

# Bi-Wiring

VS

# Bi-Amping

by Colin Croft

**B**i-wiring, bi-amping, dual-amping, bridged-mono, tri-amping—the whole area has become hopelessly confused. And it must be said that this confusion has been encouraged by many in the hi-fi industry who, no doubt, are hoping that the result of the confusion will be increased sales, primarily due to misunderstandings on the part of hi-fi consumers.

In this article, I will attempt to clear up the terminology and give detailed explanations of the various ways in which one can connect an

amplifier to a pair of speakers, or, more to the point, the various ways in which one can connect more than one amplifier to the same pair of speakers, and the advantages and disadvantages of the various approaches.

## Bi-Amplification

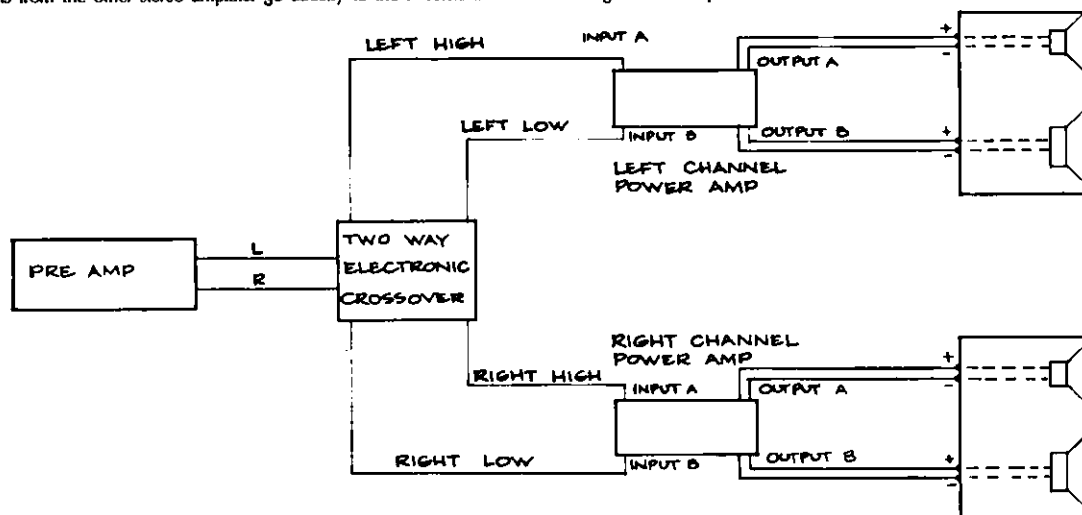
The true, correct *and only* definition of bi-amplification, or bi-amping, is the act of using two amplifiers to drive a single loudspeaker sys-

tem (ie one channel of a stereo pair), with one amplifier handling only low-frequency audio information, and the other amplifier handling only high-frequency audio information.

Therefore, any true bi-amplified system **MUST** have an electronic crossover between the preamplifier and the power amplifier stages, so that the electronic crossover can split the audio spectrum into two before it enters the power amplifiers.

Similarly, in order to be driven by two amplifiers, a speaker **MUST** have 'low' (+) and

Figure 1—A true bi-amplified system. The pre-amplifier drives into a two-way electronic crossover which, in turn, drives two stereo power amplifiers (or four mono power amplifiers). The left and right low frequency outputs from one stereo amplifier go directly to the bass/midrange drivers in the left and right channel speakers and the left and right high-frequency outputs from the other stereo amplifier go directly to the tweeters in the left and right channel speakers. Note that there is no internal crossover in the speakers at all.



