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Measuring Room Response with TrueRTA Freeware

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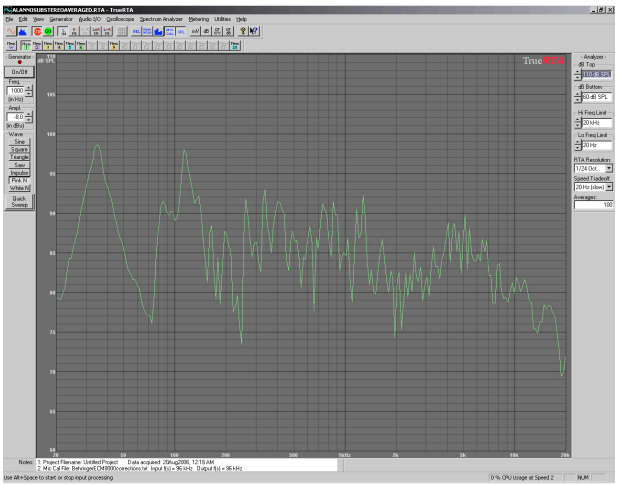
True RTA is a real time audio spectrum analyzer for the PC. It is a useful and inexpensive tool that can give a good picture of speaker response at the listening position. The software package can aid in positioning speakers for the smoothest response, or when used in conjunction with a digital equalizer such as the Behringer DEQ2496, can give quick feedback on needed frequency adjustments and their overall effectiveness.

True RTA is available as a free download, but not all features are enabled in the free version. There are four feature levels available, the most expensive being the $99.00 level four. The upper levels of the program include a 1/24 octave resolution real time analyzer, a pink noise generator, and an advanced measuring system based on a digitally generated sweep. These tools, along with other program features, provide an excellent manner of creating a frequency response picture of your listening room.

One nice aspect of the program is that it is effective even with standard and inexpensive soundcards. The program will self calibrate and cancel out any of the sound card's frequency response anomalies, giving you measurements accurate to .5 db.

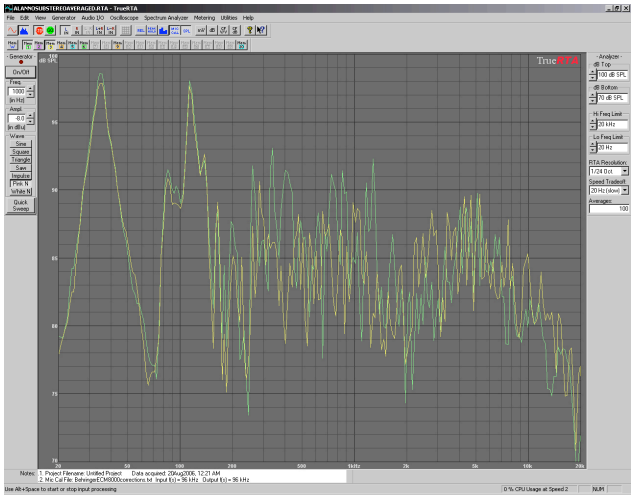
A reasonably good measurement microphone, as well as a microphone preamp is needed to obtain measurements with True RTA. For the group of measurements pictured below, I used a Behringer ECM8000 measurement microphone and an M-Audio Audio Buddy microphone preamp hooked up to the soundcard in my desktop computer. While a digital equalizer like the Behringer DEQ2496 does not require the use of a software package, I found the resulting graphs in True RTA easier to use than the RTA screen of the Behringer unit. True RTA also allows saving snapshots of various measurements so that they can all be viewed at the same time, something you can't do with the Behringer hardware. True RTA also allows averaging of a number of different measurements, as well as smoothing for easier readability.



When deciding where to apply equalization to an audio system, it is useful to see a number of different measurements around the listening position. If your listening is done on a couch, taking a number of measurements at different positions along the couch give you a more complete picture of where equalization will be effective and where it will be destructive.

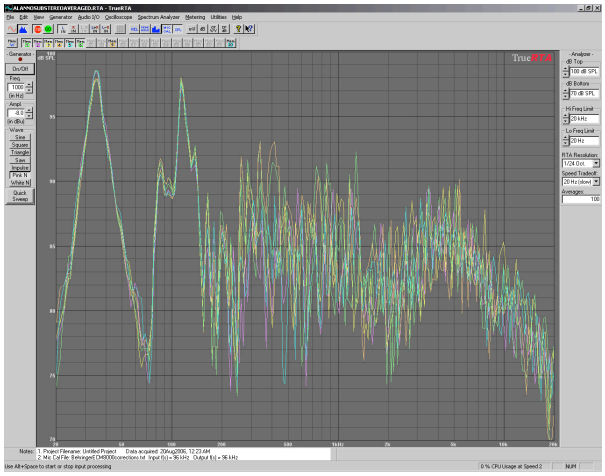
The frequency response graph pictured on the right was

