

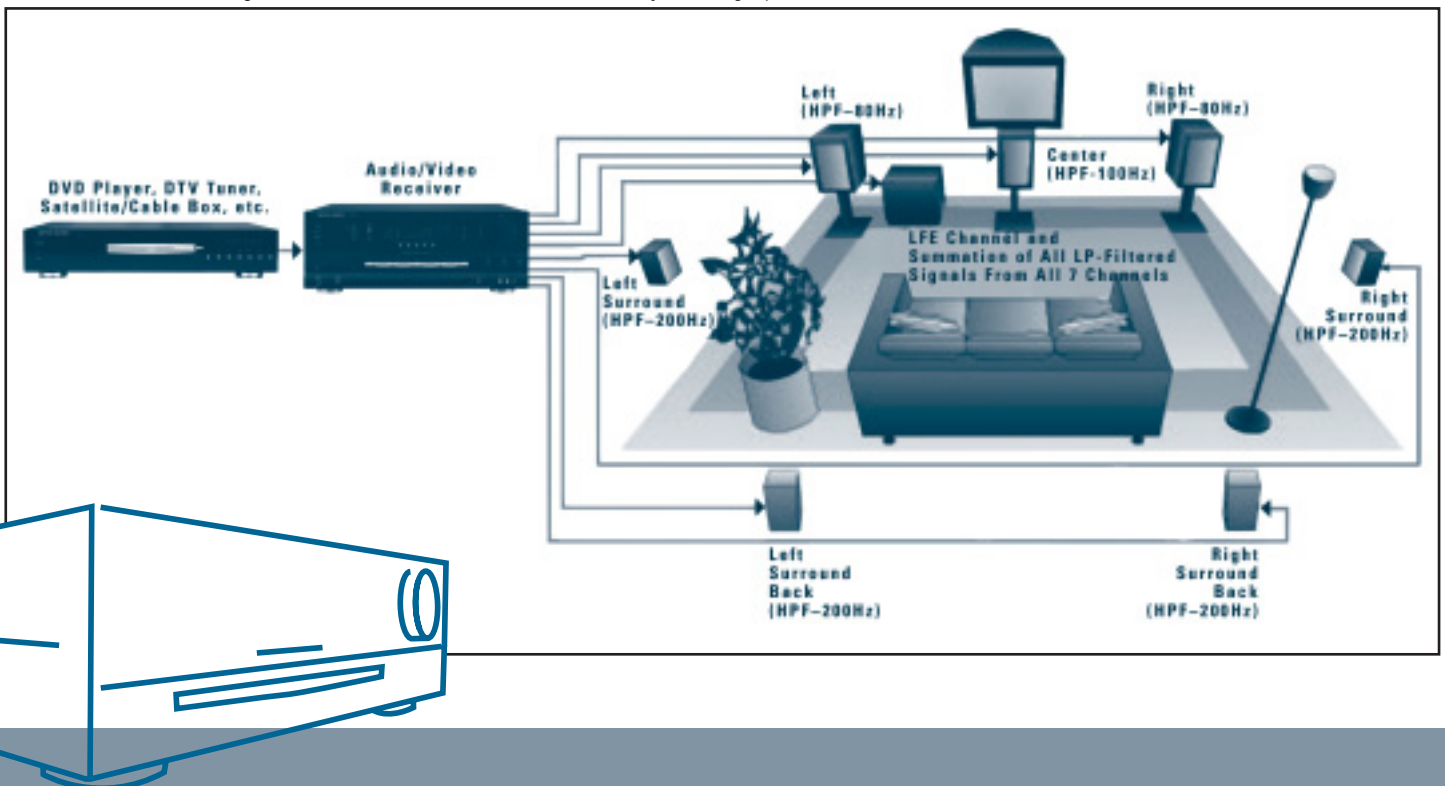
Triple Crossover and Multichannel Digital Bass Manager

Technology in A/V receivers has increased in advancement and sophistication with the introduction of formats such as Surround EX™, DTS® 6.1 Discrete, SACD and DVD-Audio. Speaker manufacturers have increased their offerings in response to these new formats, but most competitive A/V receivers have not updated their bass-management systems to accommodate the wide range of choices. For example, many receiver models still apply crossover points globally, rather than in individual groupings.

Triple Crossover System

Harman Kardon's newest receivers – the DPR 1001, AVR 7200, AVR 525 and AVR 325 – offer an advanced and versatile Bass Manager, which allows the crossover to be set to one of six specific frequencies for each of three different speaker groups (see Figure 1). Within the same surround mode input setup, the six choices are 40Hz, 60Hz, 80Hz, 100Hz, 120Hz and 200Hz. Therefore, one could set the left/right fronts to 80Hz, the center to 100Hz and the surrounds (side and back) to 200Hz. Also, when the high-pass-frequency point is selected, it automatically sets the proper matching, compatible low-pass-frequency point (to the LFE out) to ensure that none of the low-frequency information is lost and that all sound is outputted properly to the assigned channels. (Note that the software is run at 48-bit resolution using 2nd-order high-pass filters and 4th-order low-pass filters [Linkwitz-Reilly].)