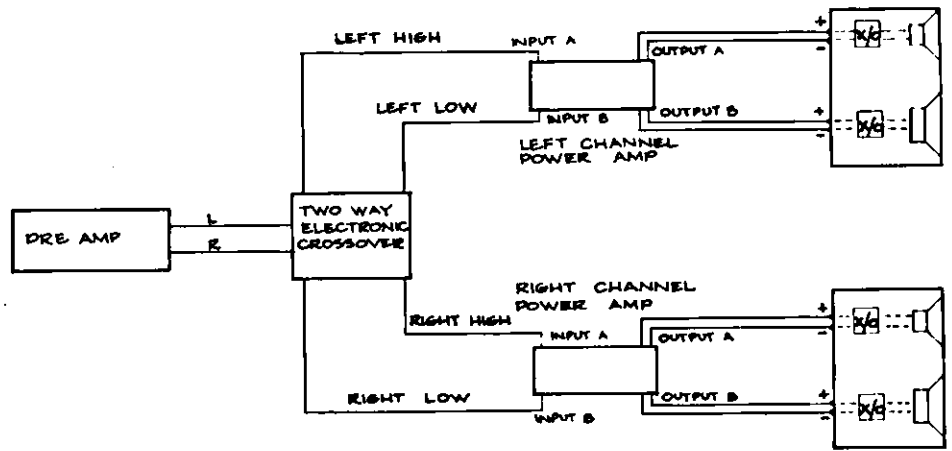


Figure 1a.

A slight variation of the system described in Figure 1. In this system, there is a partial crossover in the speaker, though the system could still be described as being 'bi-amplified'.

### Enter Speaker Cables

It was at about this time that the then-new speaker cable industry muscled in on the act. The cable industry claimed that different frequencies required different wire types, and therefore one type of cable should be used for the high-frequency connections, and another type for the low-frequency connections.

Fortuitously, the new speakers sporting the modified 'bi-amp' terminals were ideal for this application. Audiophiles were advised to connect TWO pairs of cables to each output channel of their amplifier. One pair (usually the thickest pair) went to the 'low frequency' terminals of the speaker, and the other pair of

wires went to the high-frequency terminals. Because only one amplifier was used, both wires 'carried ALL the audio information, the excess information being stripped off by the speaker's own internal crossover network. This particular approach is called 'Bi-Wiring'. (See Figure 2).

How this bi-wiring situation works is a little hard to understand. In the beginning, audiophiles found it hard to grasp why it should be that if two sets of cable were carrying full-range audio information, and the information was stripped off at the speaker end of the cable, one would get superior performance. The cable industry's answer was that in the low-frequency cable, the low frequencies went though 'undamaged', but the highs were

(-) inputs and 'high' (+) and (-) inputs. Obviously, when a speaker is driven by true bi-amped electronics it does not need its own internal crossover, since the necessary frequency division is handled before the signal ever reaches the loudspeaker. Indeed, for true bi-amplified operation, it might be said that a speaker SHOULD NOT have any type of internal crossover at all, since the crossover components would absorb power from the amplifier and generally be detrimental to overall performance. (See Figure 1)

### Semi-Bi-Amping?

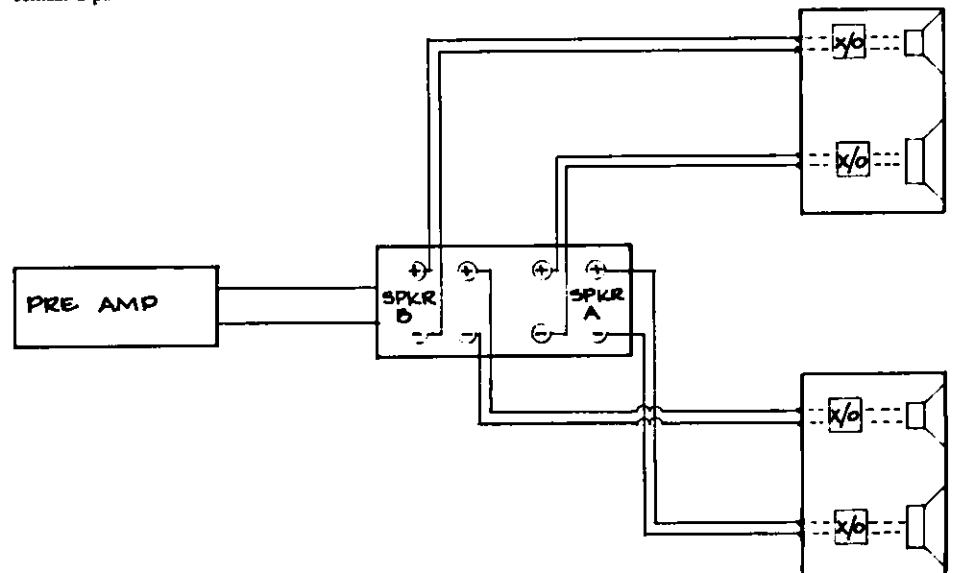
The initial confusion concerning terminology began when a speaker manufacturer which had been offering true 'bi-amp' facilities on its speakers, in addition to a standard input connected to an internal passive crossover, found that its speakers were being unintentionally destroyed by ill-informed people who were making incorrect connections (by connecting full-range audio signals to the tweeter) to them.

