

# SL LoudnessMMeter Program



Metering Loudness in "EBU Mode"

*Revision as of:  
July 26, 2016*

User's Guide



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### FCC ID:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

Shielded cables and I/O cards must be used for this equipment to comply with the relevant FCC regulations. Changes or modifications not expressly approved in writing by SoftLab-NSK Ltd. may void the user's authority to operate this equipment.

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Our company warrants this product against defects in materials and workmanship for a period of one year from the date of purchase. During the warranty period, products determined by us to be defective in form or function will be repaired or replaced at our option, at no charge. This warranty does not apply if the product has been damaged by accident, abuse, misuse, or as a result of service or modification other than by us.

This warranty is in lieu of any other warranty expressed or implied. In no event shall we be held liable for incidental or consequential damages, such as lost revenue or lost business opportunities arising from the purchase of this product.

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## Introduction

The SLLoudnessMMeter program is included into products designed by the «SoftLab-NSK» company starting from 5\_7\_310 software version.

The SLLoudnessMMeter program is designed to control loudness level on selected device (for example, device that plays sound broadcasted on air). Level is monitored according to law requirements concerning loudness ratio of advertisement and TV and radio programs interrupted by advertisement.

Functionality of the SLLoudnessMMeter program is implemented according to «Recommendations for normalization of audio signals in TV and radio broadcasting». According to the recommendations meters of loudness in "EBU mode" must be used at each step of producing and distributing advertisement, TV and radio programs.

The SLLoudnessMMeter program supports metering of volume in "EBU mode". "EBU mode" means the following: integrated loudness of TV programs must be equal to nominal value, i.e.  $-23 \pm 0,5$  ( $\pm 1,0$ ) LUFS and the following parameters must be measured:

- Loudness Range;
- Momentary Loudness;
- Short-Term Loudness;
- Integrated Loudness (the main parameter when metering loudness of sound by regularity authorities);
- Maximum Permitted True Peak level.

Note: Specification of "EBU mode" is described in the «EBU Tech 3341» document.



## General Information

### 1. Purpose and Scope of Application

The SLLoudnessMMeter program is a program designed to meter loudness of sound in the EBU mode. Also the program is used to control loudness of TV and radio programs.

The SLLoudnessMMeter program allows metering loudness on the following audio devices:

- input and output audio lines of the FD322/FD422/FD842/FDVrt boards and other devices that deal with DirectShow filters;
- standard Windows audio devices;
- audio devices that work via DirectSoundCapture interface.

Set of metered parameters and algorithm of metering correspond to requirements described in the «Recommendations for normalization of audio signals in TV and radio broadcasting» document.

### 2. Metered Parameters, Scales, Units

The SLLoudnessMMeter program implements functions of metering the following parameters:

1. Loudness Range (LRA) denotes program loudness range, unit is LU (dB equivalent). Metering interval is specified by user (the LRA Integrated parameter in program settings). Loudness Range value is displayed in the LRA field in the main program window.
2. Momentary Loudness (M) denotes loudness metered via "sliding window" algorithm with integration time equal to 400 ms. Units are LUFS (Loudness Unit Full Scale) or LU (Loudness Unit).
3. Short-Term Loudness (S) denotes loudness metered via "sliding window" algorithm with integration time equal to 3 seconds. Units are LUFS or LU.
4. Integrated Loudness (I) denotes loudness metered via "sliding window" algorithm of specified duration (the Integrated Time parameter in program settings). Units are LUFS or LU.
5. True Peak is a maximally available true peaks level of digital audio signal metered via "true peak" algorithm. Unit is dBTP (dB True Peak).

Values of the 2–5 parameters are displayed in window of program in numerical format and corresponding scales graphically. User may customize scales components:

- set of displayed scales and draft of their location;



- units:
  - Relative – LU (Loudness Unit), relative to base level –23 LUFS;
  - Absolute – LUFS (Loudness Unit Full Scale);
- displayed range:
  - EBU +9 scale – from –18 LU up to +9 LU (from –41.0 LUFS up to –14.0 LUFS);
  - EBU +18 scale – from –36 LU up to +18 LU (from –59.0 LUFS up to –5.0 LUFS).

### 3. Functionality

The SLLoudnessMMeter program implements automatic metering on loudness of audio device with displaying specified meter parameters.

The program has means for realizing the following functions:

- customizing metering parameters;
- toggling between "work" and "paused" states to pause indicators (Paused). Indicators are paused in the "paused" state that gives a possibility to examine them;
- simultaneous resetting of Integrated and Range Loudness (the Reset command);
- visual control of metered indices;
- automatic file logging.

### 4. Logging

The program provides with a possibility of logging operation protocol into log file. User may switch logging on/off, configure its placement and periodicity.

Log files are stored in CSV text format. The file can be opened via Microsoft Excel, OpenOffice Calc, etc.

Names of log files have the following format:

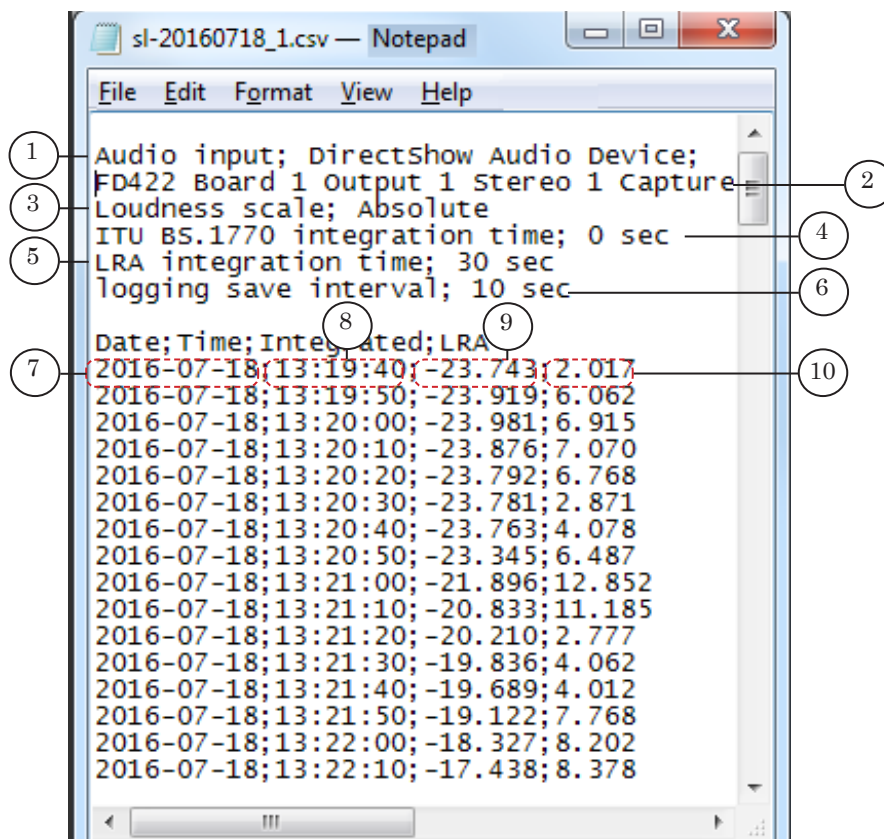
File Name Prefix-YYYYMMDD.csv, where:

- File Name Prefix is arbitrary set of symbols specified by user, 0 is by default;
- -YYYYMMDD are hyphen and date of file creation, added automatically;
- .csv is extension of log file name.

