

A Guide to Optimizing Speaker Performance

The following will explain to you some principles that should be applied for the safe operation of your DJ system set-up.

Please read these instructions carefully and you will be able to provide many hours of pleasant listening to your guests and be aware of the limits of your stereo equipment.

You will probably already have existing Hi-Fi equipment that is suitable for connection with the loudspeakers. If not, you will have been supplied with the appropriate electronics by your dealer which will meet your requirements.

A very important point worth noting is that the majority of damage done to loudspeakers in general is caused by the incorrect use of low powered amplifiers. This is not to say that a low powered amplifier is not suitable, it means that some operators are not aware of the limits of their Hi-Fi system as a whole.

Manufacturers of amplifiers will supply information in their user manuals as to the amplifiers maximum output power, expressed in WATTS per channel. Eg. 60W/ch. This figure is useful in ascertaining the approximate output level of the amplifier (in loudness) and for appropriate matching to loudspeakers.

NOTE:– This maximum power usually occurs before full scale on the volume control. eg. full scale being 10 or 0dB

The electronics in an amplifier provides an amount of gain that amplifies (multiplies) the incoming signal. The amplifiers output is relative to the amount of input level applied. If the input level is very high (as is the case if CD players are connected when compared to cassette decks or tuners) then the maximum output power is reached well before the volume control is at full. With a CD player this may occur anywhere from 12 o'clock to 3 o'clock on the volume dial.

If at this point the volume is increased further, the amplifier's maximum capabilities will have been exceeded and starts to distort the music. The more the volume is turned up, the greater the amount of distortion.

The distortion that occurs is known as 'clipping' and it is the term given to the flat topping of the waveform when the amplifier's maximum output has been exceeded

(see Figure 1). The effect of this on loudspeakers over a prolonged period is an overheating of the voice coils on the individual speaker units and their eventual failure.

An amplifier's capabilities are limited by the size of its power supply and how much voltage it can deliver (as a cars capabilities are limited by the size and type of its engine). The more voltage supply there is, the greater the amount of output level before 'clipping' occurs. There are other factors involved with the amount of output level achieved, but this is the basic concept.

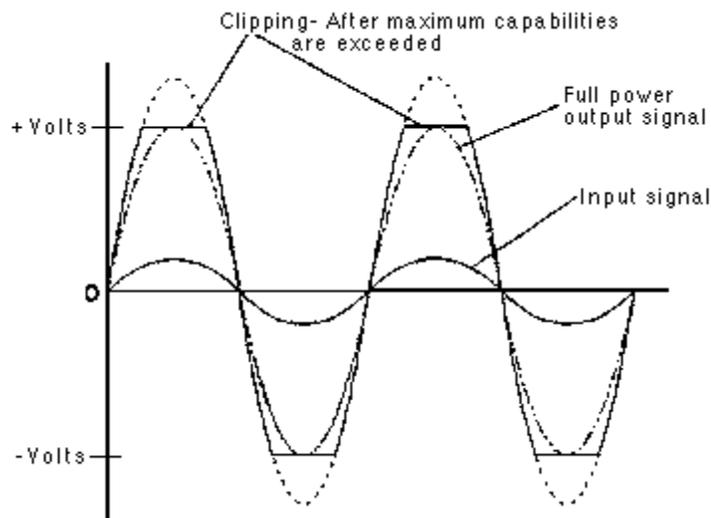


Figure 1.

Being aware of these limits is the best way to avoid any unnecessary damage to your loudspeakers.

Tone Controls

Generally the use of tone controls, we hope, will be unnecessary. Most quality speakers have been designed to deliver a flat frequency response and a well balanced sound reproduction. However, in some listening environments this balance may be distorted by room effects. Tone controls in this case can then be used to compensate for these problems.

If you do need to turn the tone controls up, whether it is for room acoustics or personal taste, then it is worth noting the effect as far as output power and 'clipping' is concerned.

