



This is the basic plan of a matrix coding system for placing four sound paths onto a two-channel medium, and then recovering the four during playback. Recovered audio signals are designated with the notation (1) to emphasize that they are not exact electrical replicas of the four original, discrete signals fed into the decoder. However, in the best matrix systems, the loss (generally a few dB of channel separation) is negligible.

of full-dimensional sound. A good quadraphonic decoder will enhance a stereo record even further.

With nine and a half billion dollars worth of stereo records in the hands of U.S. consumers, this is no small virtue. Most people do not want to throw out their existing stereo records. Most people invest more money in software (recordings) than they do in hardware. Most people like to get something for almost nothing or for very little added investment. Matrixed quadraphony—even via an inexpensive decoder—allows people to move into four-channel sound gradually rather than taking a quantum leap.

The hi-fi enthusiast who demands more channel separation can buy one of the latest "logic" decoders or a "full logic" decoder such as the one included in the Lafayette LR-4000 receiver. The "logic" circuit samples the matrixed signal and produces channel separation on the order of 20 dB. It may be electronic trickery but then so is color television in which ninety per cent of the information is actually black and white information, and the rest is color information laid on with a broad stroke. Certainly, no one complains about movies, which are actually a collection of still pictures moving fast enough to fool the eye.

Sansui has demonstrated a prototype of a remarkable new decoder which they also claim has over 20 dB of separation per channel. Audio critics had a hard time distinguishing the discrete four-channel master tape from the encoded-decoded logic version in rapid A/B comparisons.

The critics of "logic decoding" point out that in any such system there may be a lapse of action. Logic works well with one dominant sound, less well with more than one sound, and with dimin-

ished intensity when there are very complex musical passages simultaneously in all four channels. The proponents of logic argue that in this latter type of program the ear is unable to perceive the direction of any one sound with precision, and the diminished logic action is unnoticeable.

My own experience appears to confirm both arguments. For example, on Vanguard's demo record, "Flight of the Bumblebee" (QXSV 223939) where the bumblebee sweeps around the room, it does seem to take a slight dip and go out of aural perspective between the left-front and left-back speakers and again between right-rear and right-front speakers. Columbia claims that this may be the way the record was produced or it may be an oddity of the decoder being used. The over-all results, nevertheless, do sound impressive.

Ben Bauer, inventor of the SQ system and vice president of CBS Laboratories, claims that further improvements in both decoding and encoding will narrow the gap between "the discernible difference" of logic decoding and the equivalent four-channel discrete master tape. In addition, integrated circuits, by lowering the price of logic decoders, soon will enable manufacturers to use more sophisticated logic circuits in lower-priced units.

Peter Scheiber and Ben Bauer both agree that the matrix systems have not yet been used to full advantage because many recording studios are set up to optimize four-channel discrete tapes. They claim that improved encoding circuits which allow going directly from a 16-channel recording into 2-channel encoding followed by 4-channel decoding will give more flexibility to the producer and further improve the quality of the matrix disc.

The critics of matrix four-channel sound may well agree with Walter Carlos that "every matrix