

Section Six

Speakers and Compression Drivers

Speakers and Compression Drivers are what translate the audio signal back into a sound that we can hear. The speakers that we deal with in pro audio are usually larger than what would be found in your home stereo or car.

There are certain characteristics of a speaker that can be defined. The speaker has a portion of it called the cone. The cone is the paper portion of the speaker and is mounted in what is called the basket. The basket is then mounted to a magnet which is at the back of the speaker. In the center of the magnet is where a wire is wrapped around a paper tube. This is called the voice coil. The voice coil tube is attached to the cone. The size of the cone, voice coil and magnet determine the frequency range of the speaker.



For our purposes a few other speaker characteristics will be important. They are as follows:

1. Speaker Size
2. Wattage
3. Ohm
4. Output in db
5. Frequency range

Speaker sizes vary greatly. The most common sizes we encounter in daily activities include the 8", 10", 12", 15" and 18" speakers.

The wattage of the speaker also varies considerably from model to model. An important thing to remember is to look at the RMS rating of the speaker. The RMS rating is a rating that measures the amount of continuous audio signal the speaker can withstand. The peak rating shows the maximum amount of audio signal a speaker can withstand. Most speakers cannot withstand a peak signal for very long without malfunctioning (blowing the speaker).

The ohm load of the speaker is a measure of electrical resistance the speaker has. The ohm loads that we deal with are generally 4, 8 or 16. Sometimes the ohm load may go as low as 2 ohms but many amplifiers cannot withstand this load. The amplifiers then overheat and shut down or blow.

When combining multiple speakers it is important to pay attention to the ohm load of the speaker. There are two wiring configurations that I will discuss here, series and parallel.

A series connection happens when you connect two speakers together and the ohm load doubles. The way this works is like this. First you will need two speakers with the 8 ohm load rating, three speaker wires and a connector. You then run your first wire from the positive (+) side of the connector (let's use a banana plug) to the positive terminal on the first speaker. Then run the second wire from the negative (-) terminal on speaker one to the positive terminal on speaker two. Then take the third wire from the negative terminal on speaker two like normal. This terminates back into the banana plug. By using this wiring scheme you will now have a 16 ohm load.

A parallel connection happens when you connect two speakers and the ohm load is cut in half. The way this works is like this. Take the 8 ohm speakers that are each individually wired with two wires each. You then put the two positive wires together and they now become one. You then do the same with the two negative wires coming from the speakers and they now become one wire. You now use the new positive (+) wire and the new negative (-) wire to make your connections to the banana plug. This wiring scheme would result in a 4 ohm load.

The output of speakers is measured in decibels (db). This measures how loud the speaker is. A loud rock concert may have a db rating above 115 db. Also in relation to this is a SPL rating. This is a rating of the efficiency of the speaker. Many consumer speakers have a rating of around 90. Very efficient professional speakers have a rating over 100.

The frequency range of a speaker denotes how a speaker would best be used. A low frequency speaker may have a speaker range from 40hz to 1500hz. A midrange speaker would generally have a range from 150hz to 3000hz. Some speakers have a usable high frequency range up to 8000hz. But most generally in the audio systems that we are dealing with the high frequencies would have a compression driver instead of a cone speaker.

Compression Drivers

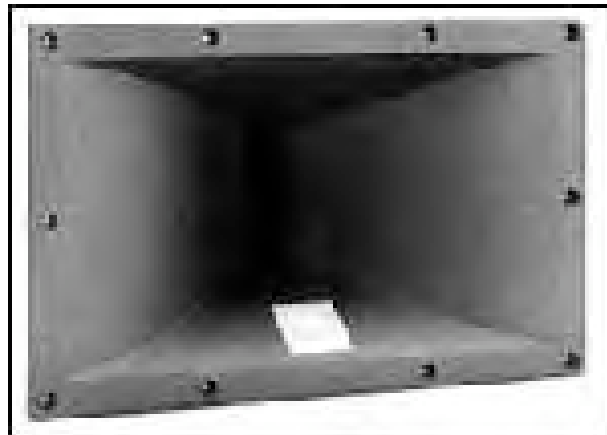
Compression Drivers reproduce the high frequencies of audio. These drivers can typically reproduce the audio signal up to 18,000hz. This is approximately the highest frequency an adult can hear. However, a baby can hear up to 20,000hz. The individual parts of the compression driver include the magnet, diaphragm and throat. A compression driver can last for many years. The part that wears out on the compression driver is the diaphragm. On the driver below the diaphragm is at the top of the picture. The diaphragm is where the speaker wires connect. It also houses the voice coil. The diaphragm itself is a very thin sheet of metal, such as titanium. The throat determines the horn size that will connect to it. The horn attaches to the front of the driver and extends out to the edge of the speaker cabinet.

The compression driver also has an ohm load and an RMS rating just like cone speakers.

Compression Driver



Bi Radial Horn



Two Way Speaker Enclosures (cabinets)

A Two Way Speaker cabinet consists of a low frequency speaker and a high frequency compression driver. In the photograph below, the low frequencies are carried by the 15" speaker and the high frequencies are carried by a 1" compression driver mounted to a bi radial horn.

A two way cabinet may have a crossover built into it. This is referred to as a passive crossover. This type of crossover takes the signal from the power amp and divides this signal. This is in contrast to an active crossover, which divides the signal as it comes from the mixer and then routes it to different power amps. One amp would be for the lows and a different amp would be for the highs.

Peavey Two Way Speaker Enclosure



Three Way Speaker Enclosures

A three way speaker enclosure consists of a low frequency section, a mid range frequency section, and a high frequency section. Once again a passive crossover may be inside the cabinet.

Peavey Three Way Speaker Enclosure



Four Way Speaker Systems

As you may have noticed I now called this a speaker system. The reason for this is that usually when you get to a Four Way System there will be at least two speaker cabinets involved. The top cabinet will probably be a three way cabinet. Below this will be a mono Sub cabinet. Sub Frequency speaker cabinets are usually in a cabinet by themselves. The Subs most commonly have 18" speakers in them.

Four Way Speaker Systems



Monitors

Monitors are speaker enclosures that are used by the musicians, vocalists or any person who is on the stage and may need to hear an individual audio mix that is different from the other mixes.

Some examples of this are. The lead singer may only want his vocals in his monitor. The drummer may want his kick drum, snare drum, bass guitar and lead singer in his monitor. The backup singer may want his vocal and the lead vocal both in his monitor, but he wants his vocal louder than the lead singers vocal.

Monitors are placed on the stage and the speakers point towards the person who needs to hear from it. On any given show numerous monitors and separate monitor mixes will be going on.

A monitor also is known as a monitor wedge. Monitors may be passive. However most of the monitors we deal with will be bi-amp monitor wedges.

Peavey Monitor Wedge