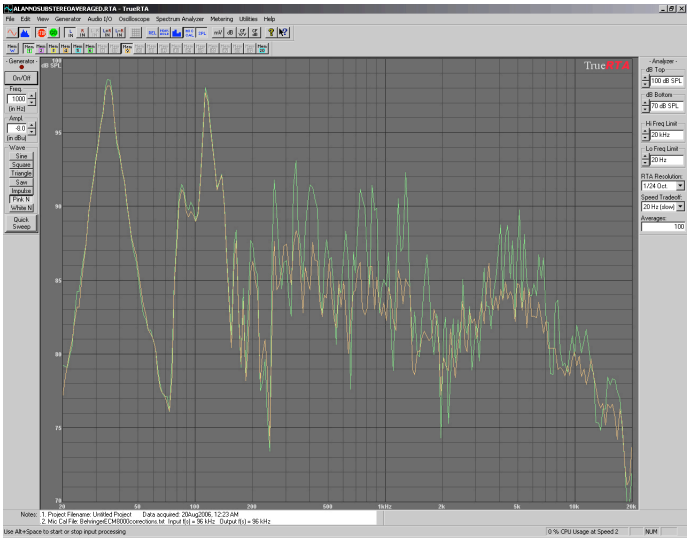
taken at the prime listening position in my listening room using the quick sweep measurement functionality of True RTA. The Y axis of the graph represents sound pressure level in decibels. The X axis represents the frequency range from 20Hz to 20kHz. Notice the average level falls at about 85dB with broad peaks and dips throughout the frequency range.



The second figure shows two graphs; the original frequency plot, plus another taken one foot to the left of the original measurement position. I have increased the scale of the graph so that similarities and differences between the two listening positions are more easily seen. Notice that the broad peaks in dips are nearly identical between the two listening positions up to about two hundred Hz, but then start to differ dramatically.

The next figure shows measurements of the six different positions where a listener's ears are most likely to be found at the listening position in my room. Notice that the peaks and dips between all positions are similar up to about 180 Hz, but begin to vary progressively as the frequency response increases. This is due to the size of the wave; the smaller the wave, the more dramatic the differences are for small changes in location. The graph below tells me that it is safe to adjust the frequency response up to about 200Hz, but any adjustment after that would adversely affect other positions near the prime listening area. I surely don't want my head locked into position with a vice when I listen to music!

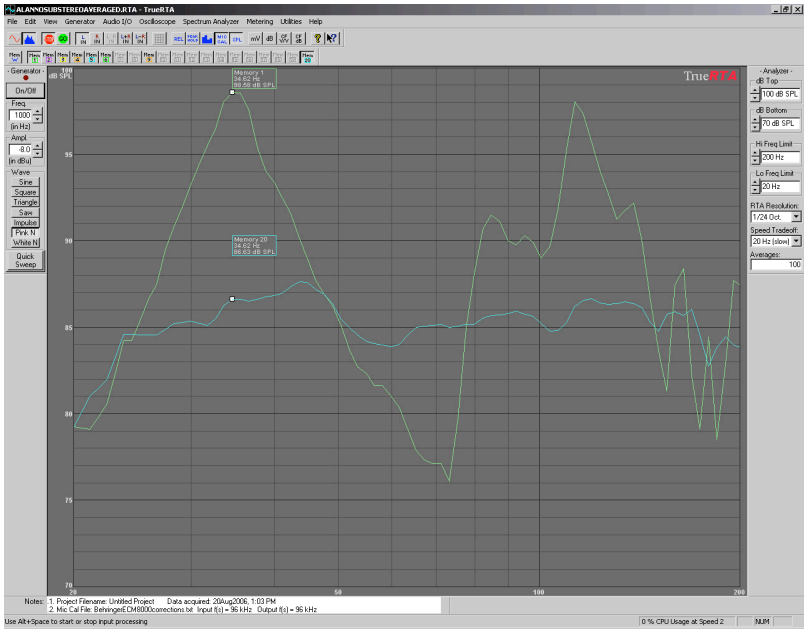




True RTA has features that enable you to average a number of measurements together. The figure below shows the prime listening position in green, and all listening position measurements averaged together in brown. The averaged measurements show the "BBC dip" that the designer of my speaker was nice enough to implement into the crossover. The average also shows the natural progressive attenuation of high frequencies that occur in a listening room.

Finally, the last graph shows only the region where digital room correction was applied with the Behringer DEQ2496. The green line shows the non-equalized response at the prime listening position between 20 and 200 Hz. The blue line shows the frequency response after a quick digital room cor-

rection setup. Note the fairly flat in-room bass response down to 25Hz. Not bad for a pair of two way stand mounted monitors. Maybe the time has come to sell my subwoofers.



Associated Equipment:
Behringer ECM8000 measurement microphone
Marantz SA8260 SACD player
Transcendent Sound Grounded Grid preamplifier
B&K ST-202 Plus amplifier
Ellis Audio 1801b speakers
Analysis Plus Oval 9 speaker cables
Silver Audio Silver Bullets 4.0 interconnect cables
Mogami Gold balanced XLR interconnect cables
Signal Cable Magic Power Digital Reference power cord