ENGINEERING STAFF REPORT

The JBL Model L50 Loudspeaker System

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System Performance

Frequency response measurements at JBL are made on a large flat baffle, essentially into half space. Figure 1 shows the swept sine-wave response of the L50 system on-axis at a distance of 1 metre, 1 watt nominal input power.

Figure 2 shows both the amplitude and acoustic phase response of the L50 in an anechoic environment above 500 Hz.

Figure 3 shows the electrical impedance magnitude and phase of the L50, which together indicate the load which the system presents to the amplifier.

The load characteristic shows smooth transition slopes and avoids both capacitive and inductive extremes. Figure 4 shows the effect of the acoustic resistance shell. Without the shell there is a sharp, large-magnitude peak with its attendant steep slope phase transition. With the shell in place, the impedance magnitude curve goes through a low, smooth rise and the phase slope is much more gradual, providing an easier load for the amplifier to drive. The damping effect results in smooth, controlled amplitude response in the cut-off region and improved transient response characteristics.

Figure 5 shows the second- and third-harmonic distortion characteristics of a typical L50 system at a 1 watt drive level.

Figures 6 and 7 show the dispersion characteristics of the L50 in the horizontal plane, Figures 8 and 9 the dispersion in the vertical plane. The consistency of angular response horizontally results in accurate stereo imaging and perspective.

Figure 10 shows the voltage drive characteristic of the frequency dividing network when terminated with the loudspeaker loads. This electrical drive, in combination with the acoustic response of the transducers, yields the desired individual contributions from each device. These curves, as with all the others, were taken with the level controls in their nominal mid-rotation positions. Figures 11 and 12 show the family of curves resulting from various positions of control rotation.

Figures 13 and 14 display typical system response to tone bursts of eight cycles duration, indicating the degree of transient accuracy.

The nominal sensitivity of the L50 system is 88 dB SPL (1 W at 1 m). In a free field, an input of 10 W will produce a level of about 89 dB SPL at 10 feet (about 3-4 dB higher in a typical indoor environment). Normal music levels, even for pop or rock, are in the 90 - 100 dB SPL range; thus the 35 W per channel continuous program nominal power rating of the system is sufficient to meet these demands. A pair of L50 systems driven by a 35 W per channel amplifier in an average listening room is capable of levels in excess of 100 dB SPL.

