2011

LCD BASS METER

Users Manual

Portable device for sound pressure measurement

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Contents

Functions and technical features of the device

We would like to bring to your attention a new generation measuring device. The main difference of LCD BASS METER in comparison with its analogues is the combination of comfortable use of the portable devices and functionality of PC compatible equipment. This device can work completely independently, displaying the readings on the built-in display. But as the need arises the meter can be connected to a computer and perform more detailed analysis of the measurement results using the specialized software.

Ergonomics

LCD BASS METER is performed as the main block and detachable sensor commutatable to each other through the specialized cable 1-2 meters long. It gives the opportunity to a user to take measurements of the sound pressure from the driver's seat or from outside the car. On the main block there are controls and two-line LCD display with micro-light for comfortable use of the device inside the car or outside in the sunlight. The device can operate from the battery inserted inside the case or from the external power supply such as mains supply at home or cigarette lighter in a car. The case of the device and detachable sensor are made of the shockproof plastic material.

Functional

LCD BASS Meter is intended for measuring characteristics of the audio signals in the car audio systems and home acoustic systems. The device takes measures and analyses the signal, after that the result is displayed in a form of peak amplitude and a frequency appropriate to it. The device has three modes of work: the real time mode, when the result on display changes with receiving measurement data from the device; the mode of fixing the maximum result of the measurement, when the on-screen result changes only if the new result exceeds the previous maximum; and the averaging mode, when the device calculates the arithmetical mean of the once-a-second peak values within the period defined by a user. For more detailed analysis of the audio signals it is possible to connect LCD BASS Meter to the PC using specialized software that gives the opportunity to work with signal spectrum as it is done by other PC compatible devices.

Item checklist

1. LCD BASS METER Main block;
2. High pressure low-frequency sensor;
3. CD with and SPL-LAB Viewer audio tracks for system calibration;
4. Cable for connecting the sensor;
5. USB AB cable for connecting the device to the PC;
6. AC adaptor for cigarette lighter in a car;

Technical features

Processor:	Atmel- 16MHz
ADC unit:	14bit
Algorithm of processing:	FFT with smoothing
Display:	two-line LCD with backlight
Inner power supply:	two AA batteries (storage batteries can be used as well)
Outer power supply:	12 volt adapter or car electric system through the special cable
The signal measured:	Frequency: 20Hz-120Hz (for the low-frequency detachable sensor)
Amplitude:	120-180dB
Calibrations:	built-in calibrations for the TERM-LAB device (calibrations for any other similar device can be made-to-order)
Signal type:	periodic, sine or square.
Sockets:	sensor connector, connector for power supply adapter and USB for work with PC.
Software for PC:	SPL-Lab Measuring Center
Dimensions: Main block	100x18x45mm
Dimensions: Detachable low-frequency sensor (LBH)	53x82x30mm
Weight: Main block	300
Weight: Detachable low-frequency sensor (G)	60

Working with the device

Safety regulations

! Before using the device, carefully examine its case for cracks and splits, because any depressurization of the device leads to its damage.

! All the connector cables should not have insulation defects to avoid the risk of the electric shock.

! Try not to allow the measuring load beyond the maximum limit.

! Do not connect or disconnect the signal cables of the detachable sensor during measurement operation.

! Do not use or store the device in the areas with high humidity or heat, as well as close to the devices generating strong magnetic field.

! The protective measures should be taken while performing the sound pressure measurements.

! Replace the batteries timely. If the device is not used for a long period of time, remove the batteries to prevent potential damage due to possible battery leakage.

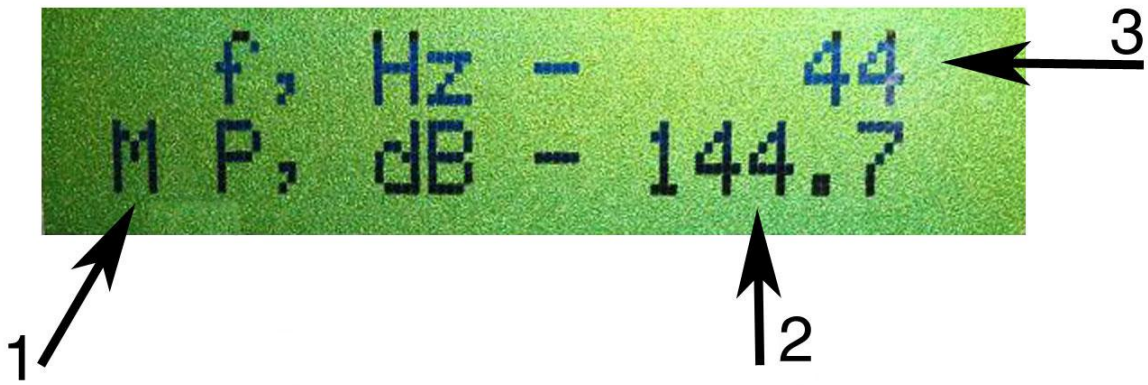
! During preventive maintenance of the device do not use the synthetic detergents or solvents; use wet wipes instead.

