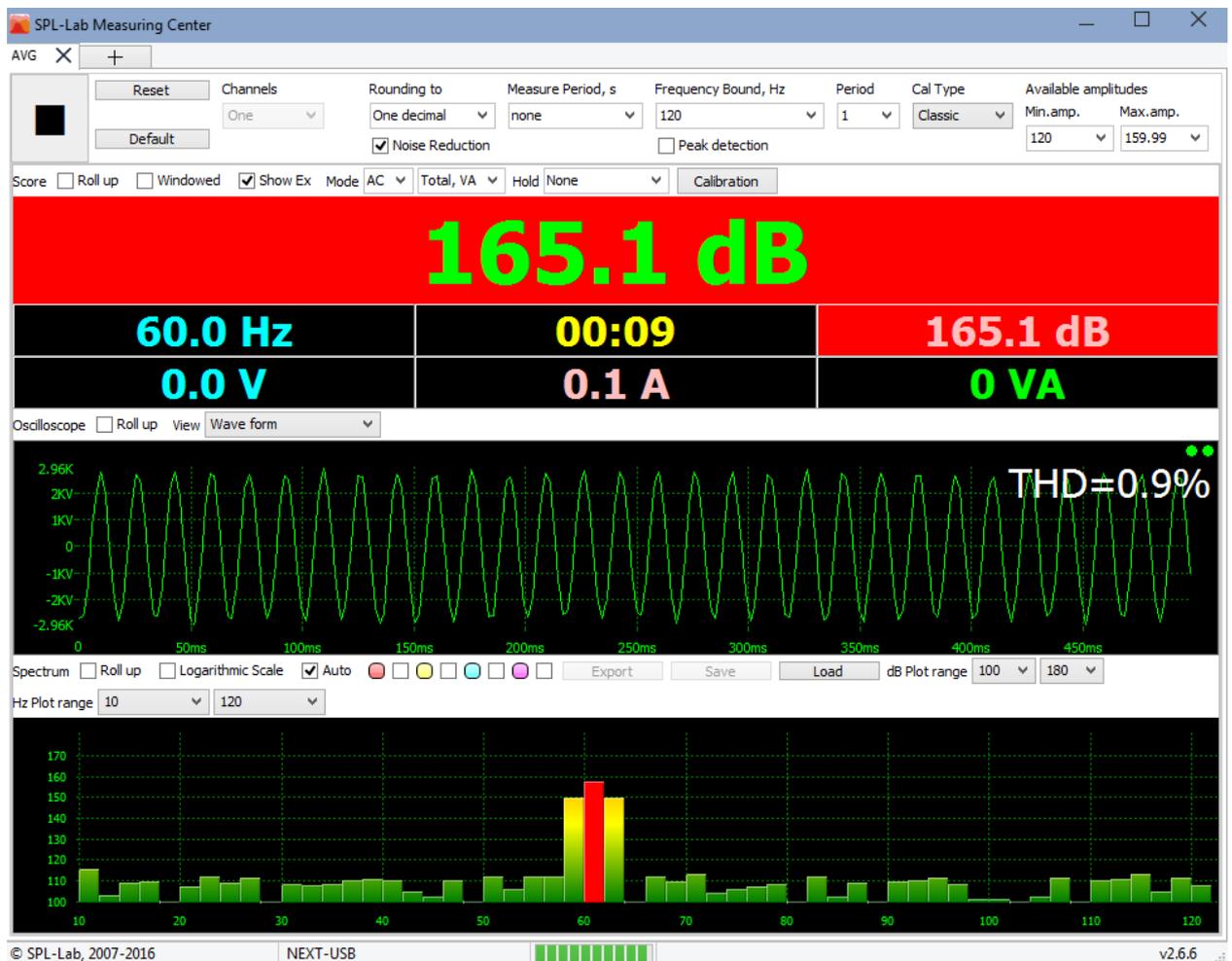
“Score”, “Oscilloscope”, “Spectrum” - groups of elements responsible for operation of the numeric panel, oscilloscope and spectrograph similar to **“RTA”** mode.

AVG Measuring Mode

Operation Principle

The AVG mode is intended for measuring the time-average sound pressure level of the low frequency sound signals. The length of the analysed part of the signal equals to 1/2 second. Current value of the sound pressure level is calculated from several spectral components separately for each analysed part of the signal. The resultant value is arithmetic average of peak figures selected within the number of analysable parts of signal, specified in the “**Period**” parameter.

Control and Display Elements



Designation of the interface elements (from left to right):

“**Start/Stop**” – the button for starting/stopping a measurement process. It is impossible to close the program during the process of measuring: first you have to stop the measurement and then you can close the program. In the AVG mode, the measurement begins after 5 second countdown.

“Reset” – the button for resetting the values on-screen. This operation does not reset the collected data in the spectrum memory banks.

“Default” – the button that sets the default values for all control elements of the mode.

“Channels” – selecting a number of channels used, if the equipment used supports operation, in dual-channel mode. If case several channels are used, the screen is divided into corresponding number of equal parts.

“Common settings” – the checkbox for switching on the use of common settings for all channels. In such case, the settings of the first channel are accepted as the common settings. This option is available only in multichannel mode.

“Rounding to” – the dropdown list for selecting up to how many digits the measurement results on the panel will be rounded. **“One decimal”** – rounding to 1 decimal, **“Two decimal”** – rounding to 2 decimals.

“Noise reduction” – the checkbox that enables/disables noise reduction system when measuring the voltage-current characteristics. This option is available only when using the appropriate equipment.

“Measure period” – the dropdown list for selecting time of the measurement in seconds. In case the “none” value is selected, the measurement will continue until it is stopped manually.

“Freq, bound” – the dropdown list for setting the threshold frequency of the measured signal. The signals with frequency that exceeds the specified one will not be considered. The spectrum will be delimited by the selected value.

“Peak detection” – the checkbox that enables/disables the detection of the threshold frequency overstepping. In case the measured signal frequency oversteps the threshold frequency, the amplitude and frequency will be fixated on the panel with red background. Further measurement will be possible only after resetting the results or stopping the measurement.

“Period” - the dropdown list for specifying a number of analysable parts of signal from which the maximum will be selected when calculating the resultant value. For example, the period equal to four means that peak figures for calculating the arithmetic average will be selected from four analysable parts of the signal with total length of two seconds.

“Cal type” - the dropdown list for selecting the type of calibrations used in measurement - **“Classic”** or **“Magnum”**. The measurement results will differ depending on the selected calibrations.

“Available amplitudes” - two dropdown lists that define the range of acceptable resultant values of the amplitude. In case if the resultant amplitude of the measured signal exceeds the specified range, the amplitude of overshoot will be fixated in the main part of the panel

highlighted in red. The part of panel that displays current amplitude will be highlighted in red without fixation of value. Further measurement will be possible only after resetting the results or stopping the measurement.

“Score”, “Oscilloscope”, “Spectrum” - the groups of elements responsible for operation of the numeric panel, oscilloscope and spectrograph similar to **“SPL”** mode.

“Delay finder” – the mode for measuring the time-delay and phase of signal

Starting Operation

Spl-Lab Measuring Center includes the specialized mode for measuring the time-delay and phase of signal.

For operating in the Delay Finder mode, the following equipment is needed: the broadband microphone like USB RTA Meter, USB Noise Meter (hereinafter - the Microphone), or NEXT-LAB RTA Microphone, any supported audio card with audio output (hereinafter - the Audio Output) and, optionally, with audio input (hereinafter - the Clock Input).

Before starting the operation, the Microphone configuration should be carried out in the Measuring Center settings. To place the Microphone at the listening spot. It is preferable to place the microphone perpendicularly to the direction of the measured signal emission. Connect the Audio Output of the PC to the input of the audio path (AUX of the head unit, input of the amplifier or audio processor). If necessary, connect any point of the audio path to the clock input (the output of the head unit, input or output of the audio processor, amplifier input, etc.).

Operation Principle

The Delay Finder operation principle consists in finding the delay of the sound signals on different frequencies relative to each other. The results received can be shown as distance, time or phase.