Rather than remove the bi-amplifier facility entirely, the manufacturer merely modified the speaker design so that anyone who used the bi-amp connections would actually also be using portions of the internal crossover.

By taking this approach, the speaker manufacturer ensured that no matter which set of input terminals was used, low frequencies could not get to the midrange and tweeters and high frequencies could not get to the bass driver. The only problem with this approach was that it penalised those people who wished to operate the speakers in true bi-amp mode, since their amplifiers had to drive the (for them unnecessary) crossover components in addition to the drivers themselves.

Figure 2.

A bi-wired system. Here, a single stereo amplifier is used. There is no electronic crossover. The 'Speaker A' output terminals on the amplifier are connected to the low-frequency connections on the speakers, and the 'Speaker B' output terminals on the amplifier are connected to the high-frequency input connectors on the speakers. WARNING: This configuration will not work on some amplifiers. If your amplifier is one of these types, you must connect both pairs of wires to the 'Speaker A' terminals. The usual shorting plug on the speakers which connects the high- and low-frequency sections together MUST be removed. The speaker itself MUST be of the type shown in Figure 1a and contain a partial crossover.



## Bi-Wiring . . .

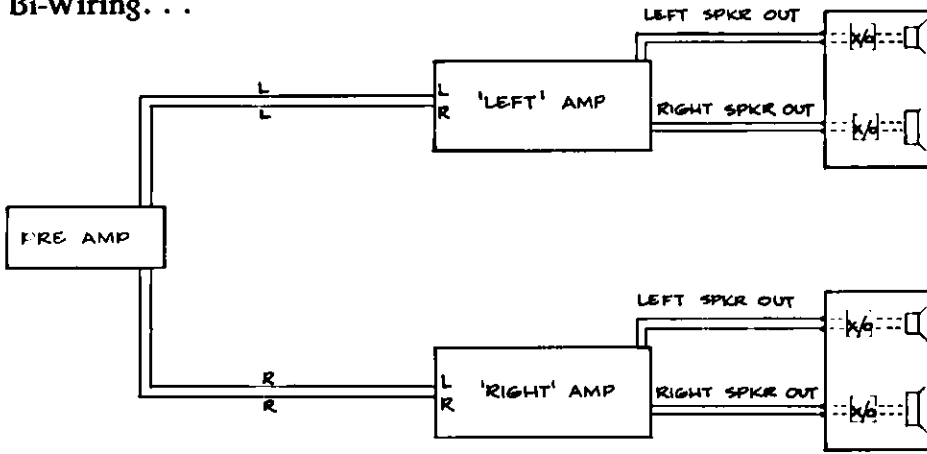


Figure 3.  
A basic dual-amp configuration. The preamplifier has two pre-out terminals. The amplifiers MUST have identical power outputs.

'damaged'. Similarly, in the high-frequency cable, the highs passed through undamaged, but the low frequencies were 'damaged'. However, because in each case, the 'damaged' signal was stripped off by the crossover network, and not used, the overall result was better performance.

## Dual-Amping

Then the confusion really started, because amplifier manufacturers decided to jump on the band-wagon as well. They claimed that if two sets of cables carrying identical audio information sounded better than a single cable, then

two amplifiers carrying identical information must sound better than a single amplifier—particularly since, in theory, more power would also be available to the complete speaker system. Unfortunately, lacking a suitable descriptive term for this theory, they referred to it, in-advicably (and incorrectly) as 'bi-amping'. In hindsight, it appears that a much better term would have been dual-amping, or dual-amplification, despite the fact that this term is quite similar to 'dual-mono', a word which had already been coined to describe a stereo amplifier which had completely separate left and right channels, including separate power supplies, yet which was contained on a single chassis.

