RightMark Audio Analyzer

Version 2.5

2001

The project of iXBT.com / Digit-Life

http://audio.rightmark.org

User manual

Contents

About the program

RightMark Audio Analyzer is an independent audio measurements open-source project developed by iXBT.com / Digit-Life team. More information is available in the official site of this project http://audio.rightmark.org.

The test suite performs various tests of electroacoustical performance of sound cards and other real-time audio devices. Testing is accomplished by playing the test signals and recording them after they pass through the testing chain.

System requirements: CPU: Pentium or higher, operating system: Windows 95/98/2000.

Before testing

In the simplest case the testing chain includes the DAC of your sound card, line or speakers output, line input, and ADC. In order to test some other devices you must connect them between the output and the input of your sound card. It is assumed that you have a high quality sound card, because otherwise poor performance of the sound card will mask the performance of the external device.

You can use external A/D and D/A converters or digital inputs and outputs of your sound card.

Connect the card's line out (or speakers out if line out is not present) to the line input of reference measurement devices (or your own sound card if they are not present).

Using the mixer of your sound card select only "wave out" source for playback and only "line in" source for recording. Turn off all equalizers, tone controls, 3D surrounds, etc. to obtain the most adequate test results.

Run the RightMark Audio Analyzer. If you run it for the first time, you will be prompted to select your sound card settings (audio device, sampling rate, and resolution): see fig. 2. The program will store these settings in registry.
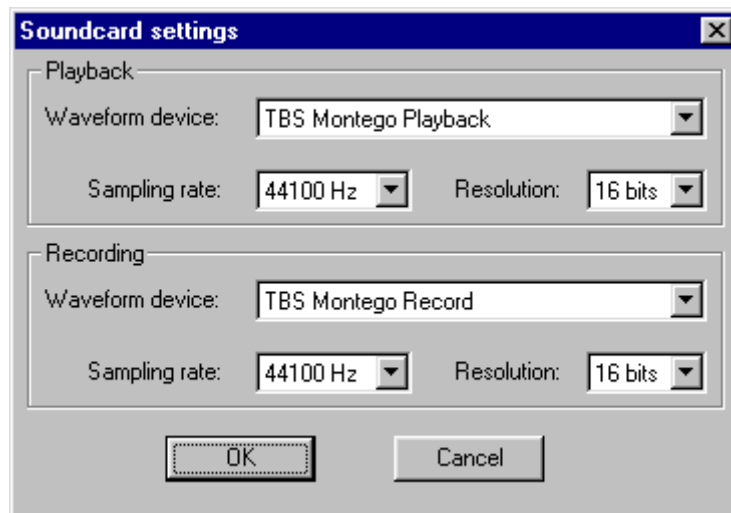

Fig. 2: Sound card settings dialog.

"Wave mapper" is virtual sound device that means current active wave device. It can be setup in Control Panel / Multimedia section.

Main window

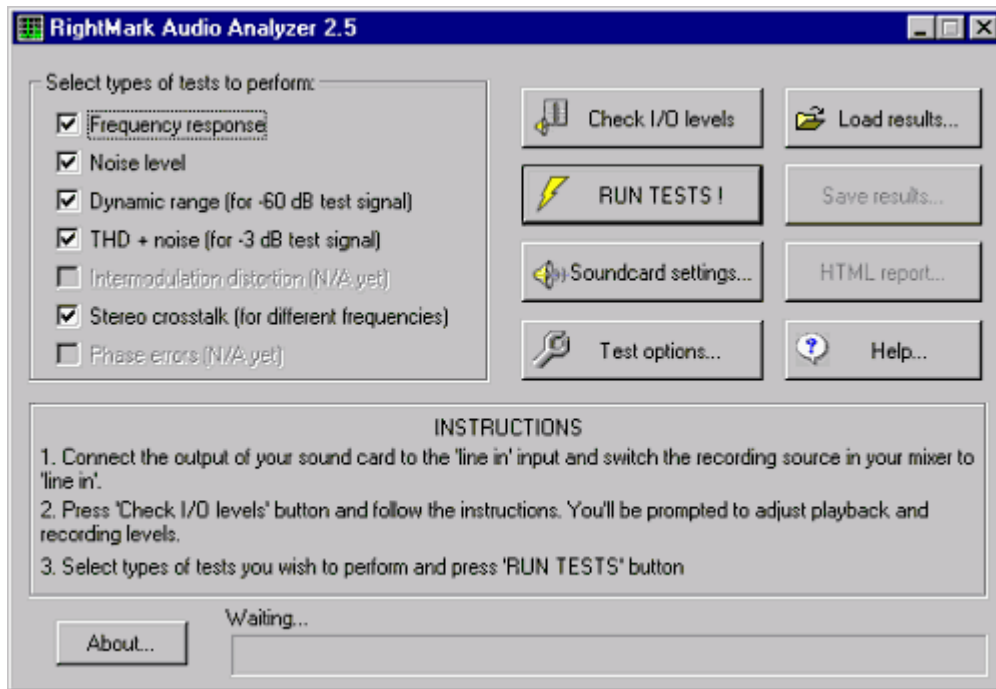After that you can see main window. It has some hints in INSTRUCTIONS part.