Identifying the functional parts of the device

Number of the element	Description
1	Connector for the power supply adapter
2	Jack for high pressure low-frequency sensor
3	Display
4	USB port for connecting the device to the PC
5	Indicators of the data exchange between the PC and device through the USB port
6	The batteries in the Battery Holder
7	Power button
8	Device operation status lights

9	Functional button #1 (nulling values in the mode of fixation of the maximum measured value/exiting calibration mode/starting measurements in averaging mode)
10	Functional button #2 (going into the calibration mode/saving calibrations)
11	Functional button #3 (switching the display micro-light on-off/reducing values in options)
12	Functional button #4 (switching measurement modes/increasing values in options)
13	Location of the sensing element of the high-pressure sensor
14	Suction cups for placing the sensor on glass surfaces

Identifying the display symbols



Number of the element	Description
1	Indication of the measuring mode
2	The sound pressure measured, dB
3	The frequency where the indicated sound pressure was reached, Hz

Starting operation

Before starting operation do the following:

1. Unpack and check the package contents of the device;
2. Take off the lid of the battery holder (Figure. 1-6), install two AA batteries, or use the 9-12 volt AC adaptor (Figure 1-1) working from the AC power outlet or car electric system.
3. Using the special cable supplied, connect the main unit of the device (Figure 1-2) to the high pressure sensor (Figure 1-2). The plug should be firmly connected to the jack.

4. If necessary, connect the main unit to the PC via USB cable (Figure 1-4);
5. Turn on the device by pressing the red button (Figure 1-7), after that the status lights on the case near the button (Figure 1-8) should go red. After the welcoming screen the image similar to the Figure 2 will be displayed.
6. If necessary switch the display micro-light on by pressing the button #3 (Figure 1-11); Note that with the display micro-light switched on, durability of the batteries is reducing. To switch the display micro-light off press the button #3 again;
7. For usability, at the back of the device there is a support with two possible positions for determining an angle of inclination of the device. If necessary the stand can be used.

Measuring modes

There are three measuring modes provided by the LCD BASS METER:

- The real time mode, when the result on display changes with receiving measurement data from the device.
- The mode of fixing the maximum result of the measurement. In this case the result on-screen changes only if the new result exceeds the previous maximum
- The averaging mode, when the device calculates the arithmetical mean of the once-a-second peak values within the period defined by user

The modes can be switched by pressing button #4 (figure 1-12).

Taking measurements

1. Place the high-pressure sensor on the windscreen of the car or into the port of the phase inverter;
2. Using the supplied CD, or any other specialized CD, or sound source, play the necessary track. For receiving the most accurate results for the values measured, the signal should be 3-4 seconds long.
3. When the necessary volume is attained the pressure level and frequency at which this level is reached will be displayed onscreen;
4. As the need arises, modes can be switched by pressing button #4 (figure 1-12). Along with this the indicator of the measuring mode on the left side will change. Letter ‘M’ indicates that the mode of fixing the maximum result is on and ‘S’ stands for the averaging mode (figure 2-1). In the real time mode there is no indicator displayed.

5. If the mode of fixing the maximum result is enabled, the on-screen result will change only if the new result of sound pressure (dB) will exceed the previous maximum, regardless of the frequency. For nulling onscreen data press the button #1 (1-9);

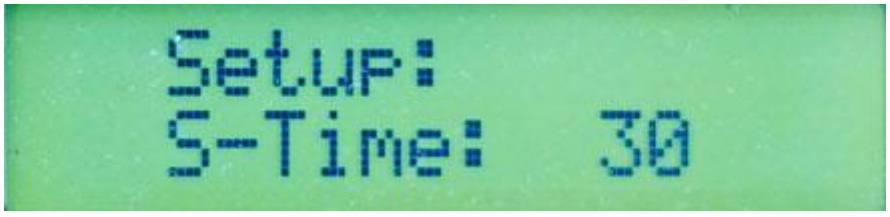
6. To start measurements in the averaging mode press button #1(Figure 1-9); The countdown of measuring time, defined in the device settings, will start on the screen. The current measured value can be seen when the device is connected to the PC. After completing measurements the average result for the defined time period will be shown onscreen.