The following signals can be compared:

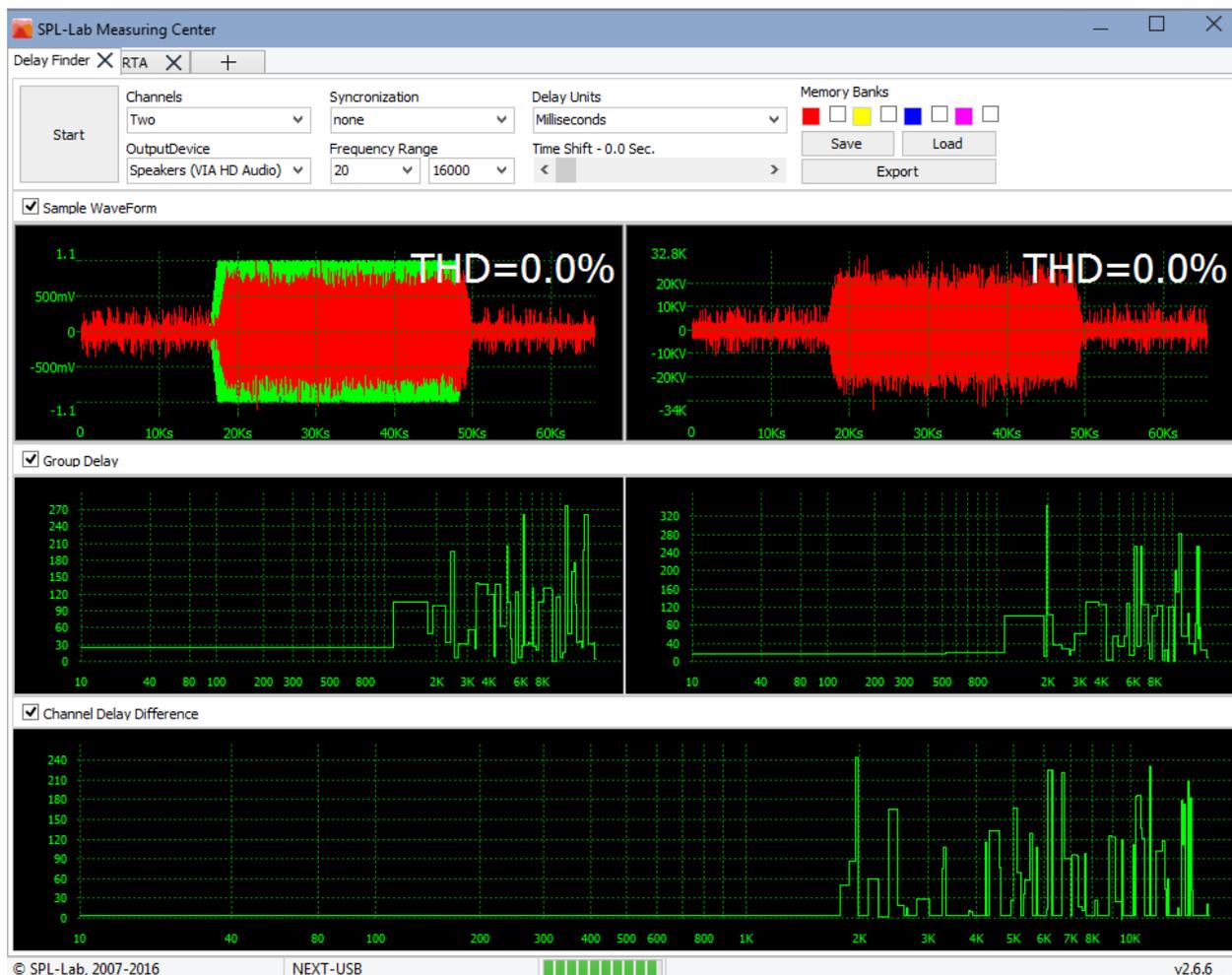
- the model signal, generated by the Delay Finder, with signal received from the microphone in the listening spot;
- the clock input signal from any spot of the system audio path with signal received from the microphone in the listening spot;
- the signals, received from the microphone in the listening spot between two channels.

For obtaining the best result, try to achieve the minimum possible delay between channels by adjusting the control elements of the audio path (head unit or audio processor).

Since the low-frequency sector has the biggest delay in the system due to its acoustic peculiarities, it makes sense to add extra delay on midfrequency and high-frequency channels. That is to adjust all channels as regard to the low-frequency channel.

For measuring the delay between channels with different frequency range, as a basis, the common range should be taken. For example, the upper range of the low-frequency section and the lower range of the midfrequency section in which they overlap.

Control and Display Elements



Designation of the interface elements (from left to right):

“Start/Stop” – the button for starting/stopping a measurement process and calculation of the results received. The measurement process can be stopped at any time, for example, after receiving the necessary data on-screen.

“Channels” – selecting a number of channels used. Using the single-channel mode is reasonable only when the clock input is involved since the delay of the model signal compared to the one received from the microphone differs from one measurement to another due to Windows OS peculiarities, though the delay between channels is regular.

“Output device” – selecting the playback device. Select an available audio output device of your PC from the dropdown list for playing back the test signals.

“Synchronization” – selecting the clock output device. Select an available audio input device of your PC from the dropdown list. Using the clock input allows measuring not only relative delay between channels, but also absolute delay individually on each channel. The clock input allows retracing the delays added to the signal in different points of the audio path.

“Frequency range” – the frequency range used for calculation and displaying. If necessary, you can decrease it for cutting the calculation time.

“Delay units” – the type of value for displaying the delay. Select necessary measurement unit from the dropdown list. It is possible to display delay results in milliseconds for time, in meters for distance and in degrees for the phase. When the measurement unit is changed, current results will be refreshed.

“Time shift” – delay time of the audio path. If the audio systems requires extra time for switching on before starting the signal playback, set the delay time using the slider, . The necessity in setting additional delay often arises when using digital signal processors.

“Memory banks” – the memory bank control elements for saving and comparing measurement results. For saving current measurement results, press one of the color buttons: current result will be outlined by the corresponding color graph and saved into the memory. To enable/disable displaying of the saved result, check the checkbox next to the color button of the required bank. For saving data from all the banks, press **“Save”** button and specify a file name. For loading the previously saved memory bank, press **“Load”** button and select the required file. For exporting data in the text form, press **“Export”** button and specify a file name.

“Sample waveform” – enables/disables the waveform graph displaying. Above it, there is a graph of the generated signal waveform in green or graph of the waveform in yellow received from the clock input when it is used. The graph of the waveform received from the microphone is presented in red. Number of windows with waveform graph depends on the number of channels used. In case of big delay of the red wave, set the necessary delay using the “Time shift” control element.

“Group delay” - enables/disables displaying of absolute delay graph for each channel. Above, there is a graph of the absolute delay in selected measurement units of the original signal or signal from clock input compared to a signal measured by microphone for each frequency in defined range. For more information, hover the mouse pointer over the required graph point and, after clicking, you will receive the coordinates for this point.

“Channel delay difference” - enables/disables displaying of the relative time delay between the channels. Above, there is a graph of the delay for relative to each other signals of each channel measured by microphone. Using this option is reasonable only when working in dual-channel mode. For more information, hover the mouse pointer over the required graph point and, after clicking, you will receive the coordinates for this point. This graph should be taken into consideration as the measurement result in case the clock input was not used.

REAL SPL Measuring Mode

Operation Principle

REAL SPL mode is an add-on to SPL mode, but it has its own unique algorithm.

For successful completion, three peaks that meet the following criteria should be measured:

- Sound pressure level value is greater than or equal to one given in “**Minimal SPL**” parameter
- Frequency value of the next detected peak differs from previous recorded “**Freq indent**” value on either side

It is if frequency indent of 10 Hz is set, then after first value is recorded at 30 Hz, for example, next result will be recorded if it is above 40 Hz or below 20 Hz.

After recording 3 peaks, the measurement stops automatically. Overall result is an arithmetic average of three detected peaks. In the bottom line of the panel, the frequency of current peak and its value are shown. If the peak meets set criteria, the frequency and amplitude are lighted in red during measurement. Recorded peaks are highlighted in red on the spectrum.