The following information is logged:

- type of selected audio device (1);
- name of audio device (2);
- metering units (3);
- interval of integrated value metering time (4);
- interval of loudness range metering time (5);
- interval of time when data is logged into file (6);

- date of logging (7);
- time of logging (8);
- value of integrated loudness (9) at a specified time;
- value of loudness range ("LRA") (10) at a specified time.





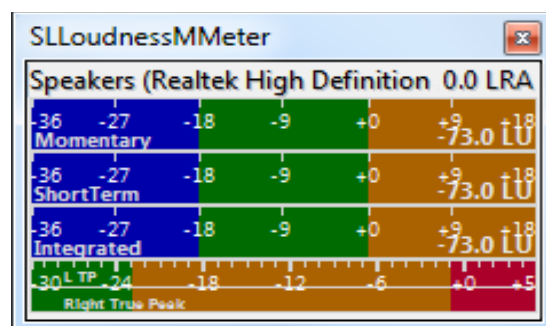
## Program Launch

### 1. Ways of Launch

Full path to the SLLoudnessMMeter program file is:  
~Tools\SLLoudnessMMeter\SLLoudnessMMeter.exe,  
where: ~ is a full path to folder where ForwardT Software set  
is installed (C:\Program Files\ForwardT Software folder at standard  
installation).

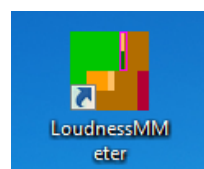
You may also use the Start menu to launch the program:  
All Programs > ForwardT Software > Tools > LoudnessMMeter.

The main program window with all default settings at first  
launch appears. You may resize the window by dragging it as  
you wish.



Settings configured at the previous program session are active  
on next launch.

You may also create program shortcut on the desktop for quick  
launch.



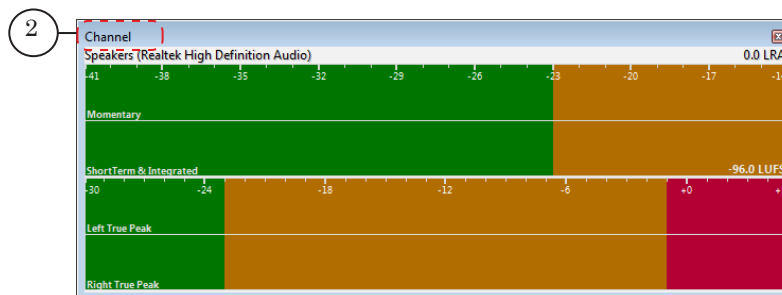
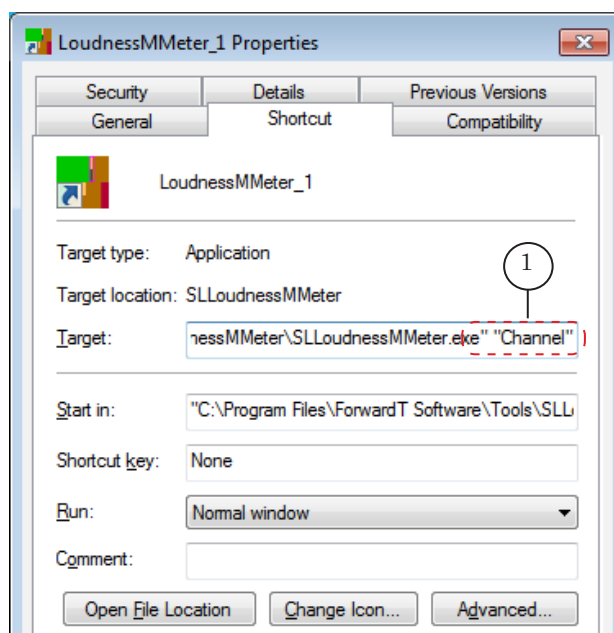




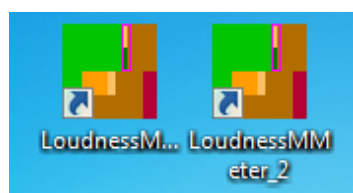
## 2. Several Program Instances

There is a possibility to launch several program instances at the same time (for example, to control input and output audio signals).

For more comfortable work customize shortcuts for each of the instances. User may specify an arbitrary text in parameter (1) of command line (for example, name of monitored channel). In this case the text is displayed in program title (2).



Each instance has its own user-specified settings. Rename shortcuts to differentiate instances.

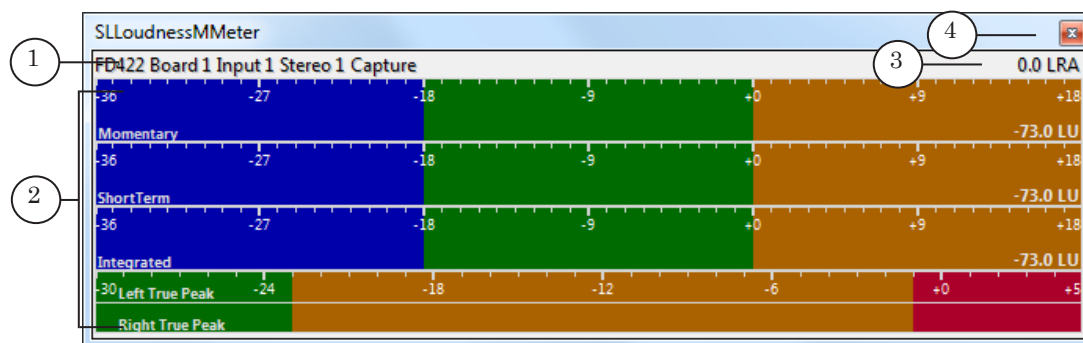


# Interface

## 1. Main Window

### 1.1. Appearance

The main program window is used to customize, monitor and control level of loudness on specified audio device.



Main window. Control elements:

1 shows name of audio device; 2 is area with indicators; 3 shows Loudness Range parameter value (LRA); 4 shows finish working with the program.

Each scale in area with indicators consists of name of corresponding parameter, active units and range. Set of scales to display, their location and other parameters can be changed.

