I have been asked to write a "reply" to the SOUND ADVICE review, but somehow I feel like I should consider the source and forget it.

But, accepting the challenge, I will start by saying the "several severe problems" (of which time delay seems to be the major "complaint") show that the author of the review is unaware of the facts relating to time delay effects in multiple speaker systems. There have been several technical presentations on this subject and the audiences could well have been misled by them. One author claimed superior performance by "phasing" woofer-squawker-tweeter arrays to a fraction of a centimeter, and I wanted to ask him which ear he listened: certainly if the array was phased within 5mm for one ear, it must certainly have been 200 mm "out of phase" for the other ear! Too bad such "papers" get approved for presentation at a "learned" Society meeting, and that SOUND ADVICE reviewers are thereby misled. Time delay effects in loudspeakers are discussed in a paper I published in October 1972. Several experiments of my own and several described by others lead to the conclusion that time delays of up to 2 or 3 or even 4 milliseconds are inaudible for all forms of audio program material, provided distortion is adequately low.

Distortion is here defined as addition of frequency components not present in the input signal. This includes amplitude modulation distortion in amplifiers and loudspeakers, frequency modulation distortion in loudspeakers, and transient intermodulation distortion or Otala distortion in preamps and amplifiers. Harmonic distortion may be mentioned in passing but this is always lower in magnitude than the distortions mentioned above, and is per se of little importance because it is less audible and less irritating, even in large amounts.

Horn throat distortion has been discussed by Thursa, Jenkins, and O'Neil (J. Acous. Soc. Am., vol 6, p. 173 (1935), but this form of distortion in our loudspeakers was too low to measure in our Tektronix 3L5 Spectrum Analyzer.

This form of distortion would give second order side-band components, and we obtained only first order components of low level when measuring horn type loudspeakers. (Our more recently acquired HEWLETT-PACKARD Spectrum Analyzer will doubtless measure these low order components, but tests so far made are adequate to show them to be far below significant levels.) Direct radiators always showed from one to three orders of magnitude greater distortion when delivering power output equal to that of the horn systems.
With an array of direct radiators, one can maintain “zero time delay”, and suffer 30% modulation distortion. With a 3 way horn system, one might tolerate 0.003 second time delay (which has been repeatedly demonstrated to be inaudible) but reduce total modulation distortion to under one percent at the same power output. Choosing low distortion is not a “trade-off”. It is just good judgment.

The KLIPSCHORN® was criticized as having no low bass, poor imaging (whatever that means), hollow sound, and “virtually no extreme high frequency response”. These subjective observations were made without reference to program subject matter or listening conditions. We aver that “The better the speaker, the worse it sounds” until all sources of noise and distortion are minimized. I wonder how much distortion the speakers were repeating from the sources feeding them! And what amplitude vs frequency anomalies existed in the source material?

As for frequency response: we regard this as fourth in importance after (1) distortion at (2) adequate power output, and (3) polar response, but our testing has produced more frequency response curves of ours and other speakers than it has of the more important aspects of speaker performance. We have yet to find a loudspeaker exhibiting smoother response than our midrange series of horns, K400, 500, 600, 700 with K55V driver. Overall response of our loudspeakers for home use are smoother than that of any of our would-be competitors.

About 20 years ago, I was successful in reviving the teachings of the Bell Telephone Laboratories’ Staff and Snow’s “bridged center speaker” for stereo. I realized there would be uninformed opposition to corner speakers but my studies showed that corner placement of flanking speakers is ideal, and with smooth polar response over the proper angle they offered accuracy of “stereo geometry” (what some writers have chosen to rename “imagery”). The addition of the bridged center speaker offered what the ear perceived as a continuous sound curtain with individual sounds on the stage being placed accurately in the playback environment.

All this is well documented. A bibliography of the AUDIO PAPERS is available on request.

Back in the 20’s when a certain automobile stood high in the public regard, the advertising slogan for the Packard was “Ask the man who owns one”. May I borrow that phrase for our loudspeakers?

PAUL W. KLIPSCH