

Setup Tips For Sound Systems Using Void Enclosures

By
Rog Mogale

SPL Dependent Midrange Attenuation

All Void mid hi and fullrange enclosures have been designed to produce a nominally flat response within +/- 2dB of there stated -3dB points. For passive models this is achieved via the internal crossover and for active models by using the supplied processor settings.

Because of the way our hearing changes when subjected to very loud sounds, it is necessary to compensate for these changes by using EQ to maintain the correct balance. If the system is used for background music reproduction or will not be reproducing SPL levels over 100dB continually then you will not need to apply SPL dependent midrange attenuation. For levels over 100dB you will need to apply EQ in varying amounts depending on the playback SPL.

Below are my recommended SPL dependent midrange attenuation settings.

| SPL range | Freq | Level | Bandwidth |
|-------------|--------|-------|-------------------|
| 100 - 110dB | 2.6kHz | -4dB | BW= 0.34 Q= 4.233 |
| 110 - 120dB | 2.6kHz | -5dB | BW= 0.34 Q= 4.233 |
| 120 - 130dB | 2.5kHz | -6dB | BW= 0.36 Q= 3.997 |
| 130 - 140dB | 2.5kHz | -8dB | BW= 0.36 Q= 3.997 |

As can be seen from above, higher SPL levels require increased attenuation in midrange frequencies. Many manufacturers already 'voice' there enclosures with some degree of midrange attenuation, but as all Void enclosures possess a flat response, the above settings should be used when running systems at high SPL's.

The best place to apply the SPL dependent midrange attenuation for active enclosures is on the input channels of your system processor. For installs using passive enclosures or specific zones run at different sound levels, apply the EQ on the corresponding output channel.

For more information about the ISO 226:2003 equal-loudness contour and how it effects our hearing, vist

<http://www.phys.unsw.edu.au/jw/hearing.html>

Basic EQ Tips

Use an RTA to fine tune the systems response to flat then play some test tracks and have a listen. Here are some subjective suggestions about system EQ and ways to rectify common problems.

| Problem | Solution |
|--|--|
| The system sounds thin and lacking in weight | Add 4 to 6dB at 50Hz with a medium Q (BW= 0.3 - 0.38) PEQ |
| No kick | Add 5 to 8dB at 91Hz with a low to medium Q (BW= 0.24 - 0.3) PEQ. (Do not confuse any other frequency with kick, it is 91Hz) |
| Double bass sounds bloated and muddled | Take out 3 to 4dB at 130 to 150Hz with a low to medium Q PEQ |
| Female vocal sounds too warm | Take out 3 to 4dB at 200 to 240Hz with a medium Q PEQ |
| Female vocal sounds too thin | Add 3 to 4dB at 200 to 240Hz with a medium Q PEQ |
| Piano sounds annoying and rings | Take out 2 to 4dB at 700 to 900Hz with a medium Q PEQ |
| Vocals sound abrasive and aggressive | Take out 3 to 4dB at 2kHz with a medium Q PEQ |
| Synth sweeps on dance tracks rip your head off | Take out 4 to 6dB at 3kHz with a medium Q PEQ |
| Vocals sound too sibilant | Take out 3 to 4dB at 4 to 6kHz with a narrow Q (0.18 - 0.22) PEQ |
| HF sounds harsh & brittle. Hi hats sound crunchy | Take out 3 - 4dB at 8.5kHz with a narrow Q PEQ |
| HF lacks sparkle | Add 3 to 4dB at 10.5kHz with a medium Q PEQ |
| HF sounds flat and lacks air | Add 3 to 5dB at 12.5kHz with a 12dB/octave HPF |

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Recommended Test Material

The first things you need are some familiar test tracks that you have played on a variety of different systems. Once you get to know how the tracks should sound, stick with them and don't change them.

Below are some of the main requirements most sound systems are used for and some suggested music styles to check the system with.

| System application | Suggested test material |
|------------------------------|---|
| FOH for Heavy rock | A modern well recorded Jazz track (not 1940's trad jazz) with double bass, drums, piano and vocal Female vocal with acoustic guitar Some rock tracks in the style of the live performance you have to mix |
| FOH for acoustic performance | A modern well recorded Jazz track with double bass, drums, piano, sax and vocal Female vocal with acoustic guitar Some acoustic tracks in the style of the live performance you have to mix |
| Dance Music playback | A modern well recorded Jazz track with double bass, drums, piano and vocal Female vocal with acoustic guitar Some dance tracks representative of the material that will be played on the system |

You will note for all the different system applications I have suggested you play some modern jazz tracks to help EQ the system. So why do I suggest a jazz track.

1. A jazz track will have a double bass, which is one of the only instruments that will reveal problems in the upper bass range around 150Hz. Double bass is also very good for detecting timing problems from bass to midrange. In an ideal system the twang or snap of the string and its corresponding bass note should happen at the same time. Listen out for bass solos and check if all frequencies arrive at the same time. It's a hard test and many expensive studio monitors will even reveal problems if you know what to listen for with double bass.

2. Jazz tracks with vocals are useful for detecting if the system is flat around the 200 to 300Hz range and if there are any problems with sibilants around 5kHz. This is also the reason a good female vocal with acoustic guitar track should be part of your test material.

3. Piano. We are all used to hearing a real piano, so when played back through a sound system it is easy to tell if the systems response is adding or taking anything away. Look out for a boxy sound (120Hz) or other problems from 500Hz to 1.2kHz, which should be easy to spot. If it doesn't sound real then you need to play around until it does. Tracks with piano glissandos with rapid playing up and down the scales are very good test material, as it's easy to spot if any of the notes that appear louder than the average.

4. Most jazz tracks have the space to allow you to hear into the mix. This is important as busy tracks contain too much information for us to process when it comes to listening for specific problems.

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Live Performance System EQ

In general you want a flat response to start with, so using an RTA to EQ the system is desirable. I would take out some 2.6kHz depending on how loud you expect the system to play at. Also keep an ear on the 4 to 6kHz range and listen for sibilance. If you find you are talking out 5kHz on all the vocal mics EQ, then its time to reach for the system EQ. Also listen out for 200 to 400hz at very high output levels as electric guitars and male vocals can merge into one and intelligibility will be lost. EQing either the guitar or vocal is the only way to make space for both.

Dance Playback EQ

In my opinion a system that is used for dance music should not have a flat response. I've been to many of the best sounding dance clubs around the world and measured the systems response and all of them have similar responses. All the systems had a rising response below 200Hz, with frequencies below 100Hz some 10dB up from levels above 200Hz. There was also a dip in the midrange from 2 - 4kHz and a rising response from 8kHz. I always setup dance systems this way and have a reference dance system curve to follow when using an RTA to EQ the system. I guarantee that if you setup a system to be perfectly flat with an RTA and them play dance music though it at very high levels you will get people complaining it doesn't sound right. There will be no bass and the midrange 2 - 4kHz will slice your head off.

Below is the ISO 226:2003 equal-loudness contour. Its upper most plots look almost identical to all the good sounding dance club systems I have measured.