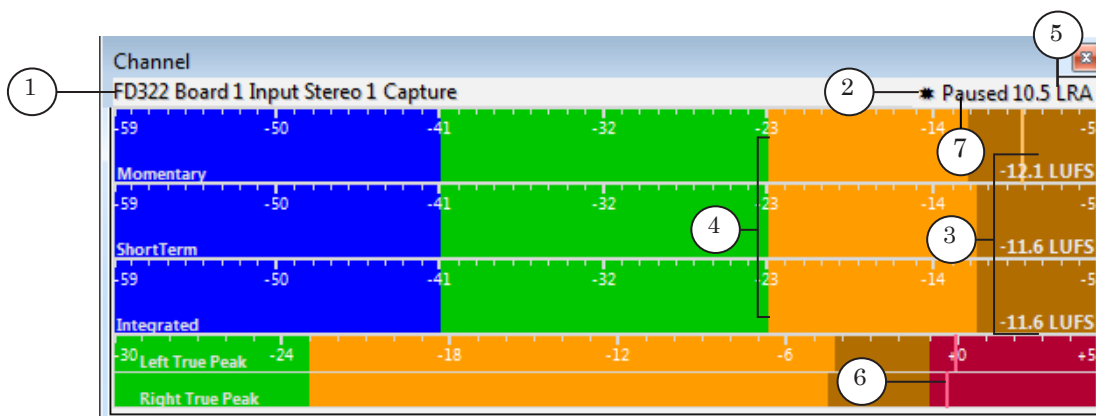
Open the meter Properties window (see the «2. Meter Properties Window» section) or use commands of context menu (see the same section) to select another source of sound, switch logging on/off or customize appearance and parameters of scales.

Context menu (1) is activated by right-clicking area with indicators (2).



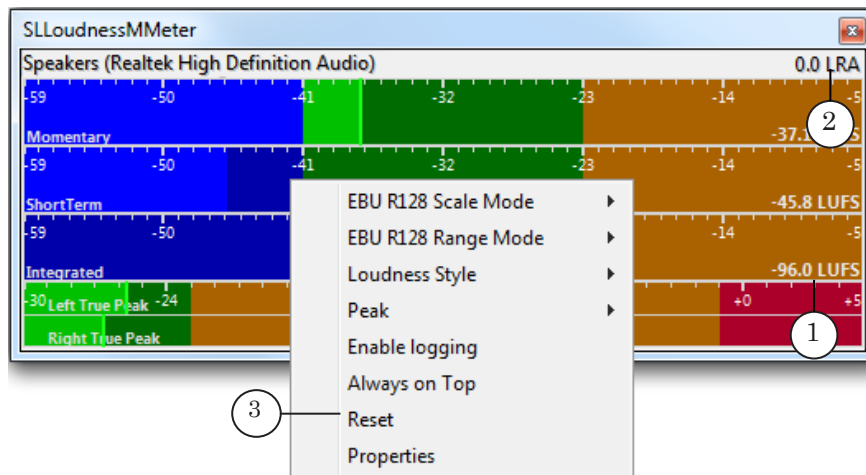
## 1.2. Metering Parameters, Indication

1. Name of device which loudness is metered is displayed in the main program window in the information field (1).



2. The (2) indicator appears when logging is on. The indicator is absent when logging is off.
3. The program is in the "active" state at every launch.
4. Current values of metered parameters (Momentary Loudness, Short-Term Loudness and Integrated Loudness) are displayed by corresponding indicators in numerical format – in the right part of each scale (3).
5. Level of loudness is  $-23$  LUFS according to absolute scale (according to relative  $-0$ ) (4). Absolute value is "green area" on scale. When controlling sound you should count on this area.
6. Loudness Range value is displayed in the right upper corner of the main program window (5).
7. Peak values are displayed graphically in the form of vertical lines (6).
8. Click once area with indicators to pause indicators (for more convenient review). Paused status (7) is displayed. Work of indicators is stopped but parameters is continued metering. Click again the area to resume indicators. Paused status disappears.

- Use the Reset option (3) in the context menu (or double click area with indicators) to reset integrated level values (1) to silence (-96 LUFS) and zero loudness range (2) and restart metering.

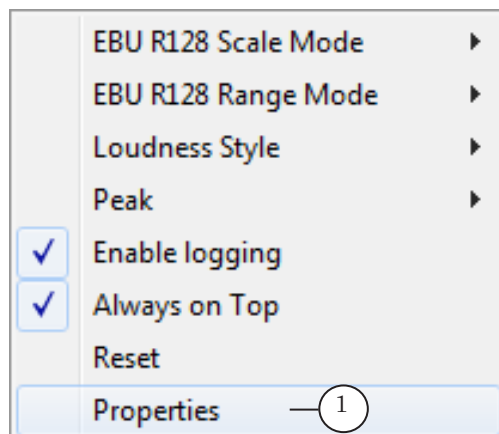


- ✓ **Important:** Double clicking area with indicators resets all values (the Reset option), once clicking the area – metering is continued (the Paused option).

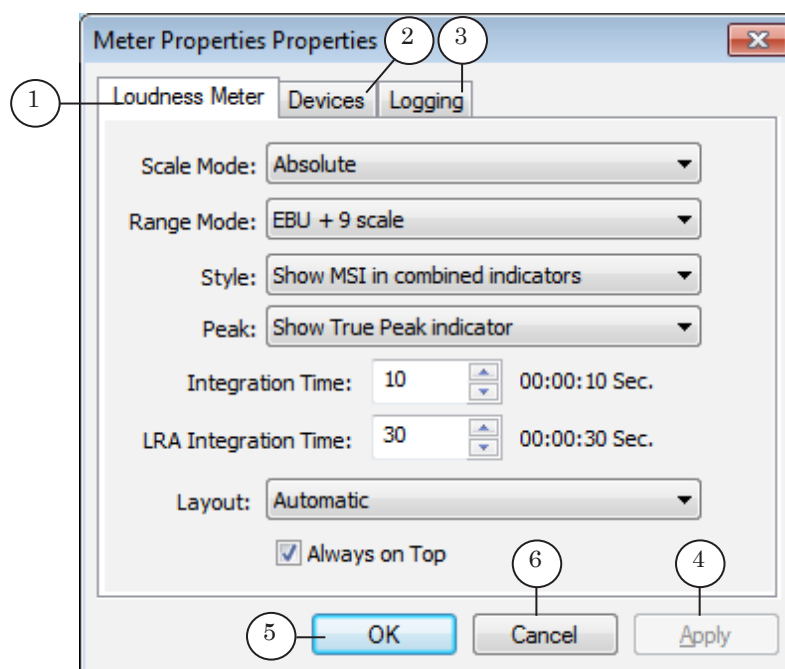
## 2. Meter Properties Window

### 2.1. Properties Window

Select Properties (1) in context menu of the main program window to open window with settings.



