SOUND & LIGHTING

SPEAKER SYSTEMS - THE MIND BOGGLES

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The more you learn about speaker systems, the more you start to realize that, technically, it's almost impossible to achieve the results you expect from them. There are so many variables involved in choosing, matching and using speakers that you can be driven crazy with options, none of which seems to be the perfect answer.

It's sort of like choosing a car - you might love a two-seater sportscar, but you can't fit the family and dog into it. On the other hand, a van could be really useful but it's not great for getting around downtown and they end up being pretty expensive if you want to make them comfortable.

To try and narrow down the field, we'll look at the way speakers work, which is really looking at the limitations inherent in speaker systems, and then we'll try to satisfy the variety of applications for which speakers are required.

The parameters of speaker operation are:

1. FREQUENCY RESPONSE - Musically speaking from 32 Hz to above 15KHz(+/- 3Db). Ideally we want flat response and reproduction of the full frequency-range.

2. DISPERSION - The angle of coverage within which the frequency response remains consistent. Ideally we want even dispersion so that the sound directly in front of the speaker (on axis) is the same as the off-axis response.

3. EFFICIENCY - The amount of sound *a* speaker system is able to put out from a given amount of electrical signal input. In P.A. work this is the single most important specification. An increase of 3 dB can be perceived by most listeners as being louder than the original. This requires twice the amplifier power or *a* second speaker. The same result can be achieved by using a speaker which is twice as efficient. Note: It takes roughly a 10 dB increase to be perceived as twice the volume.

4. POWER HANDLING - The ability to convert electrical power into acoustical output over extended periods of time without self-destructing in the process.

5. CONSTRUCTION AND PACKAGING - Size, weight, durability and reliability.

6. AESTHETICS - Fashion shows and set designers do exist.

7. COST - $$$

A speaker is a transducer. Like a microphone in reverse, it converts electrical energy into acoustical energy. With a microphone, it is possible to have one device which can reproduce a reasonably flat response from the lowest to the highest frequencies within human perception. However, not only is this virtually impossible with a single speaker, we also require it to handle large amounts of power and produce moderate to ridiculously high sound-pressure levels over large areas. Moreover, let's not forget small, light, rugged and cheap. Fulfilling all the criteria set for speaker systems would have baffled Einstein. (All puns always intended). Tune in next issue and we'll look at the problems that woofers and tweeters have to contend with every day.

As *vice-president of Westbury Sound and president of Select Concert Products Inc., Don Barber has been studying sound systems since 1973. He also studied theatre at Queen's University.*