Control and Display Elements



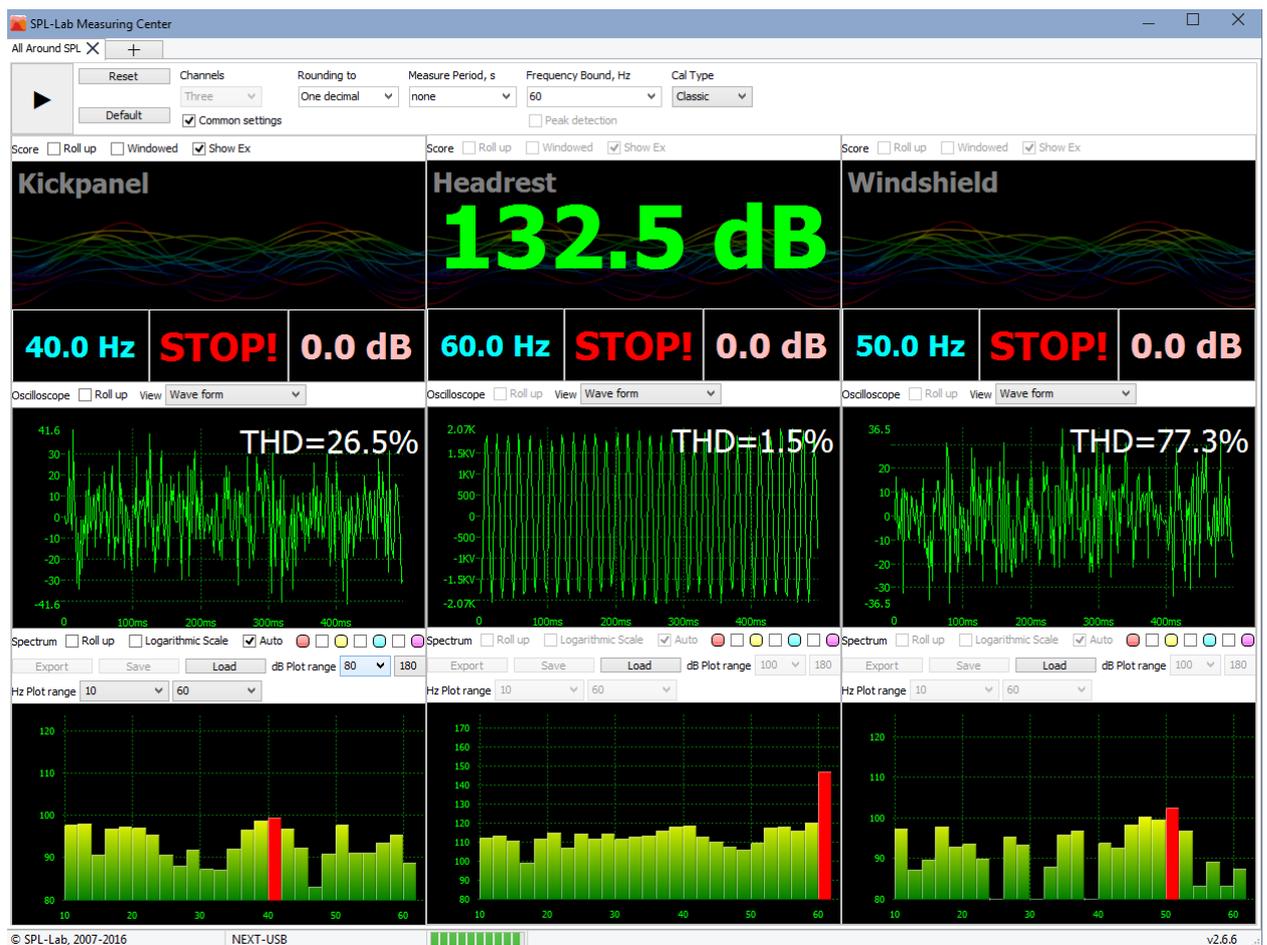
Control and Display elements are similar to respective elements in “SPL” mode.

ALL AROUND SPL Measuring Mode

Operation Principle

ALL AROUND SPL mode is an add-on to AVG mode. The main feature of this mode is to work specifically with three signal sources. The resultant value is calculated and displayed in the main section of the second channel panel and it is arithmetic average of resultant values measured on all three channels.

Control and Display Elements



Control and Display elements are similar to respective elements in “AVG” mode.

SUBSONIC SUISE Measuring Mode

Operation Principle

ALL AROUND SPL mode is an add-on to AVG mode, but it has its own unique algorithm.

After starting the measurement, a frequency of signal of the first analysed part is recorded. Further sound pressure measurements are performed ONLY for this frequency.

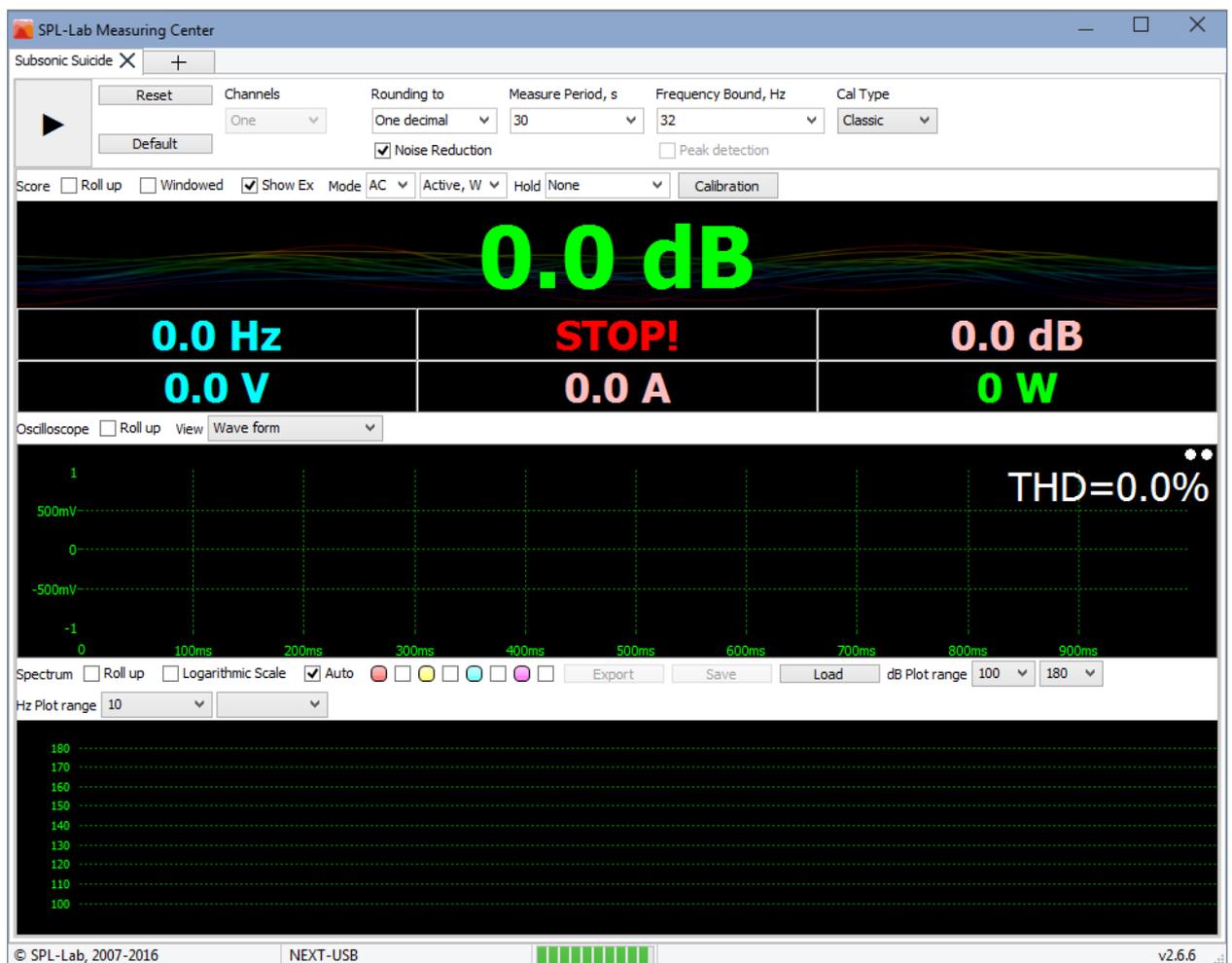
The resultant value equals to time average sound pressure at the recorded frequency taking into account the adjustment coefficient.

Coefficient = (“**Freq bound**” - is a frequency of signal of the first analysed part)*0.25 dB

If the peak frequency of the first sample is 25 Hz, then adjustment coefficient = 1.75 dB

It means for getting the highest result, the lowest possible frequency should be recorded.

Control and Display Elements



Control and Display elements are similar to respective elements in “AVG” mode.

PWR Measuring Mode

Operation Principle

Multifunctional measuring mode PWR is intended for measuring the voltage-current characteristics of direct and alternating current/voltage circuits. The length of the analysed part of the signal equals approximately to 1/2 second. In PWR mode, it is possible to measure current, voltage, power (total and active), harmonic distortion coefficient, frequency, power and impedance coefficients.

