



The Difference Between Consumer and Commercial Sound Systems

Multi-Channel vs. Single-Channel

Consumer stereos use multiple speakers at different positions relative to a listener, where the left speaker is on the left, and the right speaker is on the right. Each speaker gets a different signal in order to create a stereo field. A home theater system has five or more speakers in specific positions to create a “sound field” that matches what is on the screen. These systems are intended to be set up around one specific point where the sound is best. But what about when you are moving down an aisle in a grocery store, or from one side of a room to the other? There is no fixed left or right when the listener is moving, so commercial sound systems use one signal to feed all the speakers. Because the home stereo or theater amplifier has to feed multiple signals, it is actually multiple amps in one. Most commercial amplifiers, on the other hand, are dedicated to a single output.

Amplifier Features

Consumer amplifiers are designed with features that are desirable for the home user, like multiple signal processing capabilities, “clicker” remote controls, and multiple inputs to switch from one input component to another. Commercial amplifiers have multiple inputs too, but use them differently. If a business needs to play music, and also have two microphones, they can all be wired to the same commercial mixer amplifier, and when one of the microphones is being used, the amplifier will automatically mute the music so that the microphone can be heard. Most commercial amplifiers can be configured in various ways to accommodate the specific needs of an installation whereas the consumer amplifier only has the ability to manually switch from one input to another.

Wiring Differences

A consumer amplifier has a separate set of wires for each speaker, which means that every time a speaker is added to the system, a “home run” has to go all the way from the speaker back to the amplifier. Imagine a large warehouse where the speakers are spread out and how much wire that would be. In a commercial sound system, the speakers are “cascaded” so that the speaker wires can go from amplifier to speaker to speaker to speaker, etc. until all the speakers are wired. This takes much less wire!

Delivery of Speaker Power

Speakers are always driven with an electric signal supplied by an amplifier and delivered by a pair of wires. The power of the signal is a combination of voltage and current. If you multiply voltage and current, you get power. Home and commercial amplifiers use voltage



and current differently. Home amplifiers deliver power in the form of high current at a relatively low voltage. This is good for home stereos because the signal doesn't have to go very far, usually just a few feet. But the farther that a low voltage signal has to go to the speaker, the thicker the wire must be for it to get to the speaker without too much of it getting lost on the way. The cost of thicker wire is much higher because it requires more copper. So doing several home runs with thicker wire can get very expensive very quickly, depending on how big an area will be covered with sound. Commercial amplifiers deliver power in the form of low current at a relatively high voltage that can travel much longer distances on much smaller wire, making this kind of signal best for a commercial application.

Consumer and Commercial Sound System Parts Don't Play Well Together

Speakers made for use with a home stereo are designed for the high current signal from that type of amplifier. Commercial speakers incorporate transformers that accept the higher voltage signal of a commercial amplifier and adapt it to suit the actual speaker driver. Powering consumer speakers with a commercial amplifier might damage the amplifier, and commercial speakers powered by a consumer amplifier will not sound as loud as they should.

Limitations on the Number of Speakers

A home stereo with left and right outputs is designed to connect to two speakers. While it is possible to wire in more speakers, doing so must be done in a very specific way that becomes increasingly complicated with the number of speakers. Cascading the speakers like in a commercial sound system would cause a failure of the stereo in a short amount of time. In commercial sound systems, however, more and more speakers can be cascaded together until there are enough for the area or "zone". Having enough speakers is important because having too few speakers means that there are "hot spots" where the volume is too loud near the speakers and "cold spots" in between where the volume is not loud enough. A commercial sound system designer can specify how many speakers will be needed to ensure even coverage.

Commercial Speakers are Adjustable

A critical feature of commercial speakers is that the power rating on each individual speaker can be adjusted at the time of installation. Consider a sound system installed in a bank where the lobby has high ceilings, but the ceiling over the tellers is much lower. If all the speakers had the same power rating, the sound would be too loud over the tellers relative to the lobby area. The sound system installer can set the teller speakers to a lower rating when they are installed to accommodate the difference in ceiling height. This feature is not inherently available or easily accommodated with consumer speakers.



Separate Control of Individual Zones Within a Sound System

Suppose that a sound system needs to have volume controls for different areas of the building, like in individual offices. Because of the cascading wiring used in commercial applications, it is cost effective to add volume controls to each of these zones. Individual volume controls that would do the same thing in an installation using a consumer amplifier are more expensive and complicated to wire into a system. Many of them actually adjust the volume by deliberately wasting a portion of the electrical signal!

Summary:

Consumer stereo and home theater equipment is designed for specific purposes with features that are useful in those applications. Commercial sound systems are designed with customized combinations of parts that efficiently deliver superior audio quality and meet the specific needs of the individual situation.

For more information contact us.