Fig. 1: *The main window of the program.*

Press *"Check I/O levels"* button. The sound card calibration will start. Two testing signals will be played back repeatedly: 0 dB FS and -6 dB FS. Adjust playback and recording levels in your mixer to make input levels approximately equal to output levels (precise equality is not needed, but it is desirable for accuracy; a difference of 1 or 2 dB can be tolerated).

Select the desired types of tests at the main window (see fig. 1) and press the *"RUN TESTS"* button. All the tests take about 1 minute to complete. After tests are complete you can view the results in the "Test results" window or perform tests that were not selected.

Viewing the results

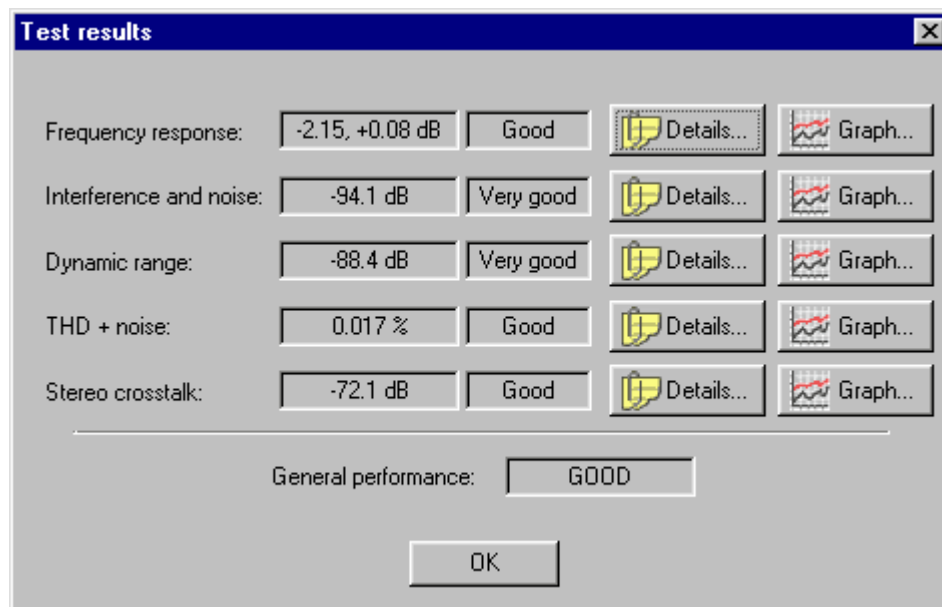In the "Test results" window you can see the information on results of all the tests that were performed (see fig. 3).

Fig. 3: *"Test results" window*

For each test a brief result and a conclusion is displayed. If conclusions are "Excellent" then your sound card is suitable for professional sound recording. If conclusions are "Good" then you can use your sound card for home recording. Lower marks mean that there are some significant drawbacks and you shouldn't use this card for serious musical work.

For each test you can view detailed report *("Details"* button) or graph (*"Graph"* button).

Details window

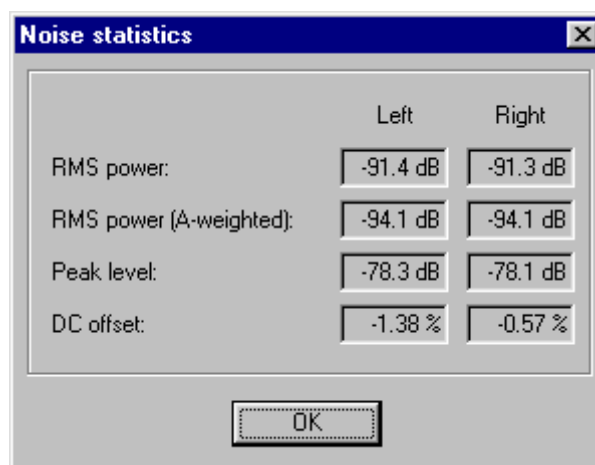***Fig.4:*** *Details window (for noise level test)*

In the "Details" window (see fig. 4) you can see a numerical report on the performance of your sound card in that particular test. Results are displayed separately for left and right stereo channels.