Control and Display Elements



Designation of the interface elements (from left to right):

“Start/Stop” – the button for starting/stopping a measurement process. It is impossible to close the program during the process of measuring: first you have to stop the measurement and then you can close the program.

“**Channels**” – selecting a number of channels used, if the equipment used supports operation in multichannel mode. In case several channels are used, the screen is divided into corresponding number of equal parts.

“**Measure period**” – the dropdown list for selecting time of the measurement in seconds. In case the “none” value is selected, the measurement will continue until it is stopped manually.

“**Noise reduction**” – the checkbox that enables/disables noise reduction system when measuring the voltage-current characteristics. Use this option for measuring signals frequency below 500 Hz for getting more accurate results.

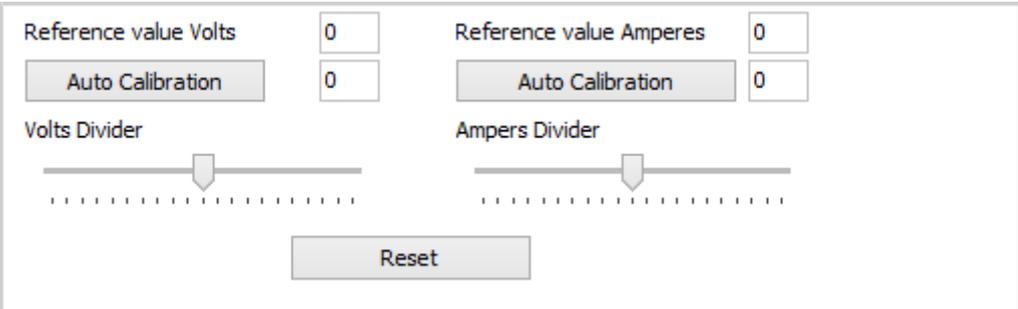
“**Score**” - the element group responsible for operation of the numeric panel.

“**Roll up**” - the checkbox that enables/disables displaying of the numeric panel.

“**Mode AC**” - the dropdown list for selecting the type of the measured signal when measuring the voltage-current characteristics. “**AC**” - alternating current/voltage, “**DC**” - direct current/voltage.

“**Hold**” - the dropdown list for selecting the type of hold of reflected values when measuring the voltage-current characteristics. “**None**” - no hold, “**Max**” - peak figures of voltage for all measured values are retained. “**Min**” - smallest figures of voltage for all measured values are retained. “**Calibration**” - the button for opening calibration parameters when changing the voltage-current characteristics. Each channel has its own independent calibrations.

“**Reset**” - the button for resetting all measured values for each channel.



The image shows a calibration interface with two columns. The left column has a text field 'Reference value Volts' with '0' inside, an 'Auto Calibration' button, and a 'Volts Divider' slider. The right column has a text field 'Reference value Amperes' with '0' inside, an 'Auto Calibration' button, and an 'Ampers Divider' slider. Below both columns is a 'Reset' button.

“**Reference value Volts/Amperes**” – the text-field for entering a coefficient that will be added to current or voltage value.

“**Auto Calibration**” - the button for calculating a coefficient. Enter the measured value in the field on the right and press the button. The coefficient will be calculated automatically.

“**Volts/Amperes Divider**” - the element for adjusting the current or voltage value divider.

“**Reset**” - the button for resetting all values to default values.

Name of values displayed on the numeric panel of direct current/voltage

- “**0W**” - power
- “**-1.1V**” - voltage

- “03:21” - time from the beginning of the measurement
- “-2.9A” - current

Name of values displayed on the numeric panel of alternating current/voltage

- “0W” - active power
- “0VA” - total power
- “0.69” - power coefficient
- “0.1V” - voltage
- “0.5A” - current
- “0.2Ohm” - impedance
- “128.2Hz” - frequency
- “03:21” - time from the beginning of the measurement
- “52.32%” - coefficient of harmonic distortion

“**Oscilloscope**” - the element group responsible for operation of the oscilloscope. After stopping the measurement, the required wave segment can be zoomed in by selecting it left to right with a mouse.

“**Roll up**” - the checkbox that enables/disables displaying of the oscilloscope.

“**Show Volts/Amperes**” - the checkboxes that enable/disable displaying current and voltage curves.

“**Value bar**” - the group of elements that enables/disables displaying changes of measured values on the graph.

“**Roll up**” - the checkbox that enables/disables displaying the spectrograph.

“**Show Volts/Amperes/Power**” - the checkboxes that enable/disable displaying current, voltage and power curves.

Press any key of the graph to receive the detailed information.

Contest Leagues and League Constructor – the tool for creating and editing the pre-configured measuring modes

Introduction

Spl-Lab Measuring Center has several measuring modes with numerous settings. Often it is needed to carry out measurements with a previously configured mode. Moreover, sometimes it is necessary to have the pre-configured group of modes and to be able to switch between them swiftly. It is especially crucial when holding contests on unlimited sound pressure and sound quality. With this aim in view, Measuring Center has a number of specialized means:

- **“Class” (Класс)** – the pre-configured measuring mode with a unique name.
- **“League” (Лига)** - the group of classes combined under the same name.
- **“League Manager” (Менеджер лиг)** – the tool for managing leagues.
- **“League Constructor” (Конструктор лиг)** – the tool for creating and editing leagues

League Manager

At the Measuring Center “Start” tab, there is a field responsible for managing leagues.



You can see buttons of the four user leagues and a button with a plus sign for creating a new league.

The leagues are files with “.League” extension that are located in folder “Leagues” of the Measuring Center program. You can move, copy or exchange the created leagues like normal files. League creation and editing is performed with the aid of the League Constructor. The depicted leagues are included in current software package.

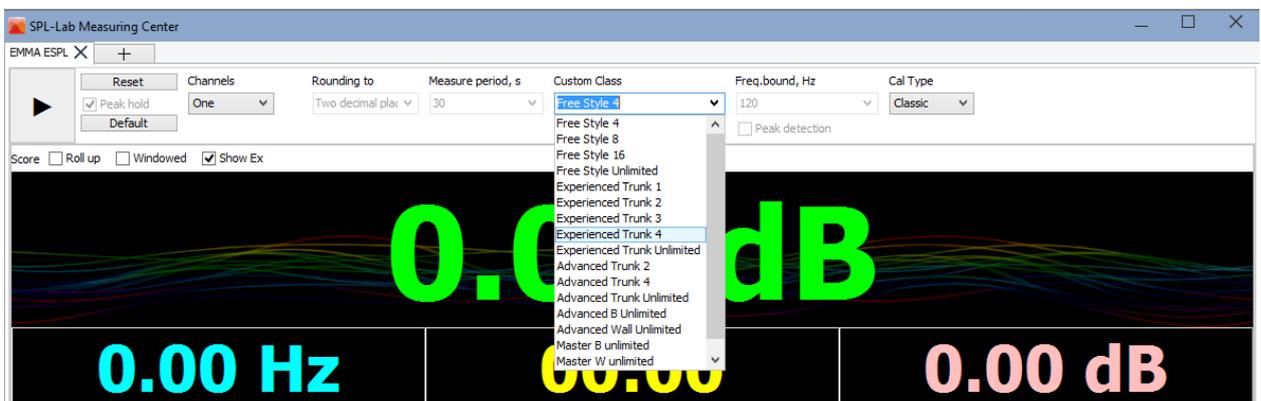
When right clicking on a logo of any league, the contest menu will appear containing the following items.

- **“Edit”** – editing a league. The league constructor will be opened.
- **“Delete”** – deleting a league. This action is irreversible!

If at the moment of league creation a password was set, then this league can be edited or deleted only after this password is entered.

