

a monophonic recording depends on the listening room to supply reverberant information from the sound that is reflected off its surfaces, and ordinary rooms in the home are a far cry from a concert hall. It's a tribute to our imagination and memory of the original musical event that we found it satisfying for so long. It also shows what selective listeners we are—to reject all the unwanted sonic information that was irrelevant to the enjoyment of the musical experience.

Monophonic sound failed to take advantage of man's binaural capabilities. We can compare (in the brain) two different sounds for phase, amplitude, and time differences over a ten-octave range. Our ear/brain combination can make auditory discriminations up to a fraction of a millisecond, and zero in on relevant information from among billions of "bits" of sonic information and detail. Without this ability, it's doubtful that we would have reached our current sublime state. Enemies would have cut us down from below, behind, or from above, as well as from in front.

The goal of any recording could be described as a simulated version of reality cut down in decibel level so that we can tolerate it in our living room. Jack Pfeiffer, executive producer, Classical Records, RCA, summarizes the attitude of a modern recording engineer: "Sounding real is not always sounding right, but if it is to sound right it must sound real."

Matrixing is the modern recording engineer's tool. With up to sixty-four channels at his command, he can use all sorts of additives that improve the subjective impression for speaker-listening in the home. Matrixing for stereo allowed our binaural listening capabilities to come truly into play. We could detect the lateral positioning in the original sound source—we had a wall of sound. Our binaural listening capabilities could compare the billions of bits of phase, amplitude, and differences (as well as similarities) and detect both direct and reflected sound. Hearing the in-phase sounds our brains filled in the "hole in the middle" between the two front speakers (the so-called phantom channel) and gave us a better-than-90-degree sonic perspective. Engineers learned to put up microphones where they could pick up reverberant, generally out-of-phase, information and thereby got better stereo perspective in their recordings.

But recorded stereo has one significant deficiency. It has allowed the reproduction of the concert stage but not of the concert hall. Matrixing and decoding in a four-channel way allows us to put the sound in its original perspective, and truly exploit man's 360-degree listening capabilities, using a single two-dimensional record groove. By

introducing suitable phase shifting, amplitude shifting, and delay, the recording engineer can simulate our normal 360-degree hemispherical sound world so that it can be reproduced through four speakers.

The big question is how well can the subtle phase, amplitude, and time differences that were in the original matrixed soup be preserved in both the encoding and decoding processes.

The matrix race has narrowed down to the Sansui system (Quadraphonic Stereo or QS), and the Columbia system (Stereo Quadraphonic or SQ). Let Columbia, which has licensed over twenty record labels and fifty hardware manufacturers, speak for the matrix viewpoint. The statements that follow in quotes are pro matrix; my own comments follow each.

1. "The SQ disc is completely compatible in stereo and in mono." This statement is true if you are not a semantic lint-picker about the word "completely." Every matrix system has its trade-offs and the Columbia system was developed in a calculated attempt to make it compatible with current stereo and mono equipment and with stereo FM broadcasting. With ninety per cent of the radios in the U.S.A. capable of receiving only a mono sound, this is no small consideration. The record is still the major programming device for all forms of radio broadcasting. And the owner of a stereo player can buy and play a matrixed record with the assurance of good quadraphonic performance at the time he converts to four-channel playback.

The JVC/RCA "discrete" record is also compatible in mono/stereo terms. It matrixes the two left channels (LF and LB) and the two right channels (RF and RB) to produce two sum signals placed on the respective left and right groove walls. Thus it will play all right on stereophonic and monophonic phonographs. Early in the game it was believed that its delicate ultrasonic carrier would be too damaged by a conventional stylus to produce good quadraphonics in the future. However, recent tests reportedly show no such impairment of the record groove. So compatibility is not an exclusive virtue of the matrix camp.

2. "SQ plays as long as stereo (up to thirty-five minutes per side)." True. The best that the discrete disc can put on one side is twenty-five minutes. Most pros in the record business I've talked to do not see this as a big advantage for matrixed sound. They say ninety per cent of most repertoire problems can be handled with a fifty-minute record. The added information is therefore only a small advantage for matrixed four-channel stereo; but in the remaining ten per cent of the repertoire it could mean that the customer would have to buy