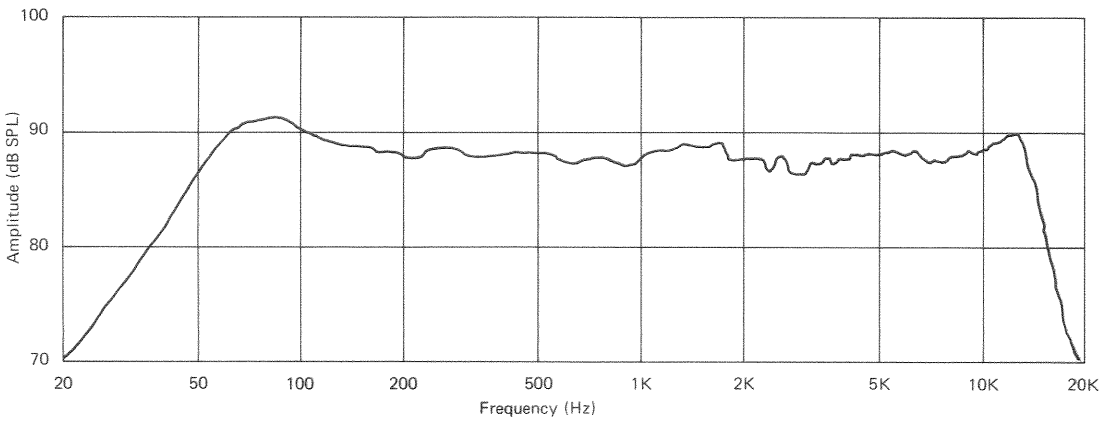

Figure 1 Half-Space Swept Sine-Wave Response

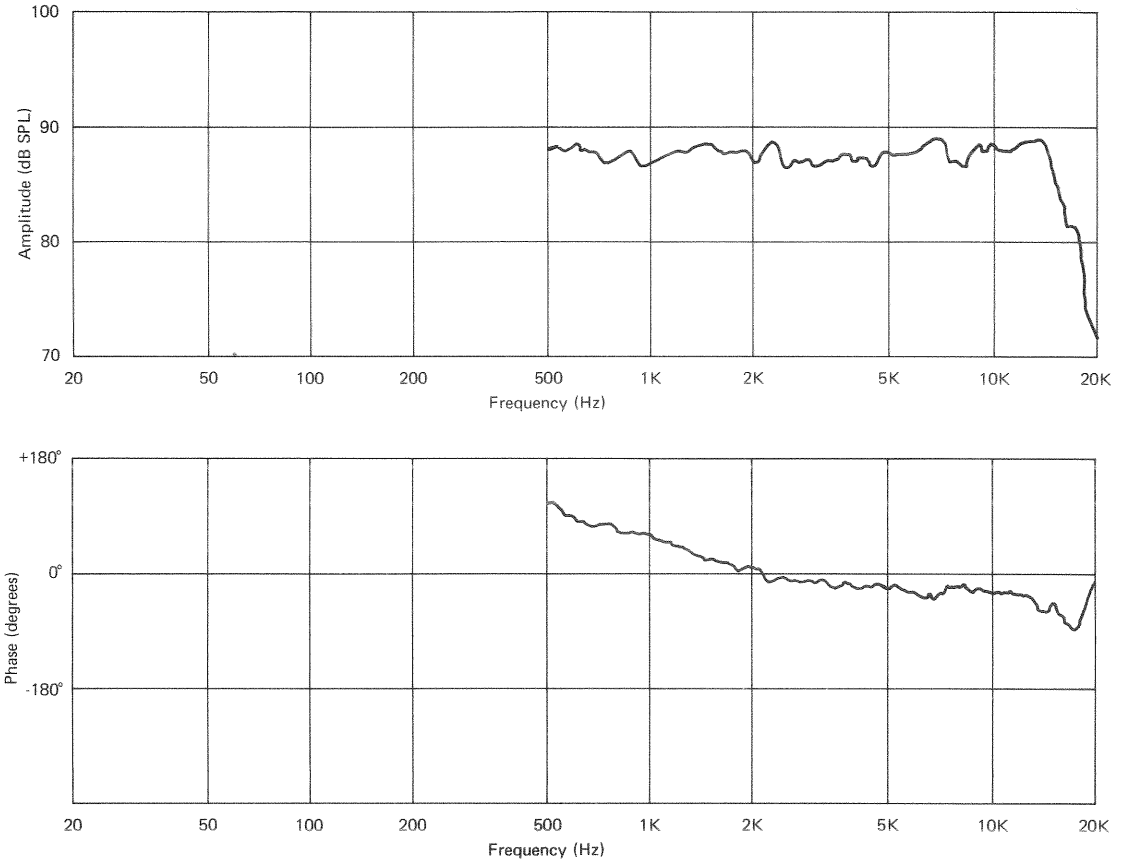