Taking Measurements in a League

For opening a league and starting measurements, press the button of the required league. A tab with the name of the selected league will be opened. At the same time, you can work only in one league. If you try opening additional tabs with another league, the current tab will be selected. Below, you can see an image of a tab with a league:

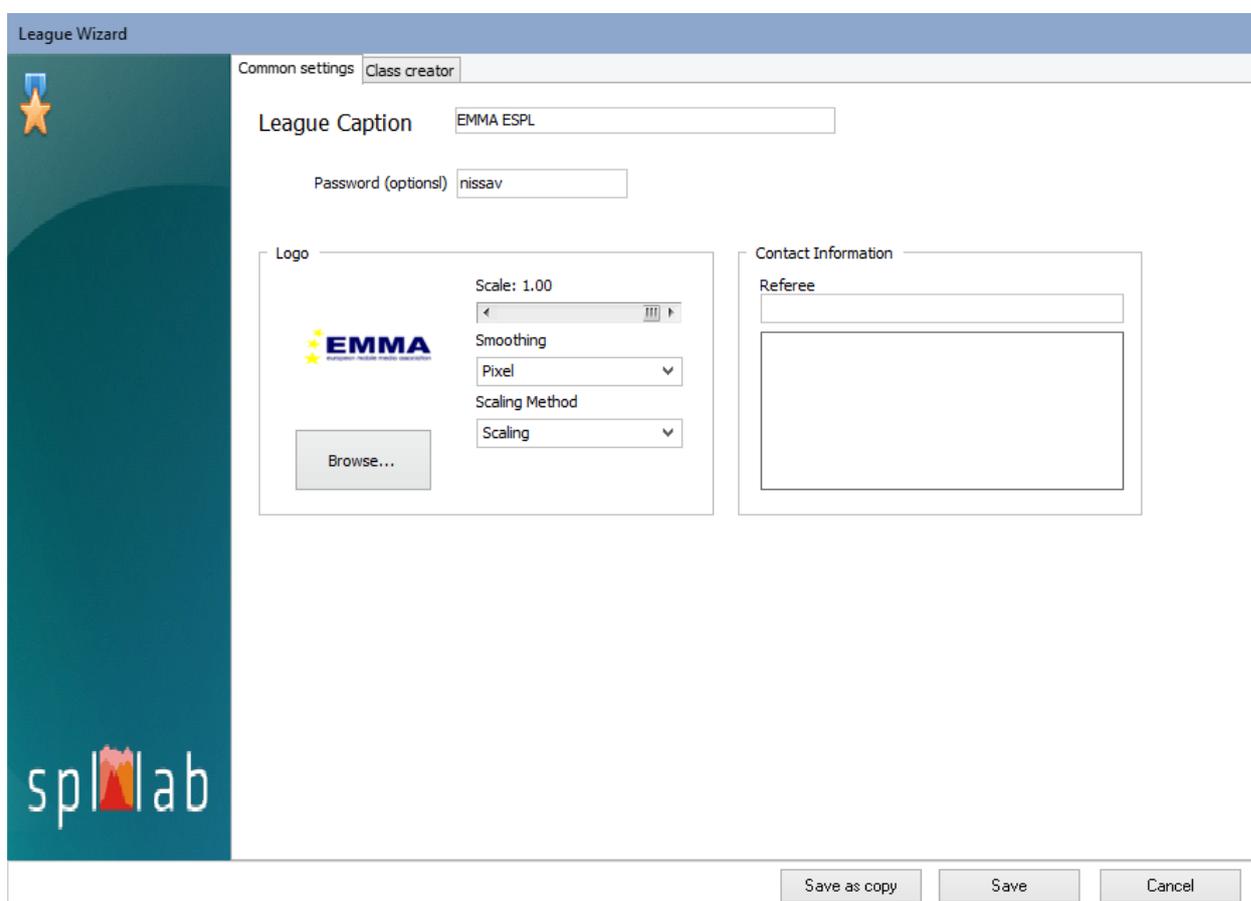


The measuring process and control elements in leagues are similar to modes. In a view of the fact that classes are pre-configured by the leagues, changing measurement settings in the process of work in the league is impossible. The only exception is the dropdown list **“Custom class”** that contains a list of current league classes. Also, a number of channels can be selected if that is allowed in the current class. After selecting a class, settings for the mode will be loaded automatically. In other respects, the measuring process is similar to measuring process in the mode.

League Constructor

The League Constructor window consists of two tabs:

“**Common settings**” tab is shown at the picture below:



Designation of the interface elements (from left to right):

“**League caption**” - name of the league. Enter any text. The league file name corresponds to its name.

“**Password (optional)**” - enter the password that will be used for editing or deleting the league. Password use is optional.

“**Logo**” - the control element group responsible for logo of the league.

“**Logo image**” (Изображение логотипа) - current logo of the league.

“**Scale**” - the scale of the logo image.

“**Smoothing**” - the dropdown list containing the list of algorithms for logo image smoothing. Try some of them and choose the one that fits the best.

“**Scaling method**” - the dropdown list containing the list of algorithms for logo image scaling. Try some of them and choose the one that fits the best.

“**Browse**” - press for uploading a file with the logo of the league.

“**Contact information**” - contact information of the league.

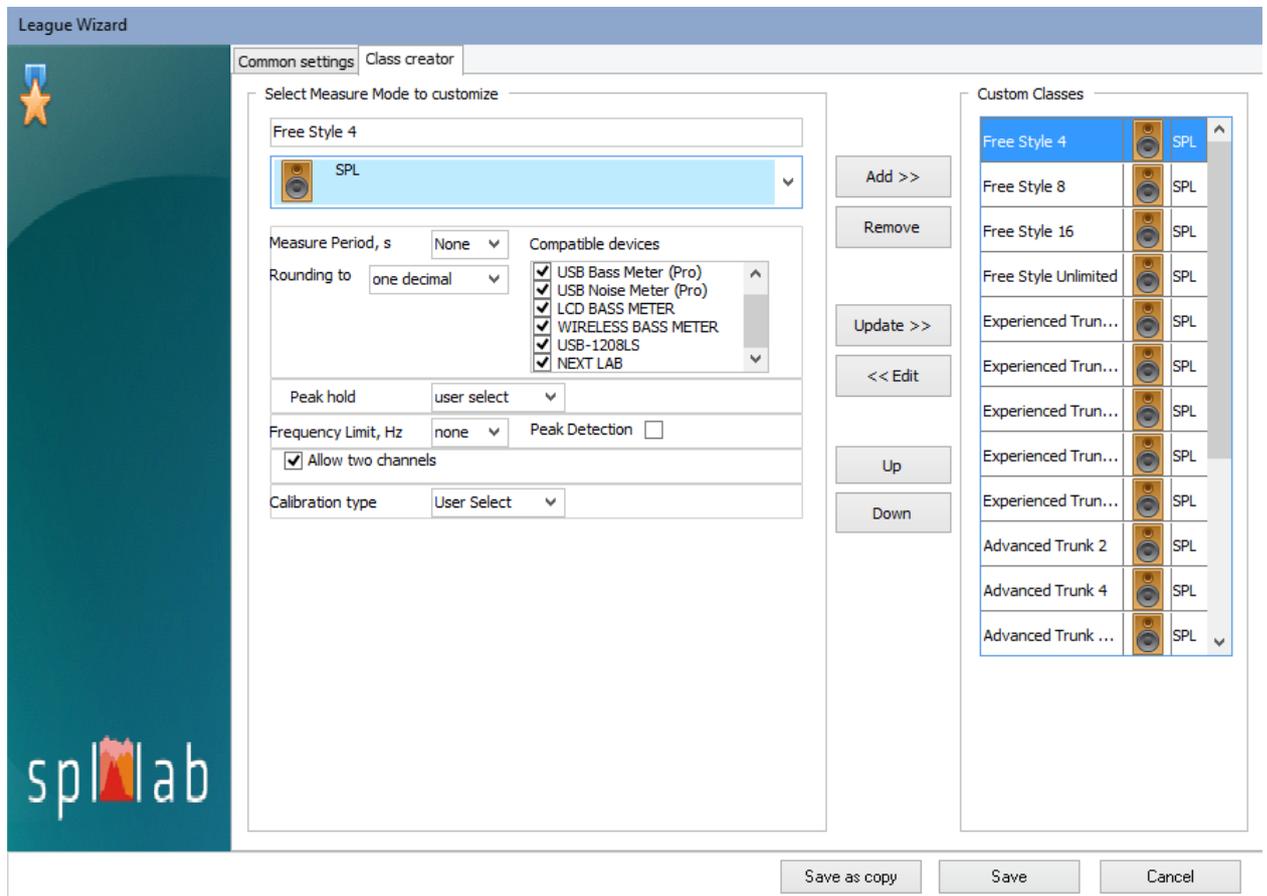
“Referee” - a name of the chief referee of the league.

“Save a copy” - save a copy of the league.

“Save” - save a league with current changes.

“Cancel” - close the League Constructor. **Changes will be discarded!**

“Class creator” tab is shown at the picture below:



Designation of the interface elements (from left to right):

“Free Style 4” - name of the current class.

