Phantom Channel for Stereo

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Simple methods that may be used to obtain a third or center channel to eliminate that "hole-in-the-middle."

ONE of the major problems of two-channel stereo is the apparent absence of sound in the space between the two speakers. The more widely separated the speakers, which augments the sense of spaciousness, the more severe is the "hole-in-the-center" effect. Therefore an increasing measure of attention has been directed toward filling this seeming void. One way of doing this is to use three-channel stereo. However, since three-channel program sources are not available to the public, the "fill" must be derived from two-channel material.

A simple way of filling in the center is to move the left and right speakers closer together. If corner speakers are employed, this is difficult or impossible to do. Even if wall-type speaker systems are involved, problems of furniture arrangement may interfere with bringing them together.

Another expedient used on occasion is that of a dummy speaker, connected to nothing at all, which is situated between the left and right speaker systems. Sight and sound go together much as taste and smell do and the visual presence of a speaker system in the center can lead the mind to conclude that it hears sound from this region. A third technique is to conceal the two stereo speakers behind a curtain, so that one is not conscious of speaker separation, enabling the two sounds to blend together in the mind.

What is apt to be a more satisfying approach is the "phantom-channel" technique, where signals from the left and right channels are combined and fed to a central speaker. The phantom-channel signal can be derived either before or after the power amplifier. If after, one saves the cost of a third power amplifier.

One early proponent of the phantom channel as a solution to the problem of hole-in-the-center was Paul W. Klipsch of Klipsch speaker fame. His method combines the left and right signals prior to the power amplifier, so that a third power amplifier as well as a third (central) speaker is required.

Fig. 1 shows the essence of Klipsch's method while Fig. 2 shows the refined circuit, including values of the resistive network, chosen to provide adequate isolation (minimization of crosstalk) between channels and the proper level of the middle channel relative to the other two. In Fig. 2 the mixing function is performed by the 33,000-ohm resistors, while the 82,000- and 220,000-ohm units attenuate the signals to the left and right channels. Klipsch in his experiments used a 5000-ohm source in the left and right channels, so that the 33,000-ohm resistors provide slightly better than 20 db attenuation of crosstalk between channels. If a cathode-follower source were employed, typically with an output impedance of about 500 to 700 ohms or less, crosstalk attenuation would be about 40 db. Generally, 20 db attenuation is considered adequate for stereo.

A vital feature of Klipsch's network is that the level of the central channel is *higher* than that of each of the end channels. To be specific, the midd[...] channel is designed to be 3 db hig[...] than each of the others or, in [...] words, equal to the *combined* [...] the left and right channels. [...] it is assumed that the power [...] and speakers for each cha[...] identical, resulting in an aco[...] put which is greater for t[...] speaker than for the flanki[...]

Fig. 1. The basic phantom channel circuit.