

The Genesis Loudspeaker Setup Procedure

Introduction

This paper describes the procedure used to set up Genesis (or any other) loudspeakers in *a living room*. It describes a repeatable and replicable procedure that can be used by anyone – not just a “Golden Ear’ed” expert. Certain pieces of music are suggested for the various steps, but these are only suggestions – other similar pieces of well-recorded music that are familiar to the reader can just as easily be substituted. Please use this paper as a living document, and feel free to change the tracks to your preferred choice of music.

When listening, trust your instinct as millions of years of evolution has conferred the human hearing with an acuteness that cannot yet be replicated by measurement devices. Many readers will not believe the instructions to move the loudspeaker by 2mm (less than 0.1”). However, the loudspeaker set-up procedure has its roots in the physics of sound, and the physiology of hearing. If you don’t believe it, try this:

Have a friend stand 10 feet in front of you and speak to you. Now, close your eyes, have him move sideways a couple of inches and speak again. Point at him. You will find that you will be uncannily close. With some practice, you will find that at about 10 feet, you can detect a move as small as 4 inches.

Now, let’s say that your friend is a point source, and your head is 6 inches wide, standing left of center, he is 120.004” from your left ear, and 120.104” from your right ear. Standing right of center, he is 120.104” from your left ear, and 120.004” from your right ear. Physically, that is a 1.9 degree angle and a 0.1” distance displacement. (Do the math as an exercise for yourself.)

The phase difference between the left and right ear at middle C (256Hz and wavelength 52 inches) is about 0.7deg. Hence, by moving one speaker forward by 0.1” or 2.5mm, you will be able to shift the image of a singer by about 4 inches towards the speaker that is being moved if the speaker is 10 feet away from the listening position.

If you still do not believe that it is the phase of sound that gives your brain the imaging clue, close your eyes, and get your friend to speak. Now point at him and open your eyes to see how accurate you were. Close your eyes again, and fold one ear towards your friend. Get him to speak and point at him. Because you’ve deformed your outer ear, and hence changed the phase relationship of the echos in the fold in your outer ear, you will be less accurate at pointing to him.

However, if you keep your ear folded, and have him speak to you with your eyes open for a few minutes, your brain will learn the sonic distortion, and when you do it again, you will be much more accurate.

Preliminaries

Set the loudspeakers up at the minimum distance to the front wall and at the minimum distance apart (as suggested in the owner's manual). You don't want the speakers to be too far out and to intrude into the living space. Too far from the wall, and you have the possibility of people walking behind the speakers and tripping over the speaker cables.

Point the speakers straight ahead. Genesis loudspeakers are designed to give the correct tonality when NOT pointed at the listener's ear. They define a "window" into the soundstage, and thus accommodate a much larger sweet spot – it means that you can have a couch or love seat at the listening spot. If space allows, position the listening seat at a spot that is about 0.618 of the length of the room. Further from the front wall behind the speaker, then the back wall behind the head of the listener. If there is not enough space, the listening seat can also be at a position that is 0.382 of the length of the room. Start with the suspension spikes inserted but retracted so that it is easier to slide the speakers around.

On the Genesis loudspeakers, also set all the controls to 12 o'clock (pointing straight up) position. On the models with the external servo-bass amplifiers, start with the recommended settings in the Owner's Manual.

Step 1 – define the image

A Song for You, Jacintha/J. Monteiro Trio, First Impression Music

The plane of the loudspeakers defines a "window" into the musical event. This means that you should be able to "see" the individual musical performers with your ears.

First, make sure that the balance control of your preamp is exactly in the center. Sonic image is defined more by phase than by loudness, so while this is not critical, a small difference in balance can make this more difficult.

The sonic image of the singer on this track should be exactly between the two loudspeakers. If the image is too far to the left, move the *right* loudspeaker forward by 2mm (1/10th of an inch). If the image is still too far to the left, move the right loudspeaker forward by another 2mm. If the image now moves too far to the right, move the speaker back by 1mm.

If the image is to the right, move the *left* loudspeaker forward. We find this easier than moving the left speaker back if the image is too far to the left. Make tiny increments. This is because if you make large movements, the image could swing wildly left and right.

Sometimes, you will also find that you cannot get the image to properly center. If you move your head side to side, the image should still be stable. If the image swings wildly,



it is because the two speakers are at different planes. In this case, you may have to find that you have to move one speaker forwards or backwards by 100mm (about 4 inches), and then re-center the image.

If the image is centered, is the image also the size of what you would imagine a female singer would be in your room? If the image is too large, is the volume higher than a female singer could be singing in the room? If the volume seems appropriate for a singer in the room, and the singer is still too large, move the speakers further *apart* by 12mm (1/2 inch).