“SPL” - the dropdown list containing modes available for measuring in the leagues. The list of class settings can vary depending on the selected mode.

“Compatible devices” - the list of devices permitted for conducting measurements in this class. Check the checkboxes of the required devices.

Allow two channels - check the checkbox if the use of the multichannel mode is permissible in this class.

“Peak hold” - the dropdown list containing the peak hold mode options. Set “Turn on”, if you need to enable the peak hold in the class or “Turn off” for disabling the peak hold function.

“User select” allows user to enable or disable the peak hold function in the process of taking measurements in the class.

“**Calibration type**” - the dropdown list for selecting the type of calibrations used in measurement - “**Classic**” or “**Magnum**”. The measurement results will differ depending on the selected calibrations. “**User select**” option allows user to change calibration type in the process of taking measurements in the class.

“**Custom classes**” - the list containing classes of the league.

“**Add>>**” - add the class that is being edited to the list.

“**Remove**” - delete the class selected in the list. **This action is irreversible!**

“**Update>>**” - save current changes to the class that is being edited.

“**<<Edit**” - load data of the selected class for editing.

“**Up**” - move the class selected up the list.

“**Down**” - move the class selected down the list.

“**Save a copy**” - save a copy of the league.

“**Save**” - save a league with current changes.

“**Cancel**” - close the League Constructor. **Changes will be discarded!**

Event-mode module - the software package for analysing, recording and processing the measurement results

Introduction

The “Event mode module” software package is an add-on for the Spl-Lab Measuring Center and is supplied separately. For starting work with this package, you should have a valid license, which you can get from the nearest Spl-Lab representative in your region.

The package includes the following components:

“**Event mode**” – a software component that allows to carry out measurements in different modes to arrange the received data and to input the results into the database.

“**Award wizard**” – a component intended for creating diploma templates for further printing.

“**DB sync**” – the component for synchronizing the measurement database using the Lab-Cloud cloud service. For obtaining access to Lab-Cloud, get in touch with the nearest Spl-Lab representative in your region.

Starting Operation

Before starting work, place the Event-mode module license file into the “License” folder of the Measuring Center program catalog. Work with this package is impossible if you have no license or it has expired. Start the Measuring Center, connect and configure the necessary equipment in the configuration tab.

Start work by pressing the required button in the “Start” tab of the Measuring Center program.



“**New Event**” – the wizard for creating new contests.

“**Past Events**” – processing and continuation of past contests

“**Award Wizard**” – the wizard for creating and editing templates of Diplomas.

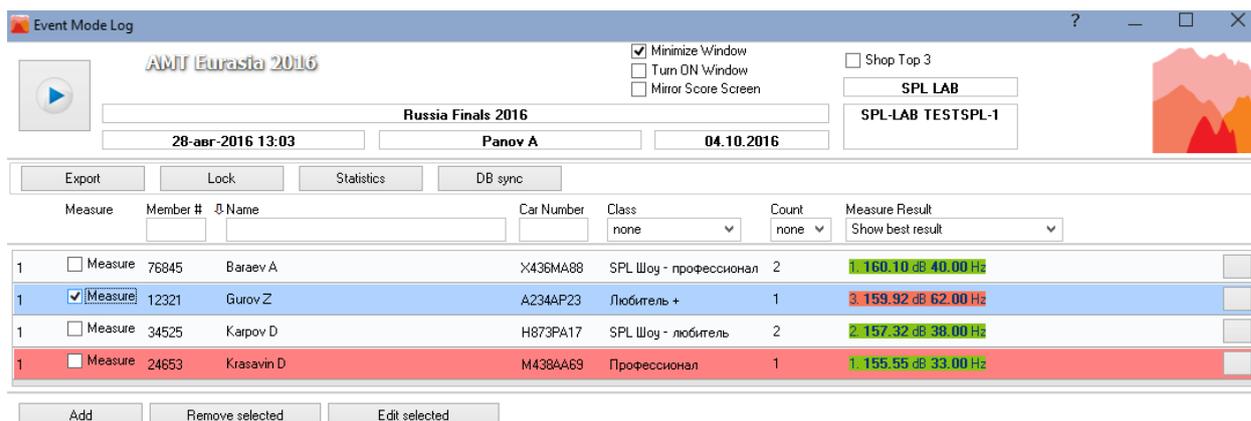
Creating New Contest

The screenshot shows a software window titled "Event Wizard" with a blue header bar. On the left side, there is a dark teal vertical panel containing a small circular icon at the top and the "spl|lab" logo at the bottom. The main area of the window is white and contains the following elements:

- A title: "This wizard will help you to create a new event!"
- A label "Date of create event:" followed by the date "28.08.2016".
- A section titled "Select Measure Mode" containing a dropdown menu with the selected option "AMT Eurasia 2016" and a small downward arrow.
- A section titled "Enter Event Caption" containing a text input field with the placeholder text "Event Caption".
- A section titled "Enter or Select a Referee" containing an empty text input field.
- At the bottom right, there are two buttons: "Finish" (grey) and "Cancel" (blue).

After the “New Event” button is pressed, the window of the new contest wizard will open. Select a Contest League from the dropdown list; indicate a name of the contest and name of the chief referee. On completing press “Finish”, the window for controlling the contest will open.

Carrying out a Contest



Designation of the interface elements (from left to right):

“Start/Stop” – button of starting / stopping a measurement process for the selected participants. “Enter” key can be used. Before starting a measurement, select at least one participant. It can be done by checking the “Measure” checkbox in the line of the participant or by pressing the space bar.

“AMT Eurasia 2016” - the name of the contest league where the contest is held. Do not confuse this item with the name of the organization that holds the contest.

“Russia Finals 2016” – the name of the contest stage that is being held.

“28-Aug-2016 13:03” - date and time of starting the contest and the duration of the contest if it was closed.

“Panov A” - the name of the chief referee for the contest stage that is being held.

“04.10.2016” - license expiration date for using the Event mode module.

“SPL-LAB” - the name of the organization that issued a license for the Event mode module use.

“SPL-LAB TEST” - the name of the owner of the license for the Event mode module use.

“SPL-1” - the name of the organizational unit of the owner of the license for the Event mode module use.

“Minimize Window” - hides contest control window after starting measurement. It is useful when working with one monitor or with a low resolution monitor. For enabling an option, check relevant checkbox.

“Turn ON window” - enables the remote panel with the measurement results. In case the second monitor is connected to the system, the window will be automatically displayed on it. For enabling an option, check relevant checkbox.

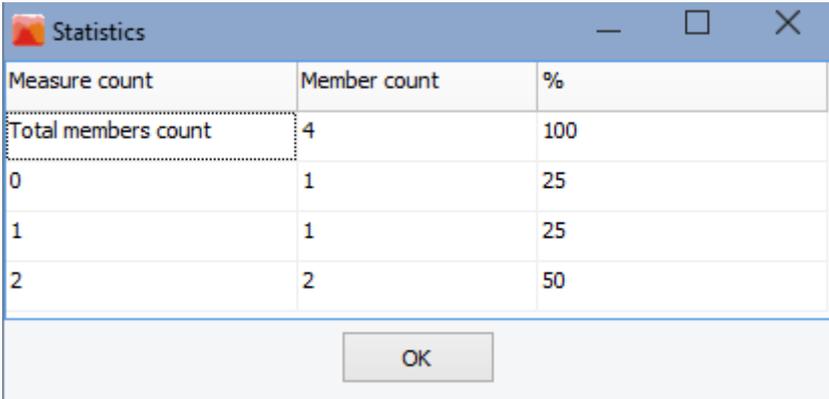
“Mirror Score Screen” - to display participants on the external panel in reversed order.

“Show TOP3” - enables displaying the three leaders in the class after the measurement is over. For enabling an option, check relevant checkbox.

“**Export**” - exports readings of current contest, including the list of participants and the measurement results, into HTML format. After pressing the button, the file will be saved automatically.

“**Lock**” - locks the contest from further continuation/changes. It is recommended to lock the contests after it is finished to avoid further alterations. **This action is irreversible!**

“**Statistics**” - displays additional window with measurement statistics for current contest. Allows to estimate how many measurements each of the participants has taken percentage-wise of the total number of participants. It is useful for estimating time remaining to the end of an event when holding contests with a large number of participants.



Measure count	Member count	%
Total members count	4	100
0	1	25
1	1	25
2	2	50

At the image above, you can see that participants with zero measurements comprise 25% of the total number of participants, participants with one measurement - 25% and participants with two successful measurements comprise 50% of total number.