Figure 2 Anechoic Amplitude and Phase Response

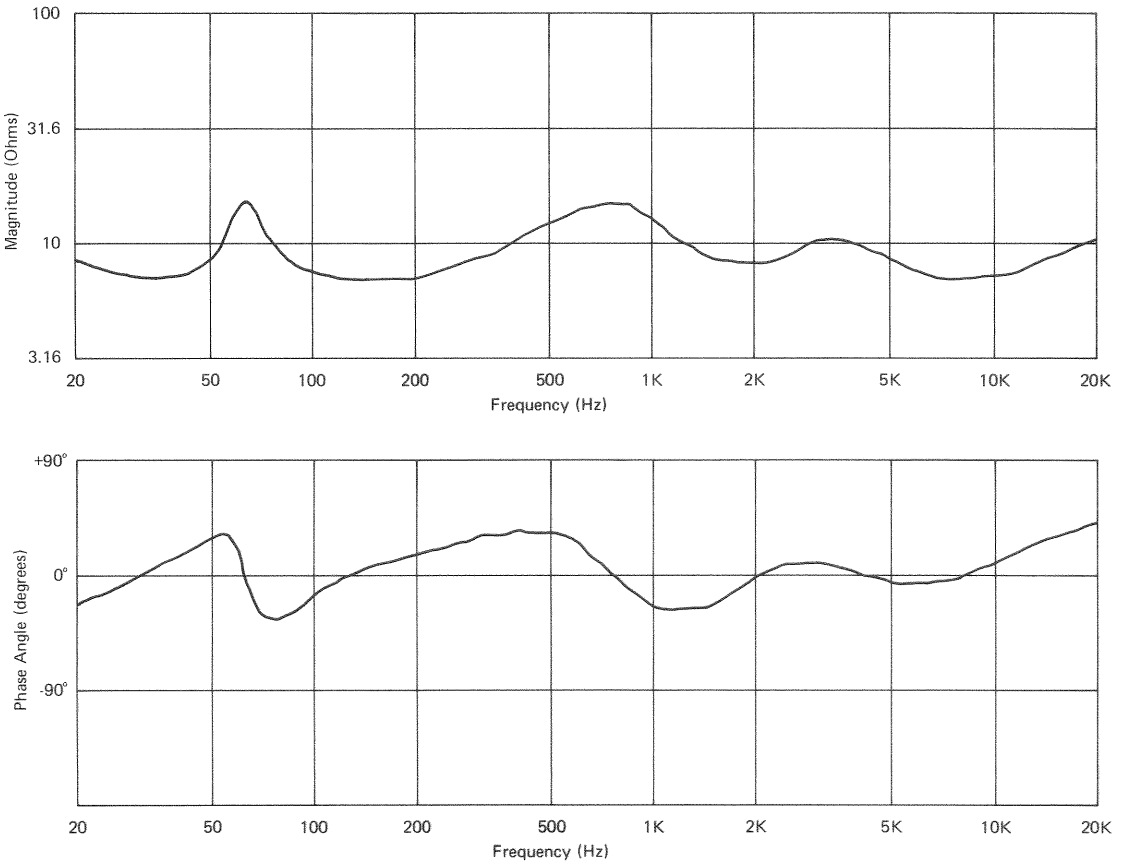

Figure 3 Electrical Load Impedance

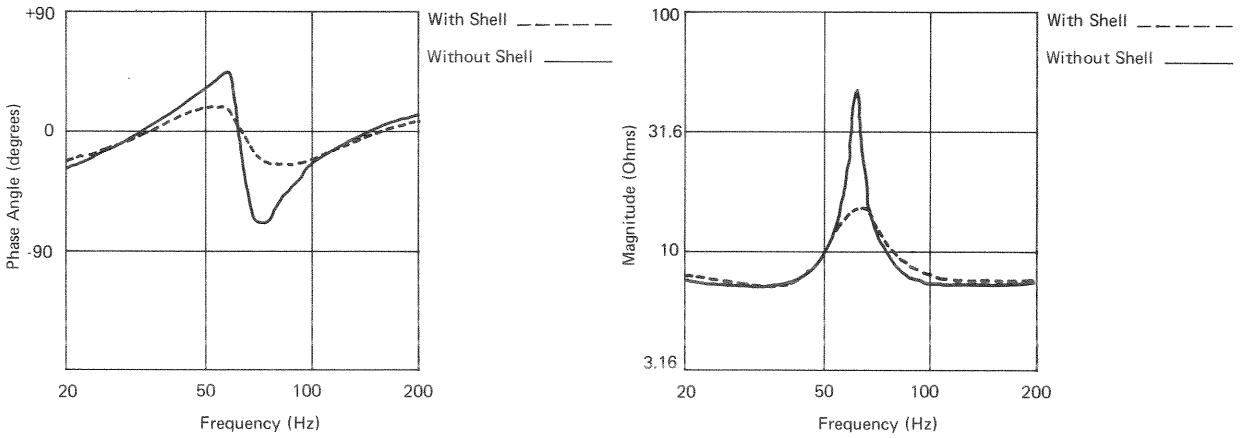