The Meter Properties window appears. The window has 3 tabs:

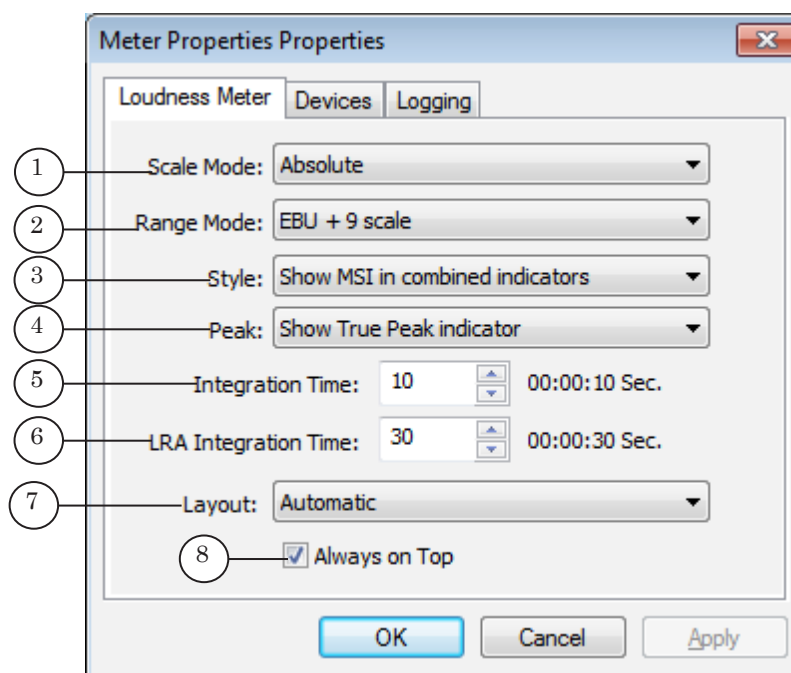


Meter Properties window. Control elements:

1 is tab used to customize loudness metering parameters; 2 is tab used to select audio device; 3 is tab used to customize logging parameters; 4 is button used to apply settings; 5 button is used to save settings and close the window; 6 is button used to close window without saving settings.

## 2.2. Loudness Meter Tab

The Loudness Meter tab has elements to customize metering parameters and scales.



Elements are described in table below.

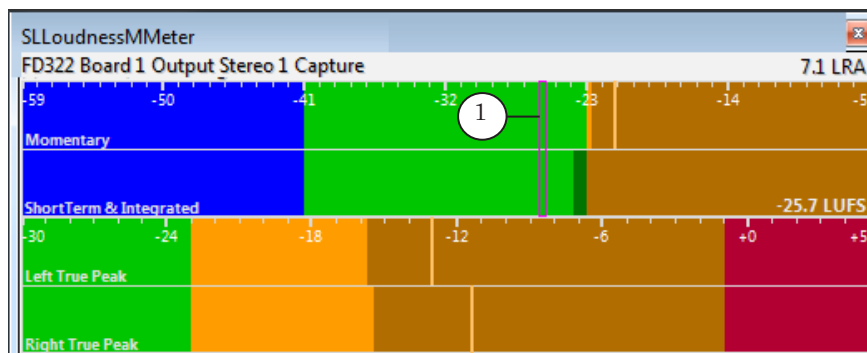
**Table 1.** Elements used to customize operating parameters

Name (index on the picture)	Submenu (commands) of context menu in the main program window	Scope of application	Values
Scale Mode (1)	EBU R128 Scale mode	Select used units: LU or LUFS.	Absolute is an absolute scale in LUFS units; Relative is a relative scale in LU units with 23 LUFS zero point.
Range Mode (2)	EBU R128 Range mode	Select scales scope.	EBU +9 scale denotes displaying standard range; EBU +18 scale denotes extended range.



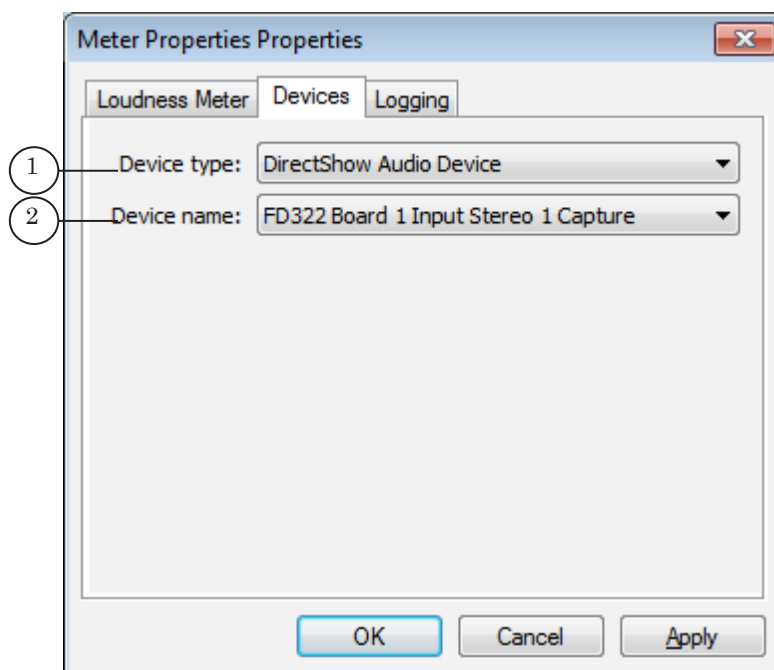
Name (index on the picture)	Submenu (commands) of context menu in the main program window	Scope of application	Values
Style (3)	Loudness Style	Customize displaying Momentary, Short-Term, Integrated scales.	Show MSI in separate indicators denotes displaying values of 3 parameters – M, S, I. Each value corresponds to separate scale. Show MSI in combined indicators denotes displaying values of 3 parameters. M on separate scale, S and I values on combined one. Show SI in combined indicators denotes displaying S and I parameters values on combined scale.
Peak (4)	Peak	Customize parameters of displaying peak scale values.	Do not show Peak indicator disables displaying True Peak scale. Show Peak indicator denotes displaying peak indicator. Show True Peak indicator denotes displaying "true peaks" indicator according to ITU-R BS-1771 and EBU Tech3341 requirements (not greater than –1 dBTP).
Integration Time (5)	–	Specify time interval for metering Integral sound loudness.	Default value is 10 seconds: during last 10 seconds. If this parameter is 0 then metering starts either from launch of SLLoudnessMMeter program or from the last reset of values (the Reset option).
LRA Integration Time (6)	–	Specify time interval for metering LRA.	Default value is 30 seconds, during last 30 seconds. If this parameter is 0 then metering starts either from launch of SLLoudnessMMeter program or from the last reset of values (the Reset option).
Layout (7)	–	Select way of indicators placement.	Automatic denotes automatic indicators placement. Depends on ratio of the main program window dimensions. Show Horizontal Indicators denotes horizontal placement of scales. Show Vertical Indicators denotes vertical placement of scales.
Always on Top (8)	Always on Top	Switch function of displaying "Always on Top" on/off.	Presence of mark denotes switching on; Absence of mark denotes switching off.