“**DB sync**” – synchronizes the measurement database using the Lab-Cloud cloud service. After pressing the button, data from all the contests of current organizational unit will be uploaded to the remote server. At the same time, data of the other organizational units will be downloaded to the local PC. In case the local database is lost or has smaller size, it will be reported before synchronization, in order to avoid uploading the empty database to the server.

“**Show best result**” - the dropdown list with possibility of selecting which of the participant's results will be displayed in the participant list. Displaying the last or the best result can be selected.

“**Measure**” - participant table column that includes the ordinal number of the participant and the measurement checkbox.

“**Member #**” - name of the participant table column, showing the participant's number. Below this column, there is a field for searching within the participant list according to set combination of letters; search runs automatically when filling in the field.

“**Name**” - name of the participant table column, showing the name of the participant. Sorting by the column can be set up by clicking the name of the column; repeated click will change the sort

order. Below this column, there is a field for searching within the participant list according to set combination of letters; search runs automatically when filling in the field.

“Car Number” - name of the participant table column, showing the participant's vehicle number. Sorting by the column can be set up by clicking the name of the column; repeated click will change the sort order. Below this column, there is a field for searching within the participant list according to set combination of letters; search runs automatically when filling in the field.

“Class” - name of the participant table column, showing a class of the participant. Sorting by the column can be set up by clicking the name of the column; repeated click will change the sort order. Below this column, there is a dropdown list for filtering the participant list according to set class value; filtering runs automatically after the value is selected.

“Count” - name of the participant table column showing the number of successful measurements of the participant. Sorting by the column can be set up by clicking the name of the column; repeated click will change the sort order. Below this column, there is a dropdown list for filtering the participant list according to set number of successful measurements; filtering runs automatically after the value is selected.

“Measure result” - name of the participant table column showing the measurement result of each participant. The value displayed depends on the value selected in the **“Best result”** dropdown list. Sorting by the column can be set up by clicking the name of the column; repeated click will change the sort order. The measurement results have color differentiation:

- The successful measurements, including fictive measurements, are marked **in green**.
- The successful measurements, where the measured value by different criteria overshoots limits specified for current class, are marked **in yellow**.
- Measurements that were interrupted due to some failure or measurement stopping before its completion, are marked **in red**.

“Participant's measurement detailing” (Детализация замеров участника) - the last column contains buttons for opening a window with each participant's measurement list.

Number	Power	Frequency	Measure time	Start	Finish	Measure Date		
1	155.11 dB	62.00 Hz	00:30	18:06:43	18:07:13	25-apr-2016	<input type="checkbox"/> Ignore measure	Comment
							<input type="checkbox"/> Failure of refereeing	
							Write comment and press Enter	
2	157.32 dB	38.00 Hz	00:30	18:08:06	18:08:36	25-apr-2016	<input type="checkbox"/> Ignore measure	Comment
							<input type="checkbox"/> Failure of refereeing	
							Write comment and press Enter	
3	108.67 dB	66.00 Hz	00:01	16:20:31	16:20:32	27-apr-2016		Comment
							Write comment and press Enter	

“**Karpov D, SPL Show Amateur**” - participant's name and class.

“**Add success measure**” - adding a fictive measurement. This function is useful if, for example, a participant refused a repeated measurement that is stipulated in the rules. The fictive measurement is considered successful and is counted in the total number of measurements, but it does not have the result. The fictive measurement can be deleted.

“**Number**” - number of the measurement.

“**Power**” - main resultant value of the measurement. The type of the value depends on the measuring mode of the class.

“**Frequency**” - measurement frequency. The type of the value depends on the measuring mode of the class.

“**Measure time**” - duration of the measurement.

“**Start**” - time of starting the measurement.

“**Finish**” - time of finishing the measurement.

“**Measure date**” - date of the measurement.

“**Excludes**” - exclusion option. In this column, you can set an exclusion according to which the successful measurement can be considered invalid: due to participant breaking the rules (Ignore measure), or due to refereeing error (Failure of refereeing). In the first case, the measurement will be counted in the total amount of the participant's measurements, but its results will not be considered. In second case - the measurement will not be considered in the total amount of the participant's measurements. For enabling an exclusion option, check relevant checkbox. Later, you can change or remove the exclusion.

“**Write comment and press Enter**” - data field for entering a comment to measurement.

“**Comment**” - the button for saving a comment to measurement.

“**Delete measure**” - delete a fictive measurement. After deletion, the fictive measurement can be added again.

In the bottom line of the contest control window, there are elements for adding, changing and editing the participants:

“Add” - adding new participant. After pressing this button, an additional window will open where you enter Participant's Number, Name, Class and Identification number of the vehicle. Hereat for your convenience, **All** participants, who were at any time added in any organizational unit, will be represented in the list.

“Remove selected” - removing the participant which is selected by mouse cursor in the list.

“Edit member” - edit participant's name, class and identification number of the vehicle. Editing is possible only if the participant has no measurements.

For ease of operation, you can use hotkeys and mouse wheel for managing the participant list:

“Up, Down” - moves the cursor up or down the participant list. For scrolling, the mouse wheel can be used.

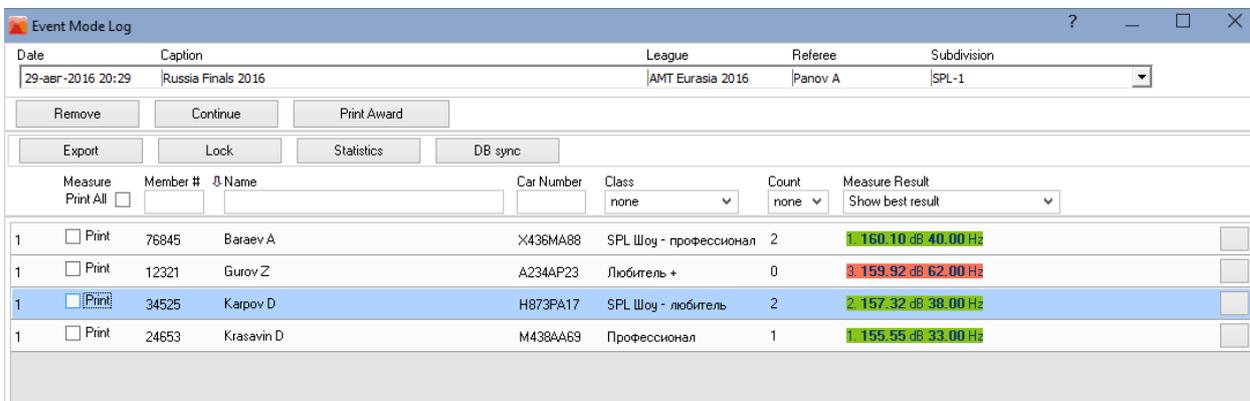
“Space Bar” - checks the **“Measure”** checkbox on the participant selected with the cursor.

“Enter” - starts measurement.

The last measured participants are marked in red in the list.

Processing of the past contests

Start work by pressing “Past events” button in the “Start” tab of the Measuring Center program. Further, the window for processing the past contests will be opened. The window is depicted below



The screenshot shows a window titled "Event Mode Log" with a table of contest data. The table has columns for Date, Caption, League, Referee, Subdivision, Measure, Member #, Name, Car Number, Class, Count, and Measure Result. The data is as follows:

Date	Caption	League	Referee	Subdivision	Measure	Member #	Name	Car Number	Class	Count	Measure Result
29-aer-2016 20:29	Russia Finals 2016	AMT Eurasia 2016	Panov A	SPL-1	1	76845	Baraev A	X436MA88	SPL Шоу - профессионал	2	1.160.10 dB 40.00 Hz
					1	12321	Gurov Z	A234AP23	Любитель +	0	3.159.92 dB 62.00 Hz
					1	34525	Karpov D	H873PA17	SPL Шоу - любитель	2	2.157.32 dB 38.00 Hz
					1	24653	Krasavin D	M438AA69	Профессионал	1	1.155.55 dB 33.00 Hz

The dropdown list of the contests that were held in all organizational units; it is located at the upper part of the window. It contains the following columns:

“**Date**” - date of holding the contest

“**Caption**” - name of the contest

“**League**” - a league in which the contest was held

“**Referee**” - the chief referee of the contest

“**Subdivision**” - name of the organization subdivision where the contest has been held.