Again, make small increments. You will find that the image shrinks in size, and then begins to grow again as you push the speakers apart. This is normal. The positioning when the transition happens is probably the correct positioning of the speakers.

Is the depth of the image appropriate? The singer should be at a spot about on level with the speakers. If the singer is too far forward, you will have to pull the speakers further from the front wall. Pull both speakers forward by 5cm (2 inches). If the singer now seems too far back, push it backwards halfway (2.5cm or 1 inch). You will probably have to re-center the image again. Then, again check for image size, and depth. Repeat this until you are satisfied. Screw down the suspension spikes to lock the speakers down to the floor. If necessary, put a small *copper* coin under each spike to protect hardwood floors.

On this track, you will find that the image of the singer is very low in relation to the rest of the band. It sounds almost like she is standing in a pit with the band members arrayed around her. This is correct. During the recording session, we think that the microphone for the vocalist was hung, and the singer facing down when singing (may be reading her lyrics). From the perspective of the microphone (reproduced by your speakers) it will seem that the singer is very low.

When the speakers are optimally set-up, you will also hear the singer shift her weight from one leg to the other during the first two or three lines of the song!

Step 2 – defining the height of the soundstage

Peace in the Heart, FIM SuperSounds! III, First Impression Music

The loudspeakers define the window to the musical performance. Hence, not only should individual performers have sonic images, the entire performance should have a realistic 3-dimensionality with height, width and depth.

In the first few seconds of this track, there is a shaker that starts off mid-height and stage left (out to the left side of the



left loudspeaker), comes forward towards the listener and down as it flies between the speakers, then goes away to the right, and disappears off into the top right corner of the room – like a bird swooping in and flying away.

If the shaker goes away from the listener as it flies stage center, the system is inverting phase. In this case, reverse the polarity of the speaker cables on both channels either at the loudspeaker or at the output of the power amplifier (or use the phase invert on your CD player or preamp if you have this ability).

Use the front-back tilt (caster angle) of the loudspeaker to define the height of the soundstage. If the shaker does not fly off into the top right rear corner of the room, raise the back of the right loudspeaker by giving the two spikes at the rear a 180deg twist clockwise. Because the suspension spikes on Genesis loudspeakers use a #3/8-16 screw thread, a 180deg twist raises it by 1/32 of an inch (about 0.8mm). Hence, you may need to make several adjustments.

It may seem counterintuitive that to *raise* the soundstage you need to raise the *back* of the loudspeaker. However, if you think of the plane of the loudspeakers being a window into the soundstage, if you want to look up, the window will need to be pointing up – hence the top of the window is leaning towards you. Imagine looking up, and you see that you will be leaning backward to look up.

To lower the soundstage, you raise the *front* of the loudspeaker – which would be like if you leaned forward to look down a downward-facing window.

Changing the caster angle of the loudspeaker will also change the tonality of the loudspeaker. This is because angling the midrange/tweeter towards the ear of the listener will make it more forward. After you have correctly adjusted the height of the soundstage, adjust the midrange/tweeter controls until the children's choir in this track sounds like they are about 8 to 12 years old. If the choir sounds too young (5 to 8 years old), lower the midrange level by turning the control anti-clockwise.

Step 3 – horizontal leveling of the soundstage

La Campanella, FIM SuperSounds! III, First Impression Music

The piece used for this is a close-miked piano. The low notes should be on the left of the soundstage, and the high notes should be on the right of the soundstage. The piano should sound leveled, and each higher note should be on the right of the last note. Imagine looking at a piano keyboard, and each key emitting the note that it plays. However, as the microphone was placed very close, the piano will sound slightly larger than the entire space between the two loudspeakers.

If the right side of the keyboard seems to be tilted up (like a hockey stick), raise the left side of the right loudspeaker (azimuth angle) by giving the two spikes on the left side a

90deg clockwise twist. If the entire keyboard seems to be tilted up from left to right, raise the left side of both the right and left loudspeaker by giving the two spikes on the left side a 90deg clockwise twist. Repeat until the keyboard sounds level.

If it is the left side of the keyboard that seems tilted up, raise the right side of the speaker.

On some systems, this seems to be impossible to do. The piano seems to be concentrated in the middle, and the low notes closer to the listener, and the high notes further away. Or, the note-to-note relationship seems to be confused. Some lower notes are further to the right of higher notes while the overall relationship of low notes to the left and high notes to the right seem to be correct. In general, we have found this to be caused by some network-type cables, and/or CD players/DACs that shift phase at various frequencies.