Take into account the (1) element that displays current value of integrated loudness (Integrated) graphically when combining displaying of indicators scales.



### 2.3. Devices Tab

The Devices tab includes elements to select device for which loudness is metered.



Meter Properties window. Devices tab.

Control elements:

- 1 is a drop-down list to select type of audio device;
- 2 is a drop-down list to select name of audio device.

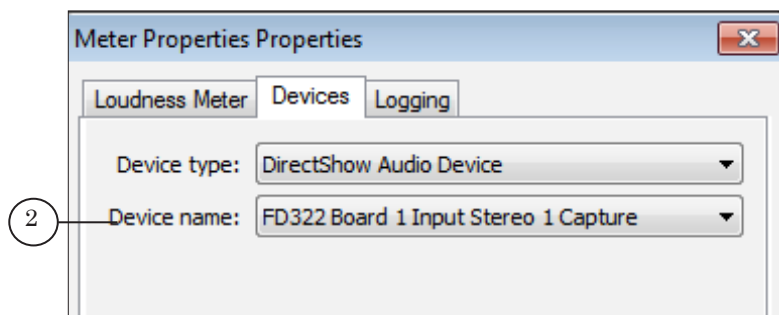
1. The Device type drop-down list (1) allows selecting type of audio device:

- CoreAudio Loopback Device is used to meter signal received from output of standard Windows devices;
- DirectSound Capture Device denotes standard input devices that deal with DirectSound interface;

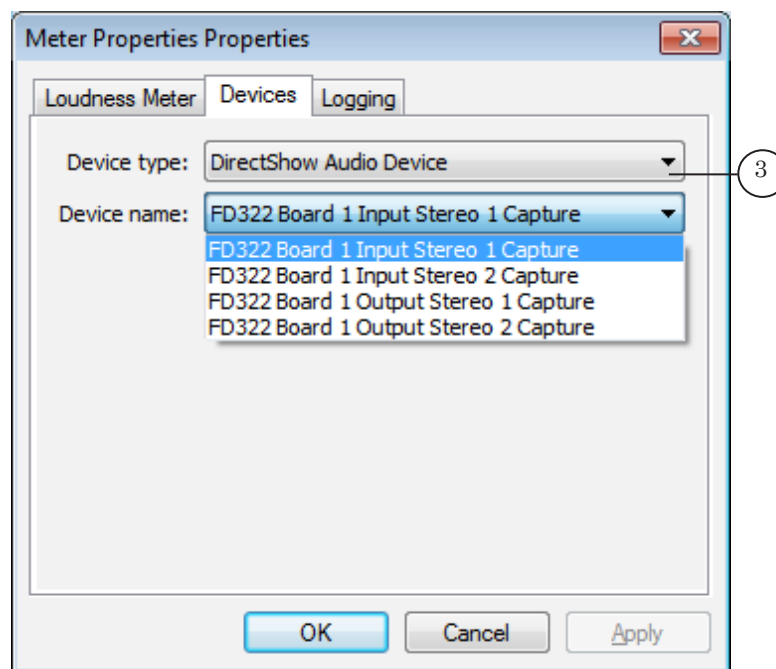




- DirectShow Audio Device denotes devices that deal with DirectShow Audio Capture interface including FDEXT boards (FD322/FD422/FD842/FDVrt).
2. The Device name list (2) content depends on selected type of audio device.

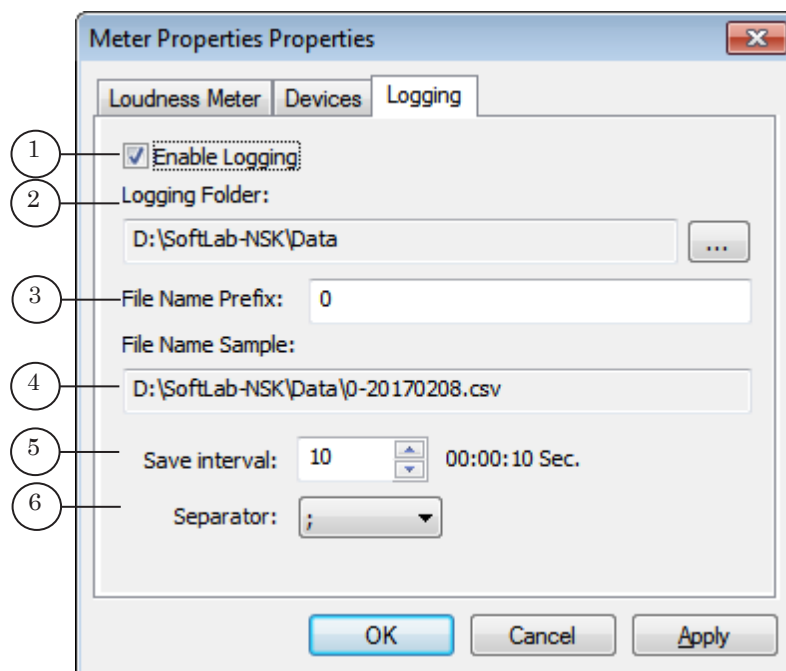


3. Select DirectShow Audio Device (3) if necessary to select FDEXT device type (FD322/FD422/FD842/FDVrt) to meter loudness.



## 2.4. Logging Tab

The Logging tab includes elements to customize logging.



Meter Properties window. Logging tab.