Figure 4 Effect of Acoustic Resistance Shell on Electrical Load Impedance

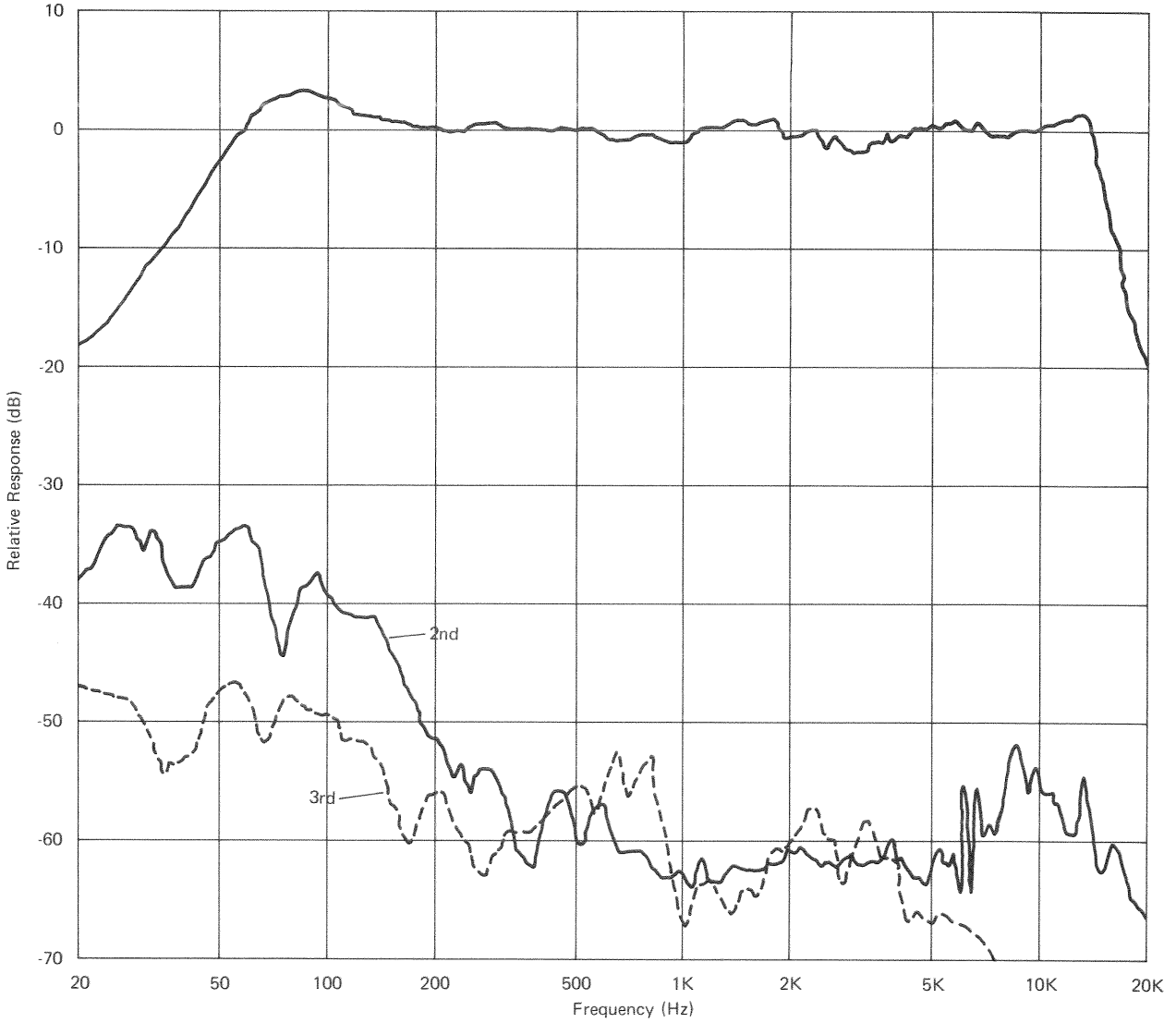

Figure 5 1W Harmonic Distortion