The basic dual-amp configuration is shown

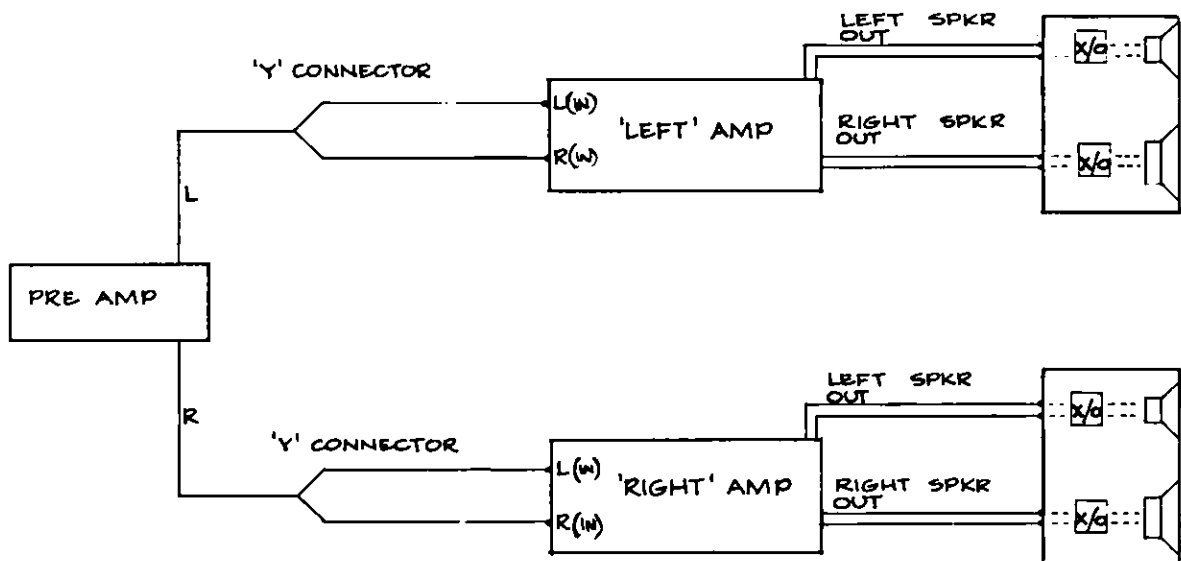
in Figure 3. It requires a pre-amplifier with two 'Main-Out' terminals and two stereo amplifiers. Figure 3a shows an alternative and less desirable system, using a preamplifier with only one main-out terminal and two standard 'Y' connectors, as this is conceptually easier to grasp. When the two amplifiers are of equal power output, one amplifier should be used for each channel, so that the left channel of the left amplifier goes to the left channel speaker's low-frequency section, and the right channel of the left amplifier goes to the left speaker's high-frequency section.

In a situation where the outputs of the power amplifiers are unequal, a different configuration must be used, to ensure that the amplifier with the greatest power output drives both left-and right-channel bass drivers, and the smaller power amplifier drives the left- and right-channel treble sections. The correct configuration for this arrangement is shown in Figure 3b.

## Other Variants

Amplifier manufacturers (and equipment reviewers!) then proceeded to muddy the waters even more, by suggesting various alternative ways dual-amping could be achieved—four monophonic amplifiers, one for each cable; four

Figure 3a.  
A modified version of the configuration shown in Figure 3, for situations in which the preamplifier does not have two pre-out terminals.