Bass and treble controls adjust the level of a selected range of frequencies in addition to the volume control which adjusts the level at all frequencies. If an amplifier is already being driven at full power and the bass and treble is then turned up, the result is 'clipping' and likely failure of the speakers. This can be explained best by use of a diagram:-

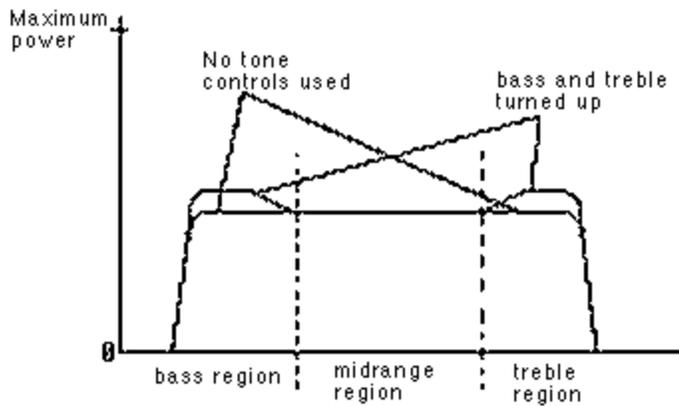


Figure 2

Figure 2. shows' the output at a moderate listening level, with and without the use of tone controls. At this level there is no danger in using tone controls.

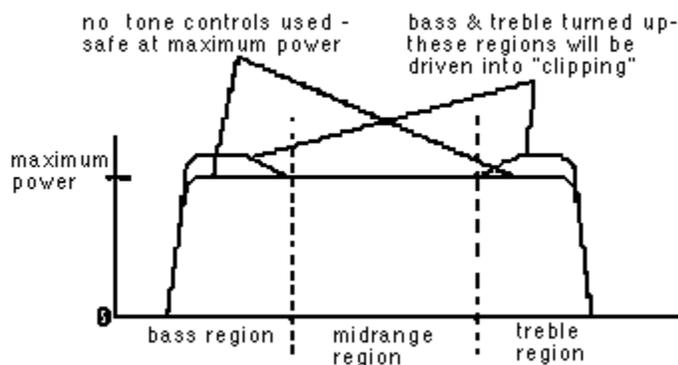


Figure 3

Figure 3. shows' the output at maximum power. With no tone controls being used at maximum power there is no danger. But if the tone controls are then turned up, the

bass and treble regions will be driven into 'clipping'. In this instance the bass drivers are quite likely to be damaged as well as the tweeters.

Speaker Power Ratings

All speakers are given a power rating equivalent to that of the maximum size amplifier that can be used, driven at full power. For example a rating of 100 Watts means that the speakers can safely handle a 100 Watt RMS/ch amplifier driven at full power without 'clipping'. This does not mean that a smaller amplifier cannot be used. Smaller amplifiers can successfully be used, again without being driven into 'clipping'.

Consider this:- If a sports car can go 300mph it does not mean that it has to be driven at 300mph all the time (you're not allowed to anyway!).

In the case of a 500Watt speaker, a 100Watt amplifier can quite safely be used. But if a 300, 400 or 500Watt amplifier was used, the sonic performance will be greatly enhanced and the speaker's real abilities will be demonstrated.

Speakers can also safely be driven with much larger powered amplifiers as long as the limits of the speakers are respected and the system as a whole is treated with respect. Sometimes a larger amplifier is actually safer to use as they will not be driven into 'clipping' as easily due to the high output levels that can be achieved.

Correct Connection

For optimum and best performance it is important that your Hi-Fi system is connected in the correct manner. Something as simple as a pair of crossed wires can cause some performance deficiencies and at worst, cause damage.

The connection is not a complicated procedure if the correct steps are taken:-

1. First make sure that all electronic equipment is turned off and disconnected from the power point.
2. Diagrams may be supplied with your amplifier for the connection of 'sources' to your amplifier ie. tape deck, turn table, CD player, video.
3. Be sure to follow any specific instructions expressed in the user manual.
4. When connecting the loudspeakers, ensure that the wires are all either neatly stripped and inserted in sockets securely, or that plugs have been fitted

properly to the wires. (This can be done by your dealer). It is critical that no frayed wires are left loose.

