



## Two Channel Listening Systems

Stereophonic sound gained universal acceptance in the late 1960's as the optimal way to enjoy high fidelity audio recordings in the home environment. Over the years many variations and adaptations have come and gone but the basic principles and components of the system have remained the same.

The following is a guide to the various stages that decode and manipulate sound through the components of a "Hifi" system.

1. Source
2. Preamp
3. Power Amplification
4. Speakers
5. Cables
6. The Room
7. Set-up

## Source

The source is where sound is created in the system. Traditionally, this was through a **Turntable** playing LP records using a stylus to interpret the grooves on the record and convert them to electrical impulses. Over the years, various magnetic tape delivery systems (**reel to reel, 8-track, cassette**) were developed; each had its own strengths and weaknesses.



The early 1980's saw the advent of digital audio and the development of the **compact disc player**. The cd, while still readily available, has been replaced by digital files stored on servers and streaming media providers. The quality of the sound (bitrate) is now a choice the consumer makes. Listeners can store more music at a lower quality or less music at a higher quality.



Many listeners have sought to find a better source and turntables, as well as high quality, uncompressed digital file formats are now considered the best way to listen to music. Many listeners' quest for sonic excellence have led them to invest in **Digital Audio Converters** or DAC's . These allow users to hear their digital music converted using far superior conversion technology producing better quality analog audio.



## Preamp

After the source has "created" the sound, the electronic levels that have been created must meet the input level that the amplifier is expecting to see. In the case of **turntables**, the output signal can be very low and a **Step Up Transformer (Pre-Pre Amp)** or **Phono Stage Preamp** are necessary to provide the required output level. When adding gain or level to a stage in the process, the result can be the addition of unwanted noise within the system that is further amplified later on in the signal chain. A quality, **transformer based pre amp stage** will boost the signal while suppressing noise and allowing the full sonic spectrum to be preserved.

Most other components do not need a preamp to function as their output level is sufficient to drive the input stage, however, in some cases a preamp is chosen to enhance the tonal characteristics of the source. This could include variable equalization, compression or filtering.

Preamps can be tube driven, producing a warmer sound with natural compression and a thicker tone, solid state, producing more accurate and precise reproduction or digital (DSP) which allows for predetermined equalisation and room characteristics to be preprogrammed. A preamp can also be a combination of these technologies.

This is also the stage where the tone or equalisation controls work best. The listener can tailor the sound of the recording to match their personal taste. Often the preamp stage will also have switching capabilities to choose between various sources.

## Power Amplifier

The amplification section or power amplifier is where volume or loudness is created. Like the pre amp stage the technology can be tube, solid state or digital and the same characteristics apply. The amplifiers have larger power transformers and/or tubes to create the power necessary to drive the speakers

### Integrated Amplifiers



Integrated amplifiers are a combination of the preamp stage (including input switching) and the power amplifier stage in a single unit. This component is most common as it requires less space but does not allow the listener to tailor the sound to the same degree.

### Headphone Amplifiers



Headphone amplifiers are a dedicated amplifier to driving personal listening headphones. These generally have a preamp and small, low output power amp stage in them and can control the tonal characteristics of the source as well as, in the case of more advanced units, allow the user to emulate the experience of hearing the source material from speakers in a room. Again, these amplifiers can be tube, solid state, digital or a hybrid.

## Speakers

Speakers are the last stage and take the amplified signal translating the vibrations into sound. Sound is created by the fluctuation of air pressure caused by the movement and/or vibration of a given object. When an object moves or vibrates, it transmits the kinetic energy to the air particles around it.

Different sized speakers can be combined within a speaker cabinet to reproduce the entire frequency spectrum. Within the speaker cabinet is a crossover which separates and sends the appropriate frequency range to the appropriate driver.

### Active



Active speakers have power amplifiers integrated into the speaker cabinet and can receive preamp or line level signals whereas passive speakers require a power amplifier or integrated amplifier to drive them.

### Sub woofer



Sub woofer's are speakers dedicated to producing low frequency sound. There is generally a variable crossover built into the sub-woofer that does not allow frequencies above a certain point to be reproduced by the sub-woofer. Generally in a home system crossover points are below 160 Hz and the "sub" has its own level control. Two Channel listening systems with a sub-woofer are often referred to as 2.1.

It is important that sub woofers are isolated electronically from the rest of the system with a transformer so that buzz and hum are not created.

## Cables

There is much debate among audiophiles regarding cables, their construction and materials used. In most cases cable length should be as short as possible for best response and aesthetics.

**Interconnect cables** attach components to each other. The most common cable in analog audio is the stereo **RCA** cable. Gold plating is most commonly used on the connectors as gold is a very good conductor. Interconnect cables are most often copper based and the cable is shielded to reject magnetic noise.

In digital systems there are several options. The SPDIF (Sony/Philips Digital Interface Format) cable looks like a single RCA type cable which allows two channels of digital audio to pass through a single cable. The HDMI (High Definition Media Interface) cable allows full multi-channel audio and video to pass through. Toslink, light pipe or ADAT optical cables can allow up to 8 channels of audio to pass bidirectionally.

A dedicated RCA-RCA (single) cable is generally used to connect a subwoofer to the preamp or sub out on an integrated amplifier (these are also often found on a preamp also).

Speaker cables can be bare wire ended or have terminated ends using “banana plugs” for quick connection to the amplifier. Generally, copper wire is used and the cable is not shielded.

Headphones are generally connected using a ¼” phone plug or a 1/8” mini phone plug.

## The Room

One of the most important and overlooked parts of the equation is the space in which the music is being heard. Modern design tastes incorporate hard surfaces which reflect sound allowing it to bounce around the room reaching the listener's ear several times, milliseconds apart. This time shift creates a smearing of frequencies and interfering with the “soundstage” (placement of sound within the stereo spectrum). By adding absorbent materials in the listening space, these reflections are trapped, preserving the sound spectrum intended by the mix engineers, musicians and producers.

Another anomaly created in untreated spaces is the standing wave. This is a low frequency “rumble” that occurs and washes our clarity in the mid-range frequencies (which produce tonal variety and intelligibility) and high frequencies (which provide energy and definition). By adding absorbent bass traps, standing waves can be eliminated and /or controlled.

## Setting up a listening room



The optimal listening position is one corner of an equilateral triangle created along with the 2 speakers. In 2.1 systems the placement of the sub-woofer is not a critical. Low frequencies are omnidirectional and as frequencies go higher, the sound is more directional. For example if your speaker are 8ft apart you should be 8ft from the center of the speakers