Setup mode

The LCD BASS METER device has setup mode. For the moment present it includes function of setting time in the averaging mode.

For carrying out setting and calibration, perform the following actions:

1. Switch the device on;
2. After booting the OS press button #2 to enter the setup mode (Figure 1-10)**;**
3. The calibration mode will be displayed:



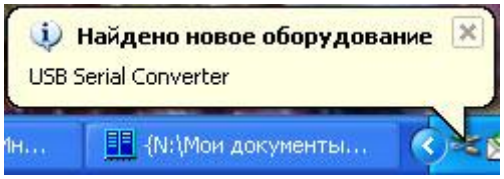
4. Using button #3 (Figure 1-11) and button #4 (Figure 1-12) set the required value:

5. For saving the value press the button #2 (Figure 1-10): 1-10):

6. To exit the setup mode without saving press button #1(Figure 1-9);

Connecting the device to a PC

1. Using the supplied USB AB cable connect the device to a PC via USB port (Figure 1-4);
2. When connected for the first time the notification that the new device was detected and the necessary drivers were installed will appear. If necessary, you can use the driver from the CD supplied together with device.



3. After the driver installation in the list of “COM and LPT ports” a new item will be added: “USB Serial Port”
4. Launch the SPL-LAB Measuring Center software from the CD supplied together with device.

Examples of the device usage

Determining the resonance frequencies of the passenger compartment of a car

1. Place the high-pressure sensor on the windscreen of a car from the passengers' side 20 centimetres from the dashboard and pillar.
2. If you are using the subwoofer case of the phase-inverter or other type with resonant port, plug it tightly or use the closed-type case.
3. Switch on the device and enable the mode of holding the maximum measured value. If necessary, switch on the micro-light. For more detailed information and displaying spectrum connect the device to a PC and use SPL-LAB Viewer in the Holding the peak mode.
4. Using the CD supplied or any other source of specialized signals, play back the pink noise or tracks in the measured range (usually from 30 to 70Hz).
5. The peak values, displayed by the device and in the SPL-LAB Viewer program are the resonance frequencies.

Determining the resonance frequencies of the phase-inverter port

1. Place the high-pressure sensor into the port of the case of phase-inverter.
2. It is advisable to take the case out of the car and to place it away from walls and other obstructions.
3. Switch on the device and enable the mode of holding the maximum measured value. If necessary switch on in the micro-light. For more detailed information and displaying spectrum connect the device to the PC and use SPL-LAB Viewer in the Holding the peak mode.
4. Using the CD supplied or any other source of the specialized signals, play back the pink noise or tracks in the measured range (usually from 30 to 70Hz).
5. The amplitude-frequency characteristic displayed by the SPL-LAB Viewer are the AFC of the measured port and the peak values, displayed by the device or computer are resonance frequencies of the phase-inverter port.

Description of the CD tracks

Track 1
Pink noise 20-20000Hz

Track 2
Pink noise 40-60 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 – 0dB.

Track 10
Sweep-tone 35-25 Hz. Level – 0dB.

Track 11
Sweep-tone 40-30 Hz. Level – 0dB.

Track 12
Sweep-tone 45-35 Hz. Level – 0dB.

Track 13
Sweep-tone 50-40 Hz. Level – 0dB.

Track 14
Sweep-tone 55-45 Hz. Level – 0dB.

Track 15
Sweep-tone 60-50 Hz. Level – 0dB.

Track 16
Sweep-tone 65-55 Hz. Level – 0dB.

Track 17
Sweep-tone 70-60 Hz. Level – 0dB.

Track 18
Sweep-tone 75-20 Hz. Level – 0dB.

Track 19
Sweep-tone 80-70 Hz. Level – 0dB.

Track 20-80
Sine-wave signal. The number of track corresponds to the signal frequency. Level – 0dB.

Track 81
Sweep-tone 20-20000 Hz. Level – 0dB.