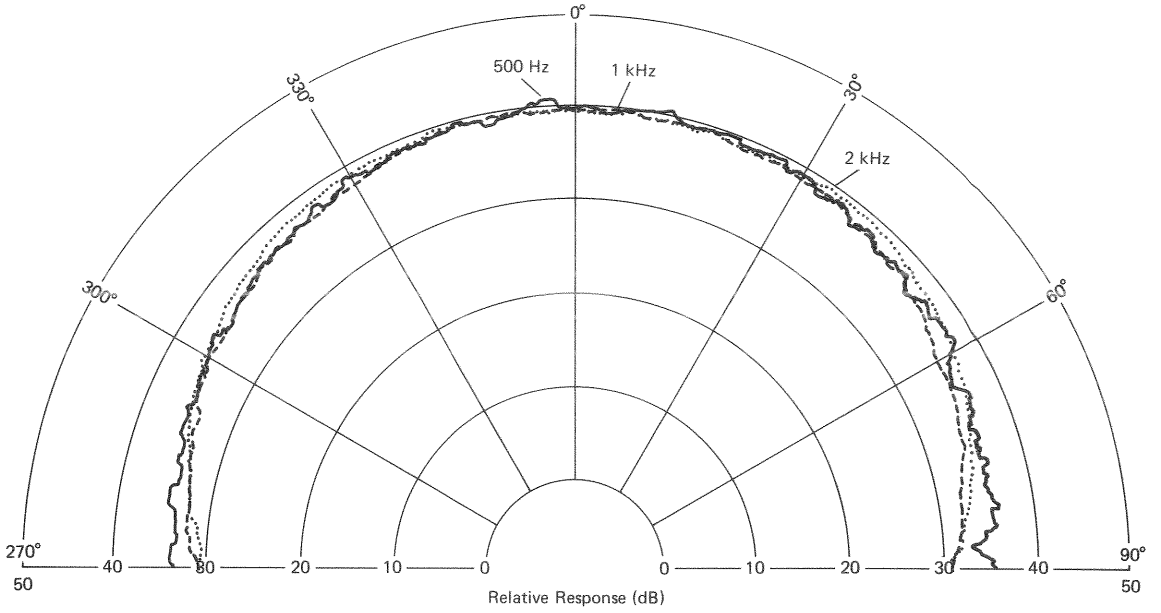

Figure 6 Horizontal Dispersion

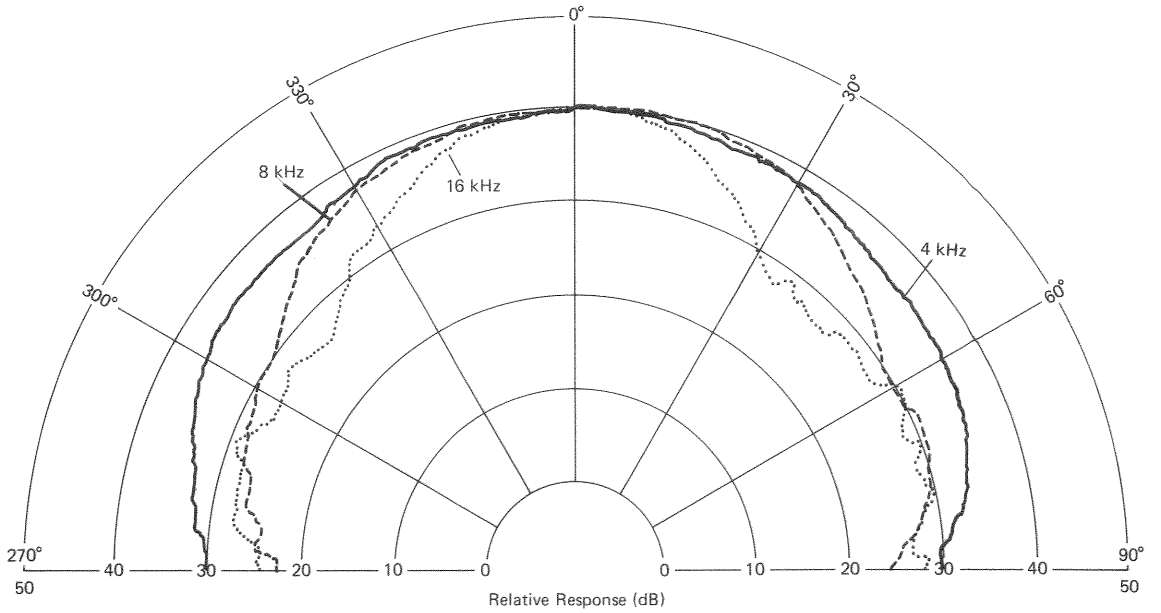

Figure 7 Horizontal Dispersion

