two discrete discs in place of one matrixed disc.

3. *"SQ plays as loudly as stereo."* This is a small plus for the matrix camp. The early JVC/RCA discs were substantially down in level, but they have recently been able to come within a few decibels of the regular stereo product. This may be a problem for playing on marginal equipment but not in hi-fi rigs that have high gain and very good signal-to-noise ratios.

4. *"SQ retains all the highs."* True. The RCA disc is limited because of bandwidth (like having two FM stations in one record groove) to 15 kHz. But many people beyond their middle years can't hear beyond 15 kHz. Columbia claims they put 22 kHz on a matrixed disc. A moderate plus here for the matrix camp.

5. *"SQ has the same signal-to-noise ratio as stereo."* True, but most independent testing laboratories say that the inherently poorer signal-to-noise ratio of the discrete disc in its latest version is not too serious a problem when the disc is played at moderate level in an average, relatively noisy home.

6. *"SQ doesn't require a new cartridge."* Here the matrix camp has a real plus. Even though there is growing evidence that the better high-end elliptical cartridges can do an adequate job of playing the JVC/RCA disc, optimum performance is achieved by the use of a wide-range (45-kHz) cartridge with a Shibata-type (modified elliptical) stylus. Surprisingly, some cheap cartridges do an adequate job on the RCA disc because of a frequency resonance at the right place in the audio spectrum for grabbing the subcarrier, but that very resonance can damage the delicate ultrasonic modulations of the CD-4 disc.

7. *"SQ can be broadcast quadraphonically."* If the discrete disc camp has an Achilles' heel, we've just found it. No extra money or effort is required to broadcast any matrixed four-channel disc. Just put it on a turntable. Most experts agree it will be years, if ever, before we have an FCC-approved system for broadcasting a discrete four-channel sound.

8. *"SQ can't lose directionality by wear."* True, but not a big practical plus for the matrix camp. Laboratory tests indicate that the JVC/RCA disc is enduring the trials of over 100 plays. My experience with the JVC/RCA disc (confirmed by others) is that the discrete discs do need tender loving care. They are very susceptible to dust and dirt, and do need constant cleaning. For those record owners not in the habit of caring for their records, this may be a definite handicap for the discrete side. I have also found that the discrete disc system is critical in its adjustment, at least with the first decoders; sometimes the rear carrier drops out, and you lose the four-channel effect. I assume that this problem can be solved with additional developmental effort. In any event, it is true that the matrixed disc requires no more care in handling and storage than what should be given to a regular stereo record.

9. *"SQ doesn't require slow-speed mastering—which is terribly important to record manufacturers."* Maybe—but the consumer couldn't care less about how long it takes to master a record. Right now the JVC/RCA record has to be mastercut at one-third the speed of a conventional record, but RCA claims that they will soon be able to master at one-half real time, and eventually they'll do it at real time. However, while cutting time is not a significant part of the total cost of a record, being able to listen to the program while it is being cut definitely is. Here is a manufacturing plus for the matrix camp.

RCA is selling its Quadradisc at the same price as its regular stereo records, but CBS SQ discs go for a dollar more. CBS says that this is to cover the added cost of mixdown from 16 channels to 4, which requires more of the producer's time. Since RCA is bound to have similar added costs, it must be offering the Quadradisc at a bargain rate. It also has been suggested that the handful or so discrete discs released so far do not represent anything like a major product effort, and that costs very likely will become more realistic if and when RCA really starts producing these discs in significant quantities since only then will they know what they're into in terms of processing and manufacturing requirements.

Other Advantages of the Matrix Method

Columbia claims that the aforementioned nine points should be "pasted in your hat." I think there are other virtues that all matrix systems have that should get equal emphasis. One in particular is the ability of matrix decoders to significantly enhance many of the records in your current stereo library, especially those containing reverberant sounds recorded as anti-phase modulations. Even the modest little Dynaco adapter ($20) attached to one or two rear speakers will enhance a stereo record to a remarkable degree. Many people have extra speakers. This simple hookup has exposed hundreds of thousands of people to the beginning appreciation