Step 4 – depth relationship in the soundstage

Canon in D, This is K2HD Sound! First Impression Music

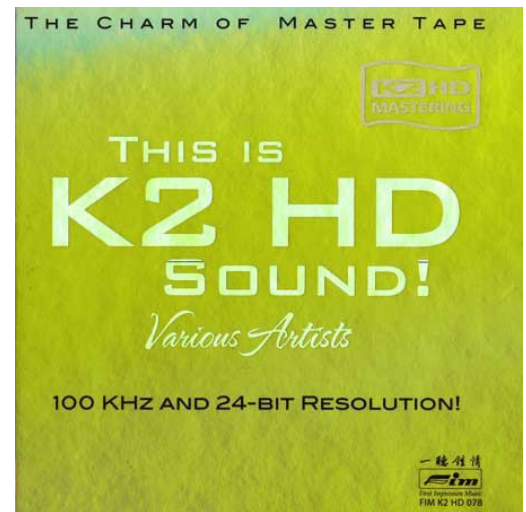
This piece is a percussion band with tympanis behind and triangles, marimba, chimes, and other percussion instruments. When correctly set-up, the tympanis can be heard to be behind, each bar or key of the marimba is distinct, and each rod of the chimes can also be heard.

When the high frequency instruments seem to be jumbled up and confused, the bass level is mis-matched. It may sound counter-intuitive, but bass is the foundation of music and a problem at 50Hz will affect all harmonics above it – 100Kz, 150Hz, 200Hz, etc. Getting the bass level correct fixes small problems with smearing of high-frequency information.

Turn the bass gain and crossover frequency up and down by very small increments, first on the left speaker, and then on the right speaker until you can hear each bar or the chimes and marimba. Once you have the bass level and crossover frequency correct, concentrate on the relative positioning between the instruments.

If the tympanis sound forward of the triangles, move the seating position forward or back in 5cm increments (assuming that you have the phase of the system correct in the first place). If that does not work, move both loudspeakers forward or backward until the bass depth is correct, in which case it may be necessary to re-adjust the image starting from Step 1 again.

With some *non-Genesis* loudspeakers, it may not be possible to achieve this depth relationship of bass and high-frequency instruments. This is due to the bass being out of phase with the mids and highs. In general, these are ported loudspeakers. When listening



to a jazz quarter, you might find that the double bass is always in front of the piano player on some of these speakers.



Step 5 – midrange attack and dynamics

Vivaldi Concerti con molto Strumenti RV560, Ensemble Matheus

The string quartet can be one of the most difficult sounds for a pair of loudspeakers to reproduce correctly. Bowed string instruments, when heard live, have a roughness and grain. Good string performers are able to impart energy and nuance into their playing by their bowing technique.

In this piece, the players “attack” the first note of each phrase. When the attack is missing, the piece sounds boring. Lots of energy is generated as the string players lean into the strings with the bow.

With many Genesis loudspeakers, the midrange dynamics and forwardness of the loudspeaker can be adjusted with the midrange control. If the piece sounds laid back and boring, raise the midrange level control. At the right setting, you can hear each player attacking the piece to give it excitement.

If the tweeter control is too high, the sound becomes too glassy. Much too high, and the strings are grainy due to distortion creeping in. Adjust the tweeter control until the sound of the strings is correct. Imagine the rough hair of a horse’s tail on the bow being drawn across the smooth string of a violin to make it vibrate.

If adjusting the midrange and tweeter does not give you the sound you want, it is also possible to raise or lower the entire loudspeaker by adjusting all four spikes the same amount. This has the effect of raising the midrange/tweeter level in relation to the ear level of the seated listener. If the midrange/ear level is closer, the speaker will be more forward. It is also possible to adjust the caster angle (front/back tilt) of the loudspeaker to effect the same tonality change, but that will also affect the soundstage height. Adjusting the height of the loudspeaker makes less of a change to soundstage height.

On *non-Genesis* loudspeakers without midrange and tweeter controls, it is sometimes possible to adjust the midrange attack and dynamics with changes in the toe-in of the loudspeaker. If the loudspeaker is directly pointed to the listener’s ears and the midrange is too searing, toe the speakers in more so that the speakers point at a spot further in front of the listener, or toe the speakers in less so that the speakers point at a spot behind the listener. In this case, a compromise between tonality and image/soundstage will have to be made.