5. Make sure that when connecting the wires that '+' goes to '+' and '-' goes to '-' between amplifier and speakers. Also that 'left' goes to the left speaker and 'right' goes to the right speaker. (Refer to Figure 4. below)

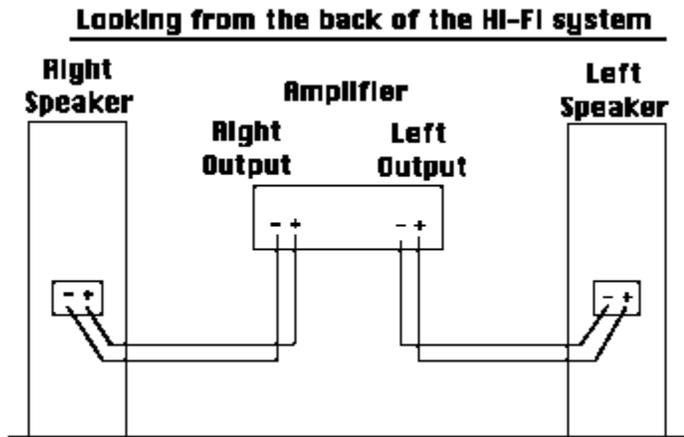


Figure 4

Following these procedures will ensure that your speakers are connected in the correct phase and that there is no chance of any damage due to poor setup.

As well as the connection, placement of the loudspeakers is quite critical to the resulting sound quality. Some examples are explained over the page.

Most venue listening environments can pose some problems when situating loudspeakers. In many cases there just isn't enough room to place the speakers ideally or there are particular fixtures in the room that cannot be moved and the speakers have to be placed around them.

If you want the best results from your Hi-Fi system we suggest experimenting with different speaker positioning. Ideally there should be equal distances between each speaker and the listener(s). (Refer to Figure 5. below). In a lot of rooms this is not possible so a few compromises have to be made.

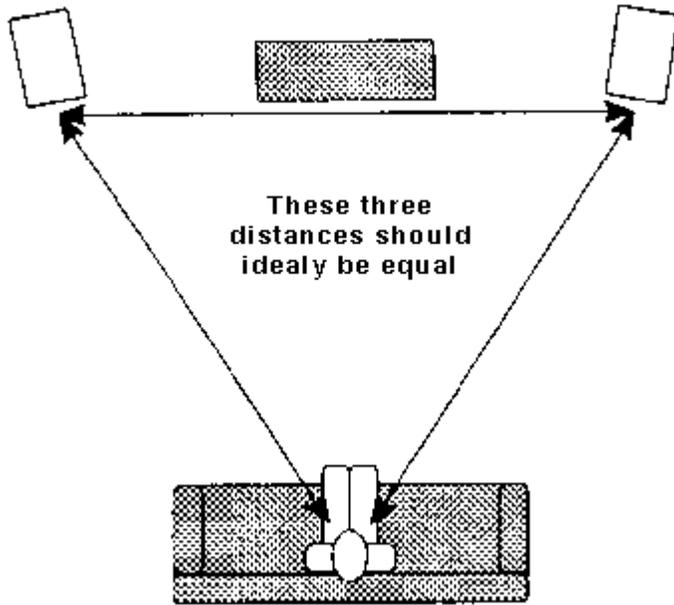


Figure 5.

Some useful pointers

1. Very live rooms (ie. large, bare surfaces such as windows, walls & ceiling, slate floors etc.) because of their reflective nature, cause the sound sometimes to become a bit harsh and bright. Unfortunately not much can be done to help this other than the placement of rugs, wall coverings and some furniture.
2. Too many objects immediately surrounding the speakers will have an adverse effect.
3. Placing loudspeakers in corners will act as a 'bass-boost' and quite often to the extent of too much bass.
4. When considering speaker cable you can go to quite extreme lengths as far as quality and price are concerned. If you are after the best performance possible from your Hi-Fi then quality cable is one of the many necessities. If this is not a large concern then we recommend the use of at least some reasonable thickness cable. Very thin cable used on moderate to high power systems will result in some loss in sound quality in a number of ways. The main one of these will be bass strength and clarity.

With the information you have just been supplied with, you should be able to successfully connect, setup and operate your Hi-Fi system safely. Your dealer may go over some of these points while you are considering buying a piece of stereo equipment and should be able to clarify any queries you might have.

Please note:-

Any manufacturing problems that might occur with your speakers can be easily identified as such and happily dealt with as a warranty claim. Similarly, any damage caused to loudspeakers due to any misuse of a Hi-Fi system or otherwise can also easily be identified and is not covered under most manufacturers warranties. The information we have supplied is to help you to prevent anything like this from happening.

Source: http://www.co-bw.com/Audio_Optimize_Speaker_Performance.htm