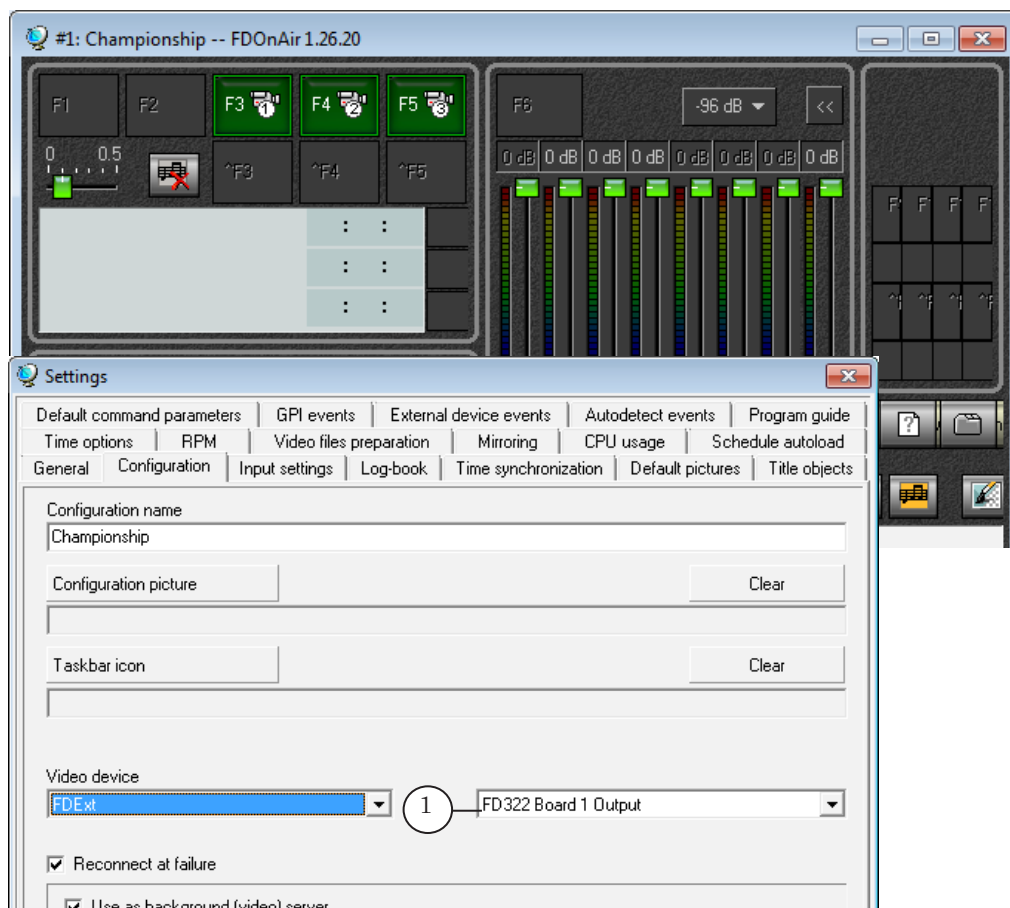
Control elements:

1 denotes enabling/disabling logging; 2 denotes specifying path to folder with log file; 3 denotes specifying prefix of log file name; 4 shows sample of full path to file; 5 denotes specifying time interval of logging data in file (in seconds); 6 denotes selecting separator (";" is by default).

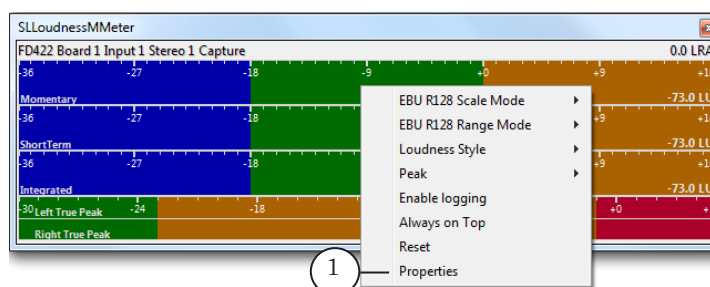
The Enable Logging option (1) can be also activated via context menu of the main program window.

## General Procedure

1. Let it is necessary to control loudness of block with advertisement on output of broadcasting server. Let the FDO nAir program is customized for work with FD322 Board 1 Output device (1).



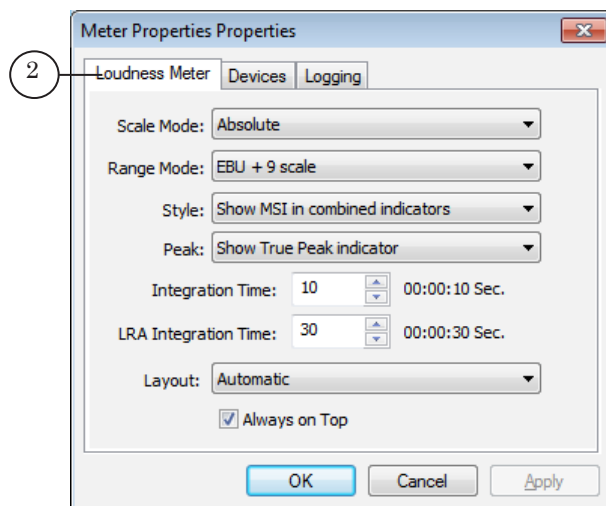
2. Launch the SLLoudnessMMeter program.  
You may use the Start menu to launch the program:  
All Programs > ForwardT Software > Tools > LoudnessMMeter.
3. Open program context menu by right-clicking indicators area. Select Properties (1).



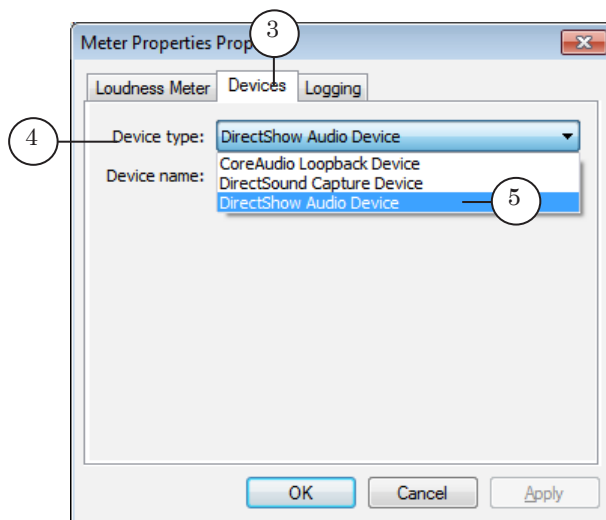
4. Pass to the Loudness Meter tab (2). Customize general parameters of loudness metering via tab elements. Detailed information on elements purpose you may find in the «Interface» section of the present document, the «2.2. Loudness Meter Tab» subsection.



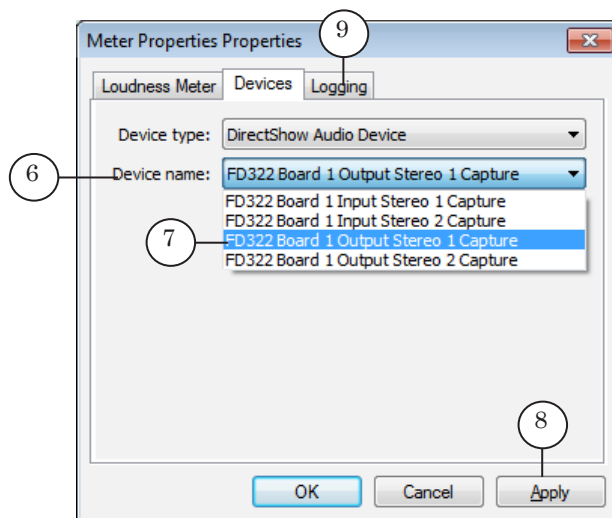
**Tip:** Set 0 for Integration Time to meter integrated loudness of block with advertisement. In this case loudness during entire period when advertisement is played is metered.