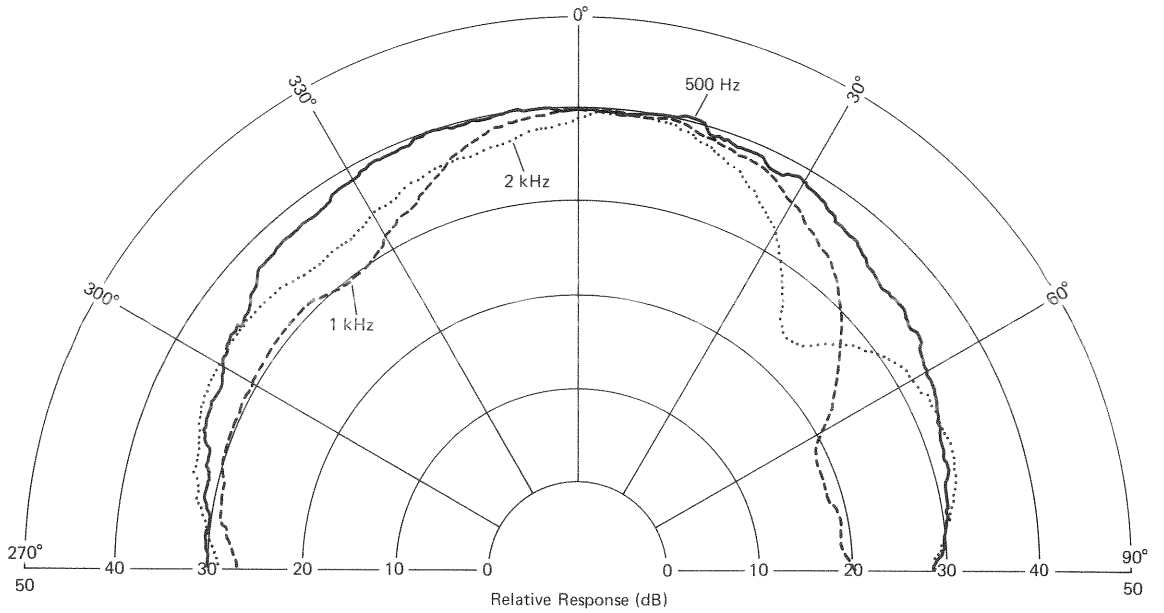

Figure 8 Vertical Dispersion

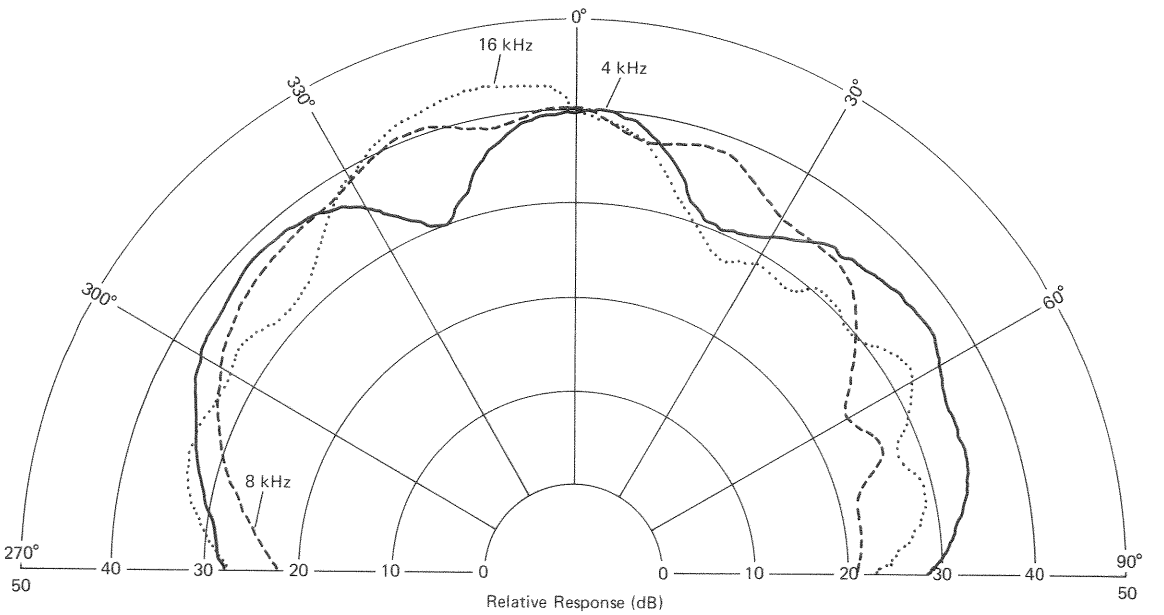

Figure 9 Vertical Dispersion