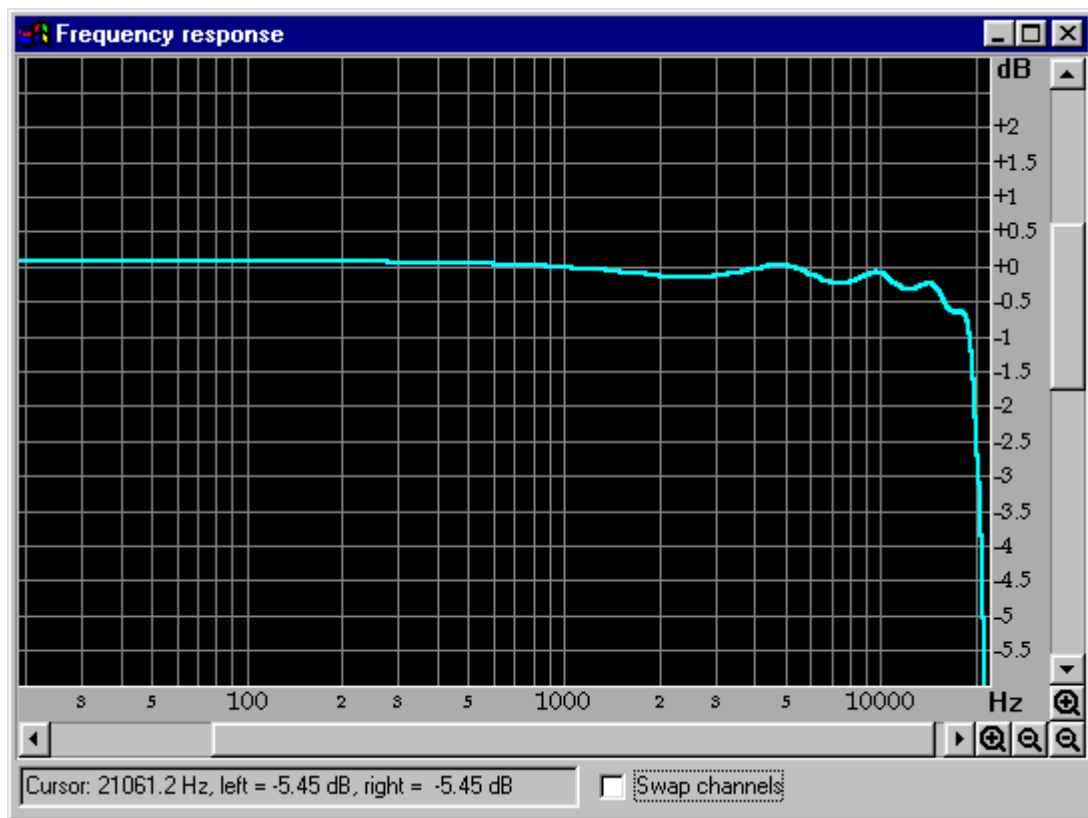### Graph window

Let's look at Graph window

Fig. 5: Graph window (for frequency response test)

There are control buttons here:

🔍 - zoom in

🔍 - zoom out

Swap stereo channels – draws the graph for left channel in front of the one for right channel (default setting is vice versa).

Mouse controls:

Left button – selects the horizontal range and performs "zoom in".

Right button – performs "zoom out".

Loading and saving the results

Three buttons for loading and saving the results are available at the main window (see fig. 1).

"Load results" button enables you to load previously saved results from SAV file into the "Test results" window.

"Save results" button enables you to save results from "Test results" window into the SAV file.

"HTML report" button enables you to create HTML report with test results. All the details and graphs are included into HTML file.

Tests description

Please see the description of tests at the separate manual (TESTS.PDF file) or online.

Test options

This dialog selects some options for various tests:

- *Apply dithering to test signals* checkbox turns on dithering during the generation of test signals (see "Dithering").

Soundcard settings

This dialog selects devices for digital audio playback and recording, and mode of operation: sampling rate and resolution.

In this version of program the sampling rates for playback and recording need to be equal. Audio devices and resolutions may differ.

After closing the dialog with the "OK" button the program tries to test selected devices and the selected modes of operation and reports on failure.

Glossary

A-weighting. Human hearing is unequally sensitive to sounds of different frequencies. For example the maximum of our sensitivity to quiet sounds lies around 3 kHz. Sounds of these frequencies we perceive as louder ones. Because of this we need to modify the technique of spectral measurements to make them closer to our hearing perception. Such modifications are known as A-weighting. They are widely used in audio measurements (for example, when estimating the noise level or dynamic range).

As a result we get inaudible frequencies attenuated and the most audible ones contribute more to the final results.

Dynamic range is a ratio of the maximal signal amplitude to the noise level (RMS value) in the presence of weak signal.

Dithering is a process of adding noise to the signal which was generated with a high precision. Usually dithering is performed before quantization to eliminate correlation between the signal and quantization error. As a result the noise of quantization becomes white and more pleasant than the "dirty" quantisized signal. Although we add some noise, the dynamic range becomes subjectively higher.

Full-duplex mode is an ability of sound card to record and playback digital waveform audio simultaneously. Almost all of modern soundcards support this mode, but some of them need to be tuned up in the Control Panel.

THD (total harmonic distortion) is a level of (usually unwanted) harmonics generated in the sound device. Usually high quality devices have a low THD value (lower than 0.002%), but there are exceptions. Many tube devices have rather high THD level, which makes their sound "warm". But transistor devices must have low THD, because their (odd) harmonics don't make the sound pleasant.

Feedback and future work

In the next versions of this project we plan to make online database for comparison of different sound cards. The set of tests will be extended (tests of phase errors and intermodulation distortion will be added).

All your comments and suggestions on this program will be highly appreciated. Please contact us on any questions or problems you experience with RightMark Audio Analyzer.

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