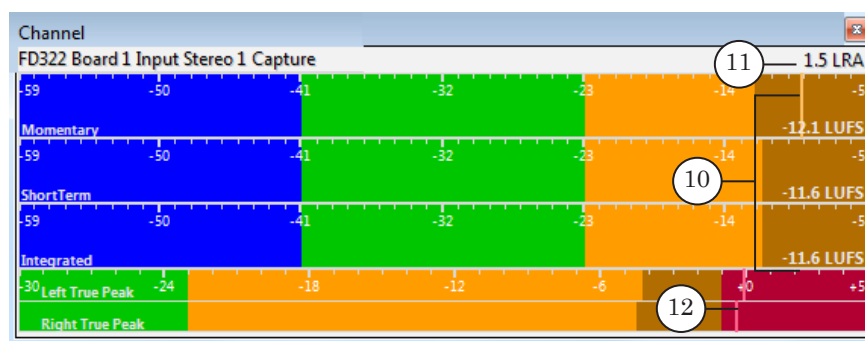
5. Pass to the Devices tab (3). Select DirectShow Audio Device (5) in the Device type drop-down list (4).



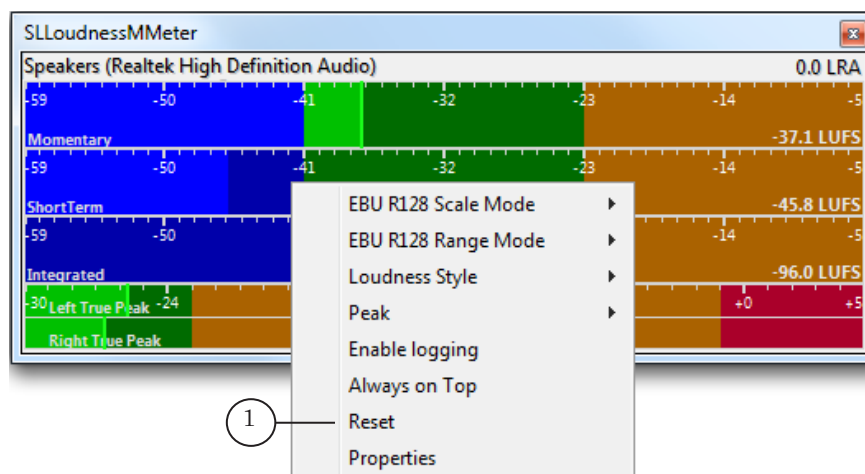
- Select audio device in the Device name drop-down list (6). FD322 Board 1 Output Stereo 1 Capture (7) is in our example, the first stereo output of the FD322 board. Click Apply (8).



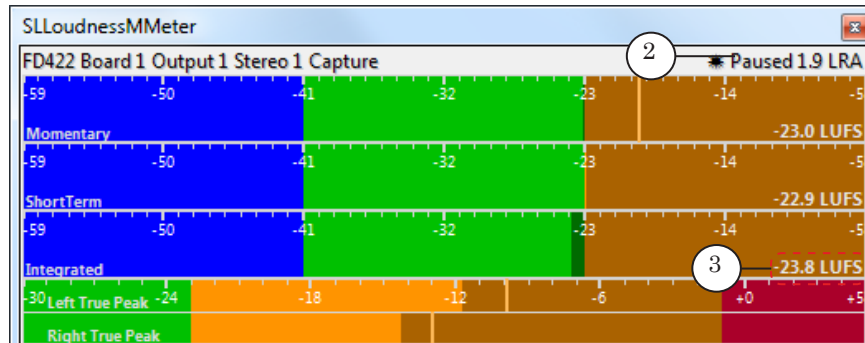
- Pass to the Logging tab (9). Put the Enable Logging mark to start logging. Customize logging parameters. More information on customizing logging see in the «Interface» section, the «2.4. Logging Tab» subsection.
- Loudness of selected device starts automatically starts to be metered after settings are applied. Indicators display corresponding values graphically and numerically. Current parameters values (10) are displayed on the right part of each scale ("M", "S", "I") including integrated (average) loudness – "I". Loudness range value (11) is displayed in the upper right corner of the program window. Peak values are displayed on scale as vertical lines (12).



- Start metering loudness again when block starts to play. For this use the Reset command (1) or double-click indicators area. Current values are reset and metering restarts.



- Wait until the end of the ad block. At the end of the ad block, turn on the Paused (2) mode to view the current values. In order to do this, left click on the indicator area. On the Integrated scale, look at the value of the Integral (average) loudness (3). The optimal level of the value – minus 23 LUFS, with an allowed deviation of +/-0.5 LU.



- Continue metering values for the following program. Click again that indicators continue working.



11. The \*.csv file in folder with log file appears. It is updated with a specified periodicity. You may open the file via one of the following spreadsheet editors, i.e. Microsoft Excel, OpenOffice Calc, etc.

```
sl-20160718_1.csv — Notepad
File Edit Format View Help
Audio input; DirectShow Audio Device;
FD422 Board 1 Output 1 Stereo 1 Capture
Loudness scale; Absolute
ITU BS.1770 integration time; 0 sec
LRA integration time; 30 sec
logging save interval; 10 sec

Date;Time;Integrated;LRA
2016-07-18;13:19:40;-23.743;2.017
2016-07-18;13:19:50;-23.919;6.062
2016-07-18;13:20:00;-23.981;6.915
2016-07-18;13:20:10;-23.876;7.070
2016-07-18;13:20:20;-23.792;6.768
2016-07-18;13:20:30;-23.781;2.871
2016-07-18;13:20:40;-23.763;4.078
2016-07-18;13:20:50;-23.345;6.487
2016-07-18;13:21:00;-21.896;12.852
2016-07-18;13:21:10;-20.833;11.185
2016-07-18;13:21:20;-20.210;2.777
2016-07-18;13:21:30;-19.836;4.062
```



# Work Order of Regional TV Broadcasting Companies For Normalizing Sound According to Advertisement Legality

## 1. Regulations

Algorithm of control over loudness metering you may find in the «Algorithm to measure advertisement and TV and radio program average loudness interrupted by advertisement» act. All planned and random examinations by FAMS are executed according to requirements described in act about advertisement in Russia (section 35.1 of «Federal Act About Advertisement Norms», «Act of Russian FASM from 04.06.2012 N 360 "About Confirming Administrative Standard for FASM Concerning Following Russian Legalities towards Advertisement"»).