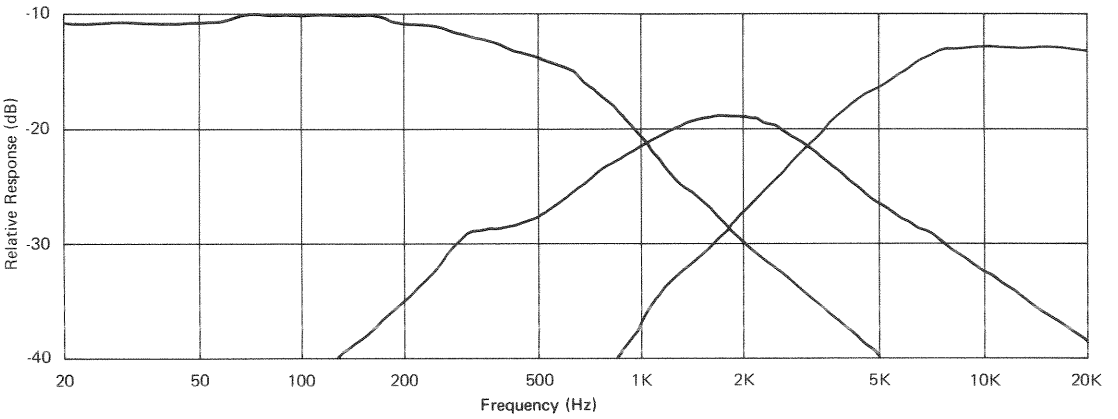

Figure 10 Network Voltage Drive

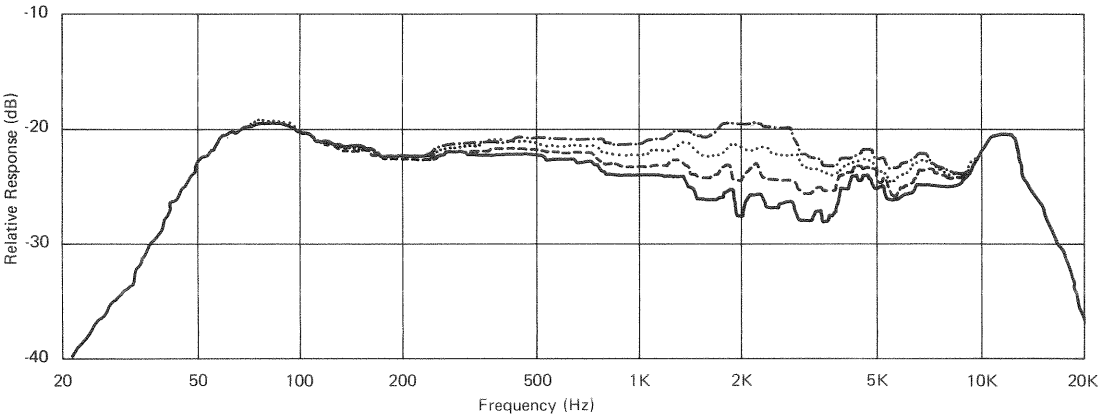

Figure 11 Mid-Frequency Control Action