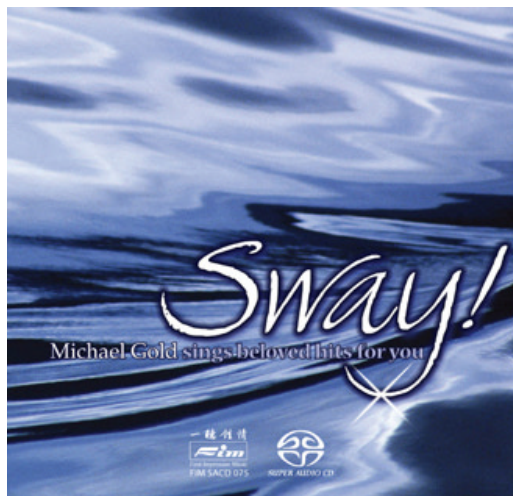
Step 6 – brass, rhythm and pacing

Hernando’s Hideaway, Ros on Broadway, First Impression Music

Assuming that the first 5 steps are correctly carried out, this piece of music will make your foot tap and your body sway to the music. If rhythm and pace are a problem by now, it may be necessary to try different cables and electronics.

As this recording was done in 1958, you may find that some instruments are panned hard left and hard right. Nevertheless, the dynamics of the piece are quite astonishing and you may jump when the trumpets first come on.

The trumpets should sound golden and brassy, but they should be forward and almost hurt as the sound hits you. If they sound hard, harsh and steely or glassy, turn UP the tweeter level. It may sound counter-intuitive, but the tweeter works only at 3500Hz and above. The major harmonics of the brass is below this level. Turning up the tweeter will bring more of the upper harmonics into play, and give the brasses more “body” and more brassiness.



Step 7 – bass balance and crossover frequency

Sway, Michael Gold, First Impression Music

Deep male voices will tend to sway away from the speaker with the lower bass level. Hence, listen to Michael Gold sing, and if he seems to lean away from one side at the end of each line, raise the bass gain on that side by a hair. If that does not make a difference, raise the crossover frequency by a hair.

If that gives you too much bass, turn down the bass gain at the side that he is leaning towards.

Step 8 – punch and bass dynamics

Don’t Crash the Ambulance, Shangri-La, Mark Knopfler

The mid-bass/woofer crossover point defines the amount of “punch” you will get from rock music. If you feel a *hollowness* between the vocals and bass guitar/drums, raise



the crossover frequency. If there is a *fatness* in the male voice, and/or a slowness in the bass guitar, lower the crossover frequency.

On non-Genesis loudspeakers, you can sometimes increase the mid-bass punch by moving the speakers closer to a wall, or move them closer together in order to increase mid-bass coupling between the two loudspeakers.

Step 9 – bass balance and syncopation

Moonglow, Happy Coat, Shota Osabe Piano Trio, First Impression Music



This track is used to fine tune positioning and integration of a subwoofer into a system that is not really full-range (like the G7.1p or G6.1e), or the positioning of the bass towers in the line source models (G1.2 or G2.2).

The relationship of the individual bass notes played by Ray Brown helps you position the sub in relation to the side-walls. Due to reflections with the long wavelengths of the bass, small changes in the distance of the subwoofer to the sidewall will change Ray Brown's syncopated rhythm. It must sound natural, and at the speed that two fingers can be used to pluck a single string.

Move the subwoofer left and right in 5mm (1/5 inch) increments until the bass rhythm sounds right.

The position of the sub in the vertical plane of the loudspeakers will change the way that the bass frequencies waveform's foundation relates to the high frequency waveforms. Listen to Harold Jones' play of the cymbals. If the relationship is correct, the cymbals will sound like they are made of brass. If incorrect, the cymbals will sound like they are made of steel or glass. This is a great illustration of how bass is the foundation of music.

Move the subwoofer forwards and backwards in 5mm (1/5 inch) increments until the cymbals and high-hat sounds right.

This track can be used to fine-tune positioning of the full-range Genesis loudspeakers in the room if necessary. There is considerable effort in doing this, as any change made here will completely obliterate the image, soundstage, and tonality. In some difficult rooms, it may be necessary to position the speakers asymmetrically. That is, the center line between the two speakers and the listening seat is not down the center of the room.

Step 10 – maximum deep artificial bass levels

No Sanctuary Here, Roadhouses and Automobiles, Chris Jones, Stockfisch Records

Deep bass must have power and articulation. Unfortunately, with much music (especially pop), the sound engineers have equalized for speakers that are not truly full-range. Hence, the bass levels are often tweaked so that the bass level goes up as the frequency goes down. This can work pretty well with loudspeakers that do not really have the full bass frequencies to make them sound larger than they actually are.

With Genesis loudspeakers that have an amplified bass section (often with up to 500W of power), such music can often cause the woofers to bottom out and distort. This is one such track. For the most powerful bass, raise the bass gain until the woofer starts to distort, then turn it down a bit. This setting should result in more than enough bass for most listeners, while keeping things sane and safe to protect the woofers and amplifiers.

