

Understanding Different Speaker Sizes & what they do.

NOTE: I am not a specialist on hearing; I am giving you information based on my 20+ years of car audio experience. All references in this chapter are from my real life install experience. So please do not be 100% critical on what I explain. I am not a scientist, nor do I claim to be, so if you are the type that wants all of the scientific factssorry, this is all my opinion. I am going to address this issue in the basics that most people can understand. I guarantee you that I am not 100% correct, but I think this will help you.

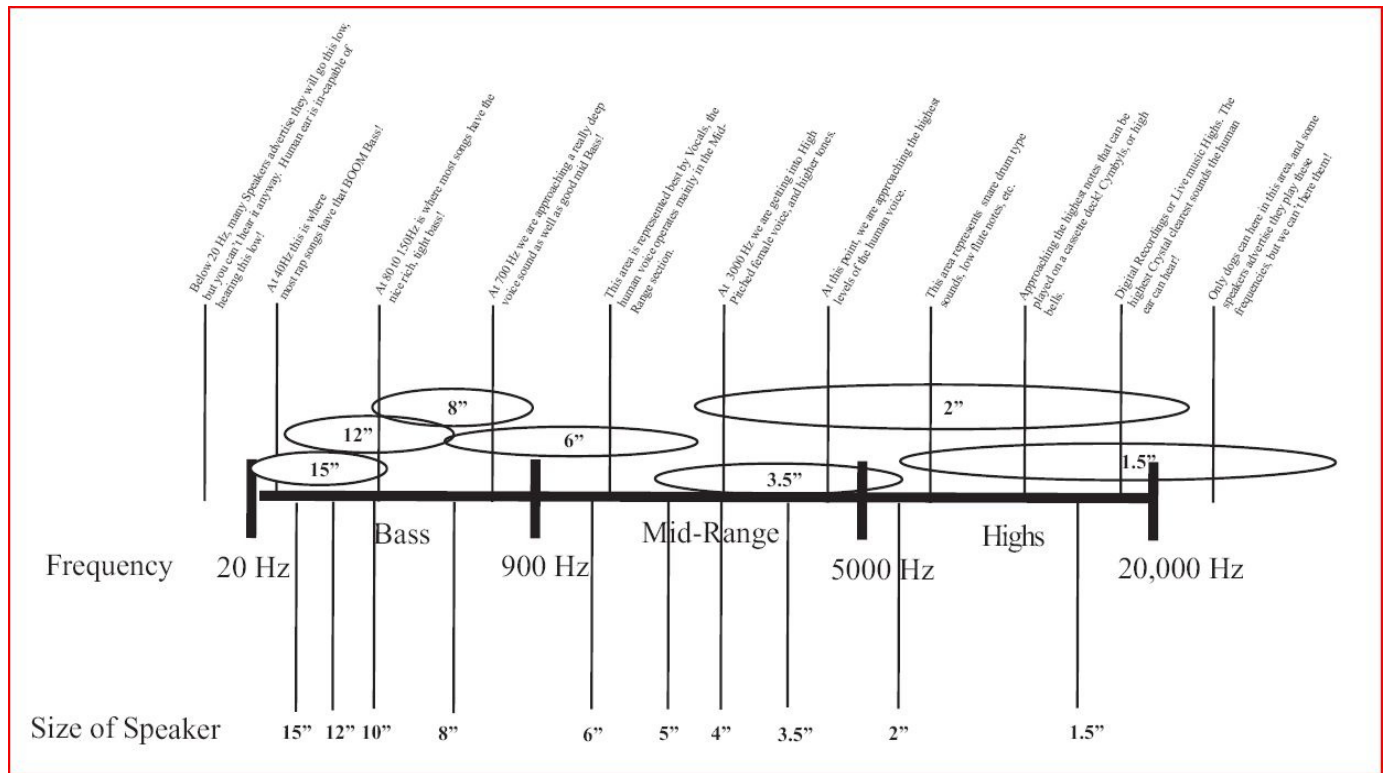
Here we go....

Before I start talking about how to design an Incredible Car Audio System, I want to go over the different speaker sizes, and what they do. Also I want to talk about the difference between different speakers to give you a clear understanding of what is needed and what is best for your application.

The human ear is an incredible device. The ear hears so much, it is phenomenal. Different sounds that are heard by the human ear are named by frequency. We hear different sounds, by what frequency the sound is produced at. Frequency is measured in Hertz. For instance, if a Bass Note is being reproduced from a speaker at 40 Hertz (BASS). This means that the speaker is moving 40 times per second to play that note. If a note is played at 2000 Hertz, then the speaker is moving 2000 times per second to reproduce that note(Mid Range). Here is a chart on what the average human ear can hear.

Before reading this chart, please note, that the entire chart is approximations. This chart has been drawn by me to give an overall understanding of sound, and how speakers correspond to different sounds. This chart is in no way exact. It is for reference only. If you want exact figures, and measurements, then you are going to have to refer to text books that are written to teach about sound as well as electronic text books which will teach about frequency, as well as speaker specifications provided by each separate speaker manufacturer to tell you what frequencies they are capable of reproducing. Be careful about speaker specifications. All of the companies tend to play with the numbers to make them sound really good in the manuals. They play the same games as amplifier companies do with wattage. I think after you read this chapter, you will understand sound.

Photo of FREQUENCY CHART #1



Here are some basic facts.

The bigger the speaker, the lower or deeper the speaker will play.
 The smaller the speaker, the higher it will play.

Take a look at the chart. The average human ear can hear from approx 20HZ to 20,000HZ. So if you see a speaker that has a rating of 35,000Hz it is not better than a speaker that says it will play at 25,000 HZ because your ear can't hear it anyway! Also if a subwoofer says it will play at

15HZ it is not better than a Sub that will play 18HZ because you can't hear these sounds anyway. Do you understand? This is a chart of that full spectrum of frequencies. Also note, that most heavy bass songs will only ever require a speaker to play around 45 to 80HZ Normally 10" or 12" subs). These are the cars you can hear for blocks. No songs play notes at 20HZ. The only songs that go that low are test or DEMO productions. As you can see by the top comments at different locations on the chart, you will be able to better understand what size speakers, play what type of sounds.

Subwoofers play the deep bass, Mid-Range speakers play the voice, and Tweeters play the highs. It is the combination of many different speakers that make a good sound system. The goal is to cover all of the areas with different size speakers in your car.

Note the round ovals. Take a look at the Oval labeled 12". What this oval represents is where an average 12" Speaker would reproduce a note in the sound spectrum. In this chart, the limits of the speaker are approx 45Hz on the low side, which means the lowest note this speaker will play is 45Hz, and 600Hz on the other end, which means that the high limit of this speaker is 600Hz. The highest note that this speaker is capable of playing is 600Hz, which means the speaker would be moving 600 times per second. That is really fast for a 12" speaker, so that is why this is the limit. Please note that as you reach the outer limits of the speaker's capabilities, sound quality deteriorates. So this 12" speaker that is listed on this chart would have difficulty playing in the 30 Hz Area and below, as well as having difficulty in playing sounds of 500 Hz and above. Even though the speaker is capable of playing these notes, sound quality will be poor. It is impossible for this 12" Speaker to play a 5000Hz note. If you put a 5000Hz note to this speaker, the speaker would not even recognize the note, and would be very distorted. (Refer to Crossing over speakers) Just as it is impossible for a 2" Speaker to play a 100Hz sound. If you put a 100Hz note (Deep Bass) to a 2" speaker it would blow it up!

I hope this makes sense. Speakers are made in different sizes to cover different parts of the audible spectrum.