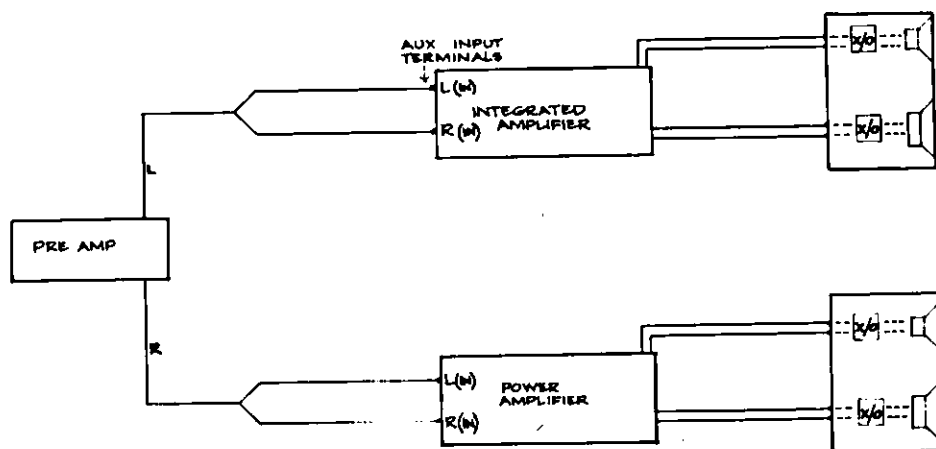


Figure 4—The set-up for dual-amping using a preamplifier, integrated amplifier and power amplifier. The pre-amp output is split by the Y connector, after which it goes to the left and right channel inputs of the power amplifier, and the left and right channel inputs of the auxiliary input on the integrated amplifier. In this diagram the integrated amplifier is the lower-powered of the two amplifiers.

bridged stereo amplifiers—the list is almost endless. We'll deal only with the most common variant, which is to use a large power amplifier for the bass section, and a smaller integrated amplifier for the treble section. It's common because many audiophiles upgrade from a small integrated amplifier to a separate pre/power combination, and elect to keep the integrated amplifier rather than trade it in. In such a case, unless the integrated is used in a bedroom or study system, it lies around gathering dust.

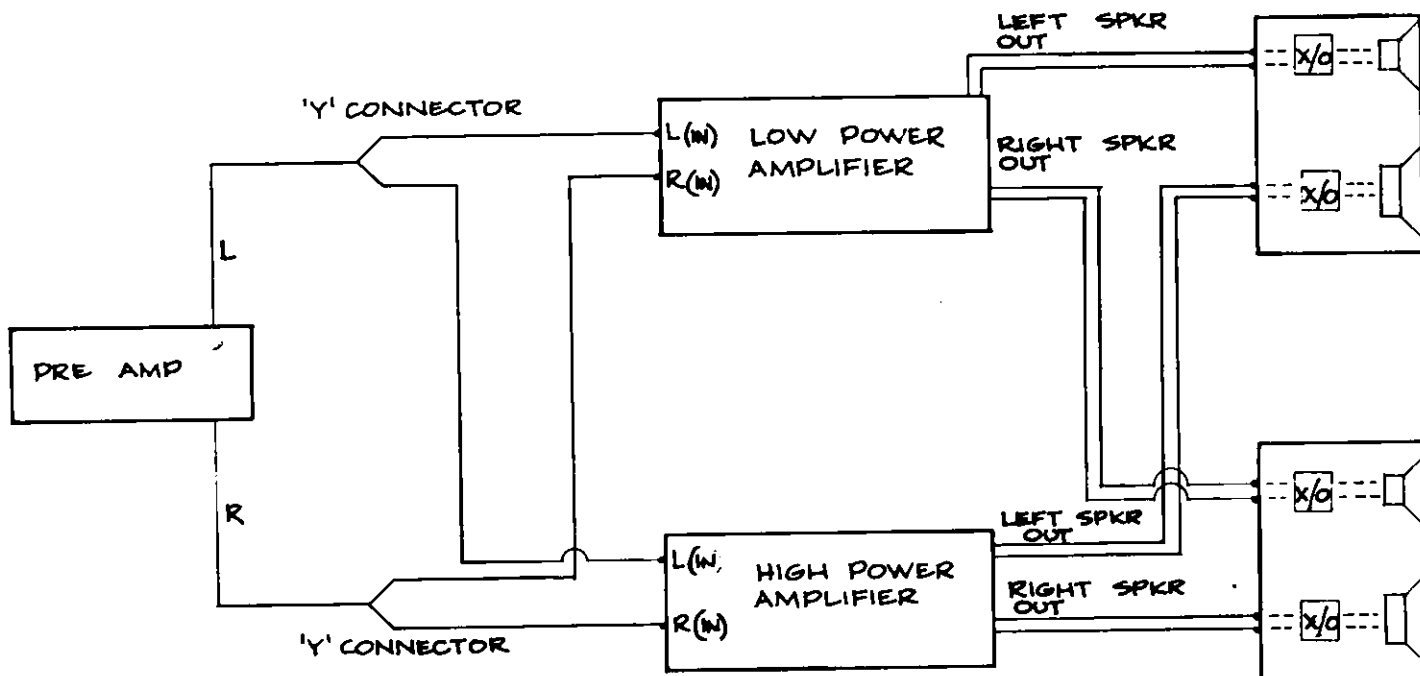
The set-up for dual-amping using a preamplifier, integrated amplifier and power amplifier is shown in Figure 4. The pre-amp output is split by the Y connector, after which it goes to the left and right channel inputs of the power amplifier, and the left and right channel in-