## 2. General information on the Method of measuring the correlation of loudness of ads and programs

In order to normalize the audio according to the requirements of the law on ads, it is recommended for broadcasting companies to make controlled measurements according to the proposed Method.

For controlled measurements recordings of TV or radio programs containing the following fragments are used:

- pre-ad fragment – a fragment of a TV or radio program preceding an announcement or ad block; the duration of the pre-ad fragment should be no less than 5 minutes;
- post-ad fragment – a fragment of a TV or radio program following an announcement or ad block; the duration of the post-ad fragment should be no less than 5 minutes;
- ad block or announcement, containing only full ads or announcements.

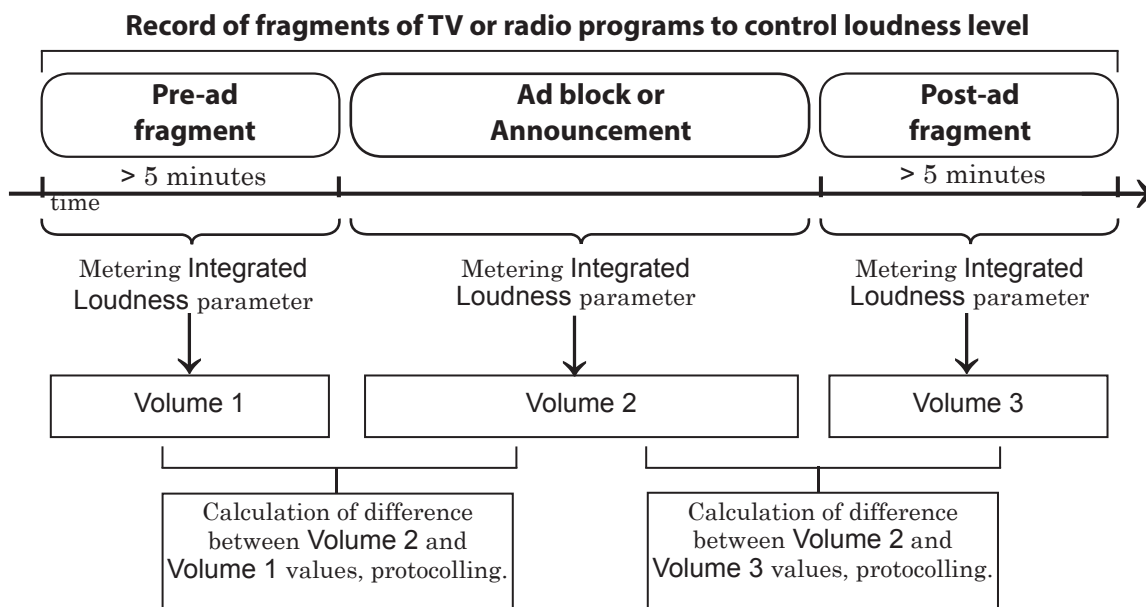
The measurement of the loudness of each of the fragments is done in Loudness units relative to Full Scale (LUFS). The difference between the values of the measured audio loudness of the fragments is defined in loudness units, equal to decibels. The difference of different audio fragments is recorded into the «Measurement Protocol» in decibels.

- ✓ **Important:** The loudness value of the ad block or announcement can not exceed the value of the pre- or post-ad fragment by more than 1.5 dB.



### 3. Checking the loudness according to the Method

Note: To control level of loudness according to the described above algorithm one only parameter is required, i.e. Integrated Loudness of TV and radio programs. Momentary Loudness, Shot Term Loudness, True Peak and LRA metering are not required.



The value of the Volume 2 parameter should not exceed the values of the Volume 1 or Volume 3 parameters by more than 1,5 dB. If it does exceeds that, then that ad is considered to be exceeding the average loudness level of the interrupted TV or radio program, which can be the basis of action by an anti-monopoly authority, stipulated by the legislation of the Russian Federation.

### 4. Work Order For Regional Broadcasting Companies at Testing Sound Loudness Level

There are 3 steps of testing sound loudness level of TV and radio programs interrupted by advertisement:

1. Be sure that level of integrated loudness of input signal received from broadcasting TV or radio station corresponds to «Recommendations on normalization of audio signals in broadcasting sector», i.e. deviations of integrated loudness during all period of broadcasting (not less than a day) do not exceed  $\pm 0,5$  ( $\pm 1,0$ ) LUFS.

Switch logging on in the SLLoudnessMMeter program (see the «General Information» section, the «4. Logging» subsection, the «Interface» section, the «2.4. Logging Tab» subsection). We recommend testing content of log file recorded during at least one broadcasting day.



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If level of integrated loudness of input signal does not correspond to normative prescriptive level then appeal to the main broadcaster and inform about law violation.

2. Normalize sound level of all inserted media material. Level of integrated loudness measured at the first step is set as objective one for the SLAudioNormalizer program (see the [«SLAudioNormalizer. Automated Normalization of Audio Volume of Media Materials \(Files\) Before Playback in FDO nAir»](#) user's guide) .
3. Control output signal via the SLLoudnessMMeter program regularly. Also, implement daily testing of log file as described in step 1.

Note: Work order with SLLoudnessMMeter program is described in the present guide in the «General Procedure» section.



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## Useful Links

### **ForwardT Software set: description, download, documentation, solutions**

<http://www.softlab.tv/forward/index.html>

### **Support**

<http://www.softlab.tv/support.html>

E-mail: [forward@softlab.tv](mailto:forward@softlab.tv)

[forward@sl.iae.nsk.su](mailto:forward@sl.iae.nsk.su)

[forward@softlab-nsk.com](mailto:forward@softlab-nsk.com)

### **Forum**

<http://www.softlab-nsk.com/forum>

### **Documentation for more information**

1. [«FDO n Air. Broadcast Automation. User's Guide».](#)
2. [«FDO n Air. Additional Sections. User's Guide».](#)
3. [«SLAudioNormalizer. Automated Normalization of Audio Volume of Media Materials Before Playback in FDO n Air. User's Guide».](#)
4. [Act of Russian Federation Ministry of Communications № 171 from 21.05.2015 «Recommendations on normalization of audio signals in broadcasting sector».](#)
5. [ITU-R BS.1770-3. «Algorithms to measure audio programme loudness and true-peak audio level».](#)
6. [EBU R 128 «Loudness normalization and permitted maximum level of audio signals».](#)
7. [EBU Tech 3341 «Loudness metering: "EBU Mode " metering to supplement EBU R 128 loudness normalization».](#)
8. [Russian Federation Federal Act № 338-F3 from 4.11.2014. «Amendment to 14 and 15 sections of the "Act on Advertisement"».](#)
9. [Federal antimonopoly service act from May 22, 2015 N 374/15 "Algorithm to measure advertisement and TV and radio program average loudness interrupted by advertisement".](#)

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