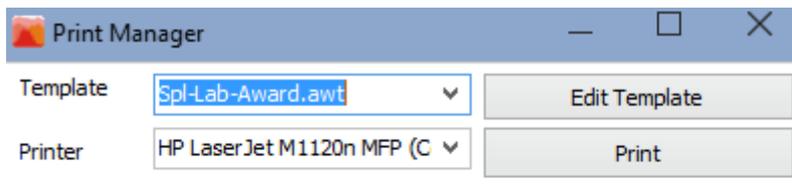
Select the required contest from the list; measurement data and participant list will be loaded automatically.

Designation of the interface elements (from left to right):

“**Remove**” - remove current contest from the database. The contest can be deleted only if it was held in this same organizational unit.

“**Continue**” - continue the selected contest. The contest can be continued only if it was held in this same organizational unit.

“**Print Award**” - print diplomas for the participants who are selected from the list. After the required participants are selected from the list, press the button and the Diploma print window will open. The print window depicted below has the following control elements:



“**Template**” - the dropdown list for selecting the previously created diploma templates. The template will be loaded automatically after selected.

“**Edit template**” - calls a template wizard for the selected template. Just press the button for opening template wizard if you need to edit a diploma template.

“**Printer**” - the dropdown list for selecting a printer for printing Diplomas.

“**Print**” - the button for launching printing process.

After the printing process is finished, close the print wizard window and you will return to work with the past contests.

“**Export**” - exporting readings of current contest, including the list of participants and the measurement results, into HTML format. After pressing the button, the file will be saved automatically.

“**Lock**” - locks the contest from further continuation/changes. It is recommended to lock the contests after it is finished to avoid further alterations. **This action is irreversible!**

“**Statistics**” - displays additional window with measurement statistics for current contest. Allows to estimate how many measurements each of the participants has taken percentage-wise of the total number of participants similar to the contest holding window.

“**DB sync**” – synchronizes the measurement database using the Lab-Cloud cloud service. After pressing the button, data from all the contests of the current organizational unit will be uploaded to the remote server. At the same time, data of the other organizational units will be downloaded to the local PC. In case the local database is lost or has smaller size, it will be reported before synchronization, in order to avoid uploading the empty database to the server.

“**Show best result**” - the dropdown list with possibility of selecting which of the participant's results will be displayed in the participant list. Displaying the last or the best result can be selected.

“**Measure**” - participant table column that includes the ordinal number of the participant and checkbox for printing.

“Name” - name of the participant table column showing the name of the participant. Sorting by the column can be set up by clicking the name of the column; repeated click will change the sort order. Below this column, there is a field for searching within the participant list according to set combination of letters; search runs automatically when filling in the field.

“Class” - name of the participant table column showing a class of the participant. Sorting by the column can be set up by clicking the name of the column; repeated click will change the sort order. Below this column, there is a dropdown list for filtering the participant list according to set class value; filtering runs automatically after the value is selected.

“Count” - name of the participant table column showing the number of successful measurements of the participant. Sorting by the column can be set up by clicking the name of the column; repeated click will change the sort order. Below this column, there is a dropdown list for filtering the participant list according to set number of successful measurements; filtering runs automatically after the value is selected.

“Measure result” - name of the participant table column showing the measurement result of each participant. The value displayed depends on the value selected in the **“Best result”** dropdown list. Sorting by the column can be set up by clicking the name of the column; repeated click will change the sort order. The measurement results have color differentiation similar to the color scheme that is used in the contest holding window.

“Participant's measurement detailing” (Детализация замеров участника) - the last column contains buttons for opening a window with each participant's measurement list similar to the contest holding window.

For ease of operation, you can use hotkeys and mouse wheel similar to the contest holding window.

Award creating and editing wizard

Start work by pressing “Award Wizard” button in the “Start” tab of the Measuring Center program. Further, the window of the Award Wizard will be opened. The window is represented below



Designation of the interface elements (from left to right):

“Select object” (Выделить объект) - after this button is activated, when clicking on the template field with a mouse, the earlier added template object will be selected and you will be able to edit its properties.

“Add object” (Добавить объект) - after this button is activated, when clicking on the template field with a mouse, a new object will be added. For convenience, a field for new object can be selected in advance.

“Zoom In” (Увеличить) - press the button for increasing the display size of the template.

“Zoom Out” (Уменьшить) - press the button for decreasing the display size of the template.

“Add background” - after pressing this button, select the graphic file to be used as the template background.

“Print” (Печать) - press the button for printing the test template; use the dropdown list next to the button for selecting a printer.

“Open” - press the button and select the required file. The previously saved template will be loaded for editing and viewing.

“Save” - press the button for saving current template and select file location and name.

“Page Settings” - the element group responsible for the template page settings:

“Page format” - the dropdown list for selecting the template page size. If selecting “A4” or “Letter” size, the dimensions are selected automatically. Select “Custom” size for manual setting of the template page size.

“Page width” - set the width of the template page manually. Value is set in millimeters.

“Page height” - set the height of the template page manually. Value is set in millimeters.

“Background left” - set the indent from the left margin of the template page for the background image (if used). Value is set in millimeters.

“Background top” - set the indent from the top margin of the template page for the background image (if used). Value is set in millimeters.

“Print background” - check the checkbox for printing the background image of the template.

“Item Property” - the element group responsible for settings of the selected template object:

“Item type” - the dropdown list for selecting the template object type. The object type defines which participant's information will be printed. The following types are available for choice:

- **“FIO”** – the name of the participant.
- **“Result”** – participant's best result selected among all successful measurements of current contest.
- **“Position”** – place of the participant in their class according to the results of contest.

- **“Class name”** – the name of participant's league class.
- **“League name”** – the name of the league, where the contest was held.
- **“Custom string”** – select this object type if you want to set the displayed value manually.

“Left” - set the object indent from the left margin of the template page. Value is set in millimeters. When moving the object with a mouse pointer, the value will change automatically.

“Top” - set the object indent from the top margin of the template page. Value is set in millimeters. When moving the object with a mouse pointer, the value will change automatically.

Width - define the width of the template object. Value is set in millimeters. When changing size of the object with a mouse pointer, the value will change automatically.

Height - define the height of the template object. Value is set in millimeters. When changing size of the object with a mouse pointer, the value will change automatically.

“Font properties” - the dropdown list for selecting the font type used for object text visualizing.

“Font color” - press for setting object text color.

“Custom text” - manually enter the text to be visualized in the object. When text is entered, the type of the object will be automatically changed to “Custom string”.

Description of the CD tracks:

The CD included in the Spl-Lab equipment distribution kit alongside with software contains specialized audio tracks with test signals for adjusting a system. Consider that these tracks are recorded not in the file form, but as tracks in Audio-CD format. For playing back the tracks from the CD, use specialized software or CD player. It is possible that some CD player models will not read the audio content of the CD. In such case or if it is more convenient for you to use the audio files, download the archive with test signals from “**Support**” at the Spl-Lab web site. Table with track description below:

No. of track	Contents
Track 1	Pink noise 20-20 000 Hz
Track 2	Pink noise 40-80 Hz
Track 3	Pink noise 60-80 Hz
Track 4	Pink noise 80-100 Hz
Track 5	Pink noise 100-120 Hz
Track 6	Pink noise 120-140 Hz
Track 7	Pink noise 140-160 Hz
Track 8	Pink noise 160-180 Hz
Track 9	Sweep-tone 30-20 Hz Level – 0 dB.
Track 10	Sweep-tone 35-25 Hz Level – 0 dB.
Track 11	Sweep-tone 40-30 Hz Level – 0 dB.
Track 12	Sweep-tone 45-35 Hz Level – 0 dB.
Track 13	Sweep-tone 50-40 Hz Level – 0 dB.
Track 14	Sweep-tone 55-45 Hz Level – 0 dB.
Track 15	Sweep-tone 60-50 Hz Level – 0 dB.
Track 16	Sweep-tone 65-55 Hz Level – 0 dB.
Track 17	Sweep-tone 70-60 Hz Level – 0 dB.
Track 18	Sweep-tone 75-65 Hz Level – 0 dB.
Track 19	Sweep-tone 80-70 Hz Level – 0 dB.
Track 20-80	Sine signal. The number of track corresponds to the signal frequency. Level – 0 dB.

Track 81	Sweep-tone 20-20000 Hz Level 0 dB
Track 82	Sine signal with frequency of 100 Hz
Track 83	Sine signal with frequency of 200 Hz
Track 84	Sine signal with frequency of 1,000 Hz
Track 85	Sine signal with frequency of 2,000 Hz