JBL-Smaart™: Answer Sheet!

Answers to Commonly Asked Questions About JBL-Smaart™.
rev by SB 11/19/96

So what does JBL-Smaart™ software really let me do?

You can use JBL-Smaart™ to measure and display room acoustics parameters, such as reverberation time, energy ratios and more. You can also use JBL-Smaart™ to OPTIMIZE a sound system by finding delay times, equalizer settings and relative volume levels using music, noise or other test signals as your source signal.

Is the speed of my computer important for performance?

YES. JBL-Smaart™ uses the host CPU to perform all of the calculations, unless a special device specific driver is provided. This means that the faster your computer is, the faster JBL-Smaart will run. The Analysis Module uses the host for FFT and graphics calculations. The Real-time module also uses the host CPU for real-time FFT calculations. For full audio bandwidth real-time performance, we <u>recommend a 66 MHz 486 or faster</u> machine.

How do I deal with multiple inputs?

JBL-Smaart™ is designed to work with two input channels. Multiple input signals are often used to make comparison measurements with several microphones or across several equalizers. Multiple channels can be handled by using an external mixer to switch the signal lines connected to the two sound card inputs. Measured data may be easily stored and overlaid for comparison.

Can I use JBL-Smaart™ with my laptop?

If your laptop contains a built-in sound card, or an expansion box which supports ISA cards, no problem. PCMCIA Cards from New Media (the wave jammer) and Eiger Labs (eiger PCMCIA sound card) have been successfully used with JBL-Smaart, however the interface between PCMCIA cards and most computers is less than standardized and can be problematic.

Must I have an advanced degree to use AND understand this software?

We sure hope not! We have done every thing we can to make JBL-Smaart easy to both use and understand.

How important is the quality of my measurement microphone?

Expensive microphones are expensive for a reason. We recommend a microphone with good frequency response, low noise and well behaved directionality. There are several extremely good measurement microphones available for less than $500. We use omni-directional microphones most of the time. (See microphones and sound cards below)

Are sound cards really capable of measurement quality audio?

The audio performance of the sound cards we have tested have been all over the map. However there are several sound cards with extremely good 16 bit (and even 18 bit) performance for less than $300 retail. (See microphones and sound cards below)

Has the 'Smaart' system been used in the field yet?
We have put the software through extensive beta testing. Recently we used JBL-Smaart to tune the sound system and document the acoustics of seven new NBA arenas! Our beta test team includes consultants, contractors and even a live sound guy or two!

What about Windows 95™?
We have written our code to comply with the Windows 95™ standards as a native Windows 3.1 program. JBL-Smaart has been extensively tested running under Windows 95, and works well.

Are we having fun yet?
We're sure trying! We believe that JBL-Smaart™ will solve most, if not all of your audio measurement, analysis and optimization problems, at a surprising low price .... now that's fun!

I don't understand the relationship between frequency resolution, sampling rate, FFT-size and bandwidth.-some formulas, basic explanations?

Sampling rate: is the number of samples taken per second. This limits the freqeuncy content of the signal being sampled. A sampling rate of N limits the highest frequency content of the digitized signal to ~ N/; This is known as the Nyquist frequency.

FFT: is a Fast Fourier Transform: is a mathematical process which takes time domain data (such as Windows WAV files or sound card inputs) and transforms them into the Frequency domain. The FFT mathematics requires that the number of time domain data points input be a power of 2 (128, 256. 512, 1024......). The FFT '*breaks up*' sound waves into frequency components the way a prism '*breaks-up*' light into colors.

Frequency Resoultion: FFT frequency domain data has a frequency resolution. Frequency Resolution The frequency resolution of an FFT is calculated from the sampling rate and FFT size. For a given FFT, the frequency resolution will be equal to the sampling rate, divided by 2 (the Nyquist frequency), divided by half the FFT size.

It is important to understand that the data points along a frequency plot are distributed evenly along the frequency axis every "x" Hertz, where x is the frequency resolution. For example, sampling at 44,100 Hz gives you a Nyquist frequency of 22,050 Hz. An FFT size of 1024 yields 512 frequency data points. Divide 22,050 by 512 to get a frequency resolution of 43.07 Hz. This means that there is one data point every 43.07 Hertz.

Increasing the FFT size, or decreasing the sampling rate will increase the frequency resolution. Notice that both of these actions increase the time it takes to collect a group of samples and may affect the responsiveness of the Real-Time module interface.

Transfer Function: The transfer function of a system is simply a comparison between the input and the output of the system. This comparison can be calculated and displayed in either the time or frequency domain.

How can I test the JBL-Smaart Real-time module?
It is easy to test JBL-Smaart real-time module using any of the following techniques:

  -Input the same signal to both channels and display
   the transfer function, it should be very VERY flat!
  -Measure a known system, such as an equalizer.
  -Input a known signal, such as a test tone (from a generator or CD)

May I use Smaart in outdoor environment. How does wind affect my measurements?
Wind is a killer! It is difficult to make good measurements is very windy conditions! Try increasing the number of averages and hope for the best!
What kind of computer, microphones and soundcards do you recommend?

-Most computers running windows 3.1 or Windows 95 with a windows standard (MCI-compliant) sound card, will work well! We recommend a 90 MHz Pentium, with 16 Meg of Ram and a *fast* video card as a great platform for JBL-Smaart.
WARNING: Make sure the Audio card has a dual channel input. Do not use a Toshiba 610 and 700 laptop computer

-Microphones should be Omni-directional and as FLAT as possible:
   the B&K 4007, Earthworks M30 or Josephson C550H or C550C
   are suitable microphones.

-Almost all sound cards we have tested work with JBL-Smaart. Specific sound cards have much better signal to noise ratios, which is an important performance criteria. We have also found that it is convenient for sound cards to have user-selectable input voltage levels.

  AudioTrix Pro card from Mediatrix is a low-cost, full featured
  sound card with good Signal to Noise and support software (~$260.00)

  The Digital Audio Labs Card D is a more expensive, but has
  HIGH end audio quality sound card (~$700.00).

How can I reach JBL-Smaart Technical support?
The fastest way to get a response is by sending email via the Internet, to
JBL_Smaart@compuserve.com.

Messages can also be left on the JBL BBS to the technical support person: Harold Kanz …or he can be reached at **818.895.3414** or mailed at **hkanz@harman.com**

Your comments, questions, and.. purchase orders are always welcome.   6-27-96

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