Dynamic Room Correction®

Dynamic Room Correction (DRC) ® is new technology developed by Tact Audio Inc. over past two years. This groundbreaking brings the science and art of Room Correction, and specifically Tact room correction products, to yet another level.

When we introduced our first RCS system (the Tact-2.2 in the late 90's) we were fully aware that we were embarking on a long term research process in the new exciting field of room acoustics correction. As a result of this research effort we brought to the market products such as Tact-2.0 S two channel RCS preamp, the Tact-2.2 X two channel preamp with RCS on two main and two subwoofer channels, and the TCS MKII ten channel theater correction system. All these systems offer RCS technology not found in any other product on the market. Our continued research combined with enormously valuable feedback from our customers has resulted in this new technology that we named Dynamic Room Correction (DRC)®.

Why do we call it Dynamic Room Correction (DRC)?

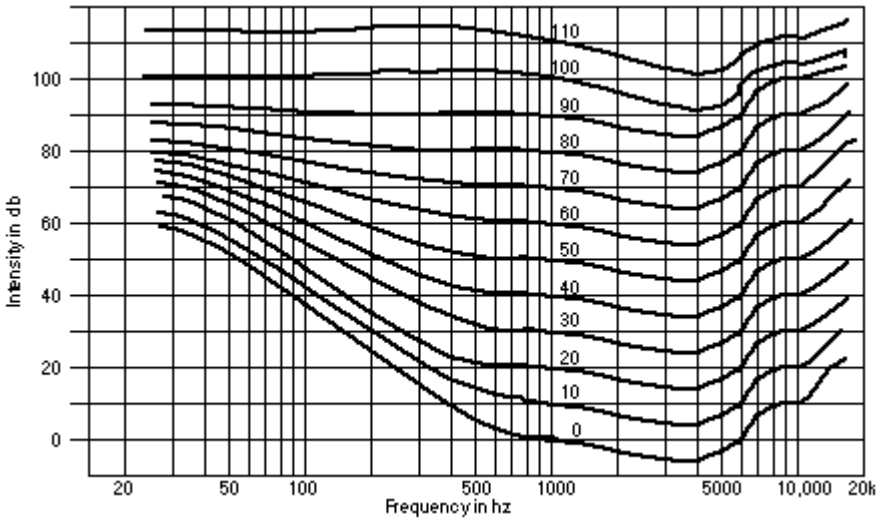
The reason we call it DRC is that the target curve used to compute correction filters dynamically changes with the master level control. In another words, for every 0.1 dB of level change the system uses a new target curve to compute room correction filters. What makes this dynamic is that all computations and adjustments are done on the fly without any interruption to the music you listen to.

Why do we need Dynamic Room Correction (DRC)?

It is well known fact that humans do not here all frequencies at the same level. It is also known that our ears are more sensitive to frequencies between 2000 and 5000 Hz than to frequencies bellow 2000 Hz and above 5000 Hz. In addition to this our hearing sensitivity changes with sound pressure level (SPL). This human hearing property was first discovered and experimentally confirmed by Fletcher and Munson at Bell Laboratories in 1933 and later refined by Robinson and Dadson in 1956. Their work resulted in a family of equal loudness curves (contours), widely known as Fletcher-Munson equal loudness curves. A sample of Fletcher-Munson loudness curves is shown in the figure bellow.

On the graph bellow there are 12 curves numbered from 0 to 110. These numbers represent the loudness level in ***phons.*** A Phon is a unit used to describe the loudness level of a given sound. The reason for introducing the loudness unit is that two sounds with the same SPL (dB) do not necessarily have the same perceived loudness. Phon is equal to SPL in decibels at 1000 Hz. For example, 80 phons means as loud as 80 dB, 1000 Hz tone.

Equal loudness curves represent the SPL that different frequencies need to have in order to be perceived as two tones of equal loudness. For example, a 200 Hz tone at SPL of 50 dB will have the same perceived loudness as a 1000 Hz tone at SPL of 40 dB. In this case both 200 Hz and 1000 Hz tones have a loudness of 40 phons, and they both belong to the 40 phons equal loudness curve.



Fletcher-Munson equal loudness curves

As it can be seen from the graph, in comparison to frequencies between 2000 and 5000 Hz, it is intrinsically harder for us to hear very low frequencies (below a few hundred Hz) and to a lesser extent very high frequencies (above 7000 Hz). At higher listening levels this difference gradually becomes smaller and smaller and curves become flatter.

Traditional Tact room correction systems use one target curve that allows for full range 20-20,000 Hz room corrections. Once selected, the same target curve (same set of correction filters) was used at all listening levels. This approach did not take in account the fact that our sound perception, as described by Fletcher-Munson curves, is frequency and level dependent. Many of our customers have realized this fact and they have used the nine correction presets (available on all our RCS products) to program 2.0 S, 2.2 X and TCS MKII with nine different target curves each corresponding to a different listening level. In this way they were able to take into account the equal loudness curve effect by switching to new target curves as the master level changes.

Thus for a number of reasons it is clear that we need a room correction system that will perform room acoustics correction and at the same time dynamically change the target curve (correction filters) as the system listening level changes.

How does it work?

Dynamic Room Correction (DRC) offers a very sophisticated way of handling a multi target curve approach to solving equal loudness curve problem. The system is based on one reference target curve and eight additional target curves called dynamic target curves. The reference target curve is used to perform basic reference room correction. Dynamic target curves are labeled 0, -6, -12, -18, -24, -30, -36 and –42 dB and are combined with the reference target curve to obtain the final target curve used to calculate correction filters.

For example, if the master level reads –10.3 dB (89.6 on the relative readout) the system will use the –6 dB and the –12 dB dynamic target curves and by interpolation will calculate a target curve corresponding to –10.3 dB. After that the system will combine the 10.3 dB target curve with the reference curve to obtain the final target curve that is then used to calculate the correction filters. New correction filters are loaded into the signal path as the music is playing and the new correction takes effect in a split of a second. The same process repeats again for any new master level setting.

What is the purpose of the computer interface?

With a DRC system, a computer is used only as a graphical user interface (GUI) and serves no other purpose. All calculations are performed inside the DRC processor. Target curves, measurements and other correction parameters are filed inside DRC flash memory. This approach will allow us to offer other GUI devices besides window based personal computers.

After target curve modification is made how long does it take for the new correction to be engaged?

Another main advantage of DRC technology is the elimination of the correction filters calculation and programming step. If you are current Tact user you are aware that, after the room measurement was completed and target curve was selected, you had to go through relatively long process of programming your RCS device with correction filters before being able to listen to the new correction. With the DRC technology when you make a change to the target curve, or select a new one, you click on the GUI ‘Calculate’ button to instantly calculate and engage new correction filters.

This new feature allows you to make small adjustment while you are listening to your favorite track and instantly here the changes you made. In this way without any interruption to the music you can make your system sound perfect down to the smallest details.