Figure 1. Harman Kardon 7.1-Channel Home Theater System Using Triple Crossover



Additional Options

■ Bass Remixing

All 7.1-channel Harman Kardon receivers have the capability of providing additional bass by remixing a portion of the left/right front speakers' signals to the subwoofer.

■ Direct Mode

If the user desires to have the optimum in wide-band frequency response while listening to analog program material, the entire Bass Manager can be bypassed by switching to the Direct mode.

■ Global and Independent

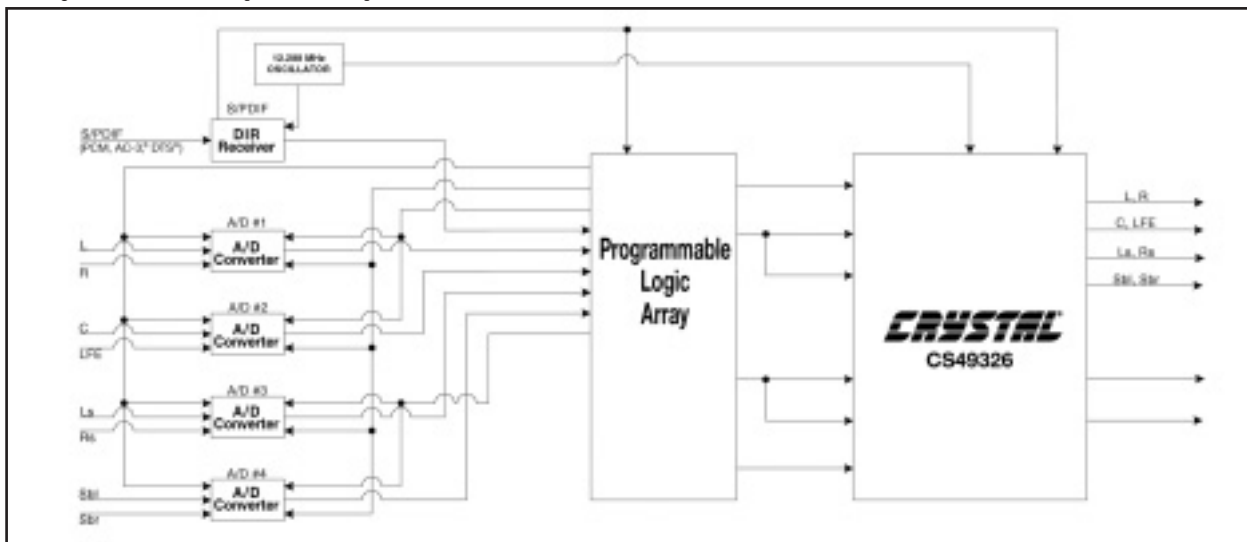
The user may choose to have the Triple Crossover settings applied to all inputs (Global) or a unique Triple Crossover setting for each input (Independent).

Multichannel Digital Bass Manager

Harman Kardon's DPR 1001, AVR 7200 and AVR 525 include, in addition to the Triple Crossover System, a Multichannel Digital Bass Manager (see Figure 2). Despite the increasing popularity of SACD and DVD-Audio players, which output six to eight separate full-range analog signals, there are virtually no A/V receivers other than Harman Kardon's DPR 1001, AVR 7200 and AVR 525 that provide a bass manager when in the 6- or 8-Channel-Direct mode. This means that systems using bookshelf or satellite speakers will receive a full-range signal from DVD-Audio or SACD sources that includes low frequencies. This could be damaging to the speakers when they're played at higher levels. Some competitive receivers claim to include a multichannel bass manager but they often don't have any bass redirection, only a high-pass filter. This means that the low-frequency portion of the original source material is lost, resulting in less-than-optimal playback performance.

The DPR 1001, AVR 7200 and AVR 525 have a unique design that utilizes eight channels of analog-to-digital converters which, in turn, digitize the incoming source signal from the SACD or DVD-Audio optical player. By digitizing this signal, the Bass Manager within the DSP processor can apply the assigned filters and proper bass redirection, including all of the options available from the Triple Crossover System. This allows listeners to have all of the same Triple Crossover settings, including bass redirection, when playing back SACD or DVD-Audio players through the 6- or 8-Channel-Direct inputs as they have when playing any conventional analog or digital source.

Figure 2. Multichannel Digital Bass Manager



Conclusion

Harman Kardon is currently the only brand that includes the Triple Crossover System and the Multichannel Digital Bass Manager to maximize the benefits of multichannel sound and high-resolution audio formats.

For more information visit www.harmankardon.com.