puts of the auxiliary input on the integrated amplifier. The left and right channel outputs from the power amplifier go to the left and right low-frequency sections of the bi-wire speakers and the left and right channels of the integrated amplifier go to the left and right high-frequency sections of the bi-wire speakers.

Using this system, one first sets the volume control on the integrated amplifier at minimum,

and advances the volume control on the pre-amplifier until the bass level is at normal listening level. Then one should advance the volume control on the integrated amplifier until the frequency balance is correct. Once the balance is achieved, the volume control on the integrated amplifier is left in the same position, and the volume control on the pre-amplifier is used to adjust volume.

Figure 3b—A modified version of Figure 3a, which should be used when the two stereo power amplifiers used have different power outputs. The power amplifiers MUST have their own volume controls. You can also use integrated amplifiers.



# Bi-Wiring VS Bi-Amping

## By His Bootstraps

It is possible, if your integrated amplifier has pre-out terminals, to dual-amp using either another integrated amplifier, or a power amplifier with its own volume controls. The configuration for this is shown in *Figure 5*. First, you remove the connection loops on the rear of the amplifier which link the preamp-out terminals to the power amp-in terminals. You next connect a Y connector to each of the preamp-out terminals. For each channel, one end of each Y connector goes to the power amplifier (or a line input on a separate integrated amplifier) and the other end of the same Y connector is looped back into the original amplifier. Note that it is **absolutely essential** in this type of hook-up, that the 'extra' amplifier is fitted with its own volume control.

If the amplifiers are of equal power output, run the speaker output from the first integrated amplifier to the bass section of the bi-wire speakers. If the amplifiers have unequal power outputs, the larger of the two should be used to drive the bass section. The procedure for setting the relative balance is similar to that used when a preamplifier is used to drive a power amplifier/integrated amplifier combination. You should use extreme caution when setting levels. Always do it at extremely low listening levels.

## Bridged Amplifiers

Many audiophiles confuse dual-amping with bridging. Don't be confused, because the two processes are entirely different. When you bridge an amplifier, you effectively ADD both channels together to create a single monophonic amplifier, whose output then becomes more than double the output power of the original amplifier. To bridge an amplifier, you require special additional circuitry. Sometimes this is built into an amplifier (in which case the unit is usually referred to as being 'bridgeable') but usually, a separate circuit must be added on. Not all amplifiers can be bridged, since a par-

ticular output stage design is a pre-requisite. The difference between dual-amping and bridging is akin to the difference between connecting two batteries in parallel or series. In parallel (dual-amp) mode, you don't get any extra voltage, just a bit more staying power. In series (bridged) mode, you get at least double the voltage.

## Conclusion

If you have followed this far, you'll probably now agree with me that the subject is complex. My suggestion is to read the text only in conjunction with the block diagrams shown in the various figures. What we have not discussed is the relative effectiveness of the various techniques. At the bottom of the pile is, of course, ordinary single-amp, single-wire connections. The next step up is bi-wiring, which is superior. After that comes dual-amping, while at the top of the list is bi-amping.

Of course, if you really want the ultimate, you have to invest in a tri-amplified system, using a pre-amplifier, *three-way* electronic crossover, and either *three* stereo power amplifiers, or *six* monoblock power amplifiers and *three-way, tri-ampable* speakers.

But that, as they say, is a whole 'nother story . . . ■

Figure 5—If your integrated amplifier has pre-out terminals, it is possible to dual-amp using either another integrated amplifier, or a power amplifier with its own volume controls. Use extreme caution when adjusting balance, and extreme care when making connections. In the example shown, the power amplifier has a higher power output than the integrated amplifier.