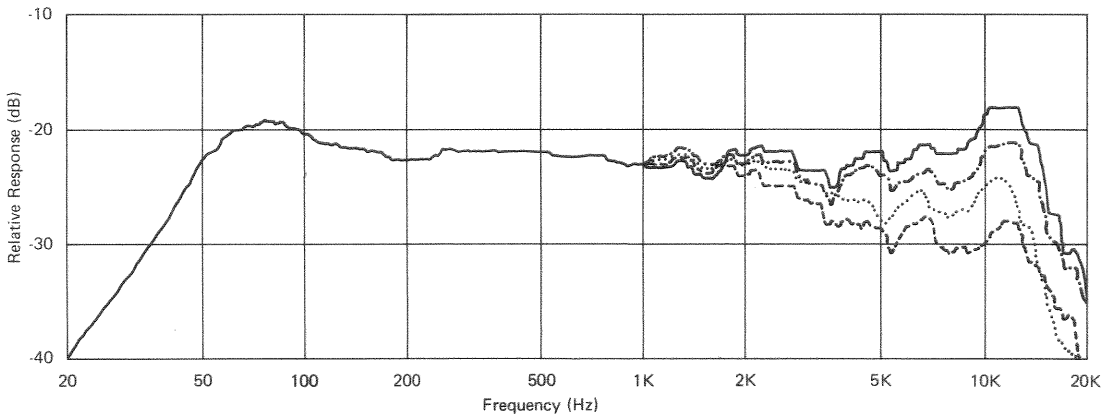

Figure 12 High-Frequency Control Action

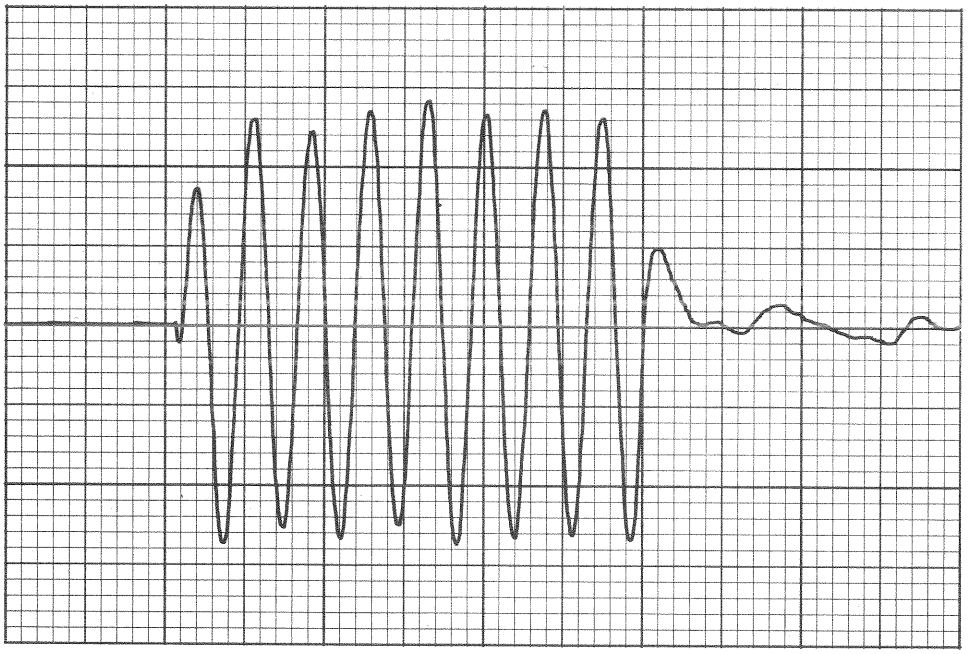

Figure 13 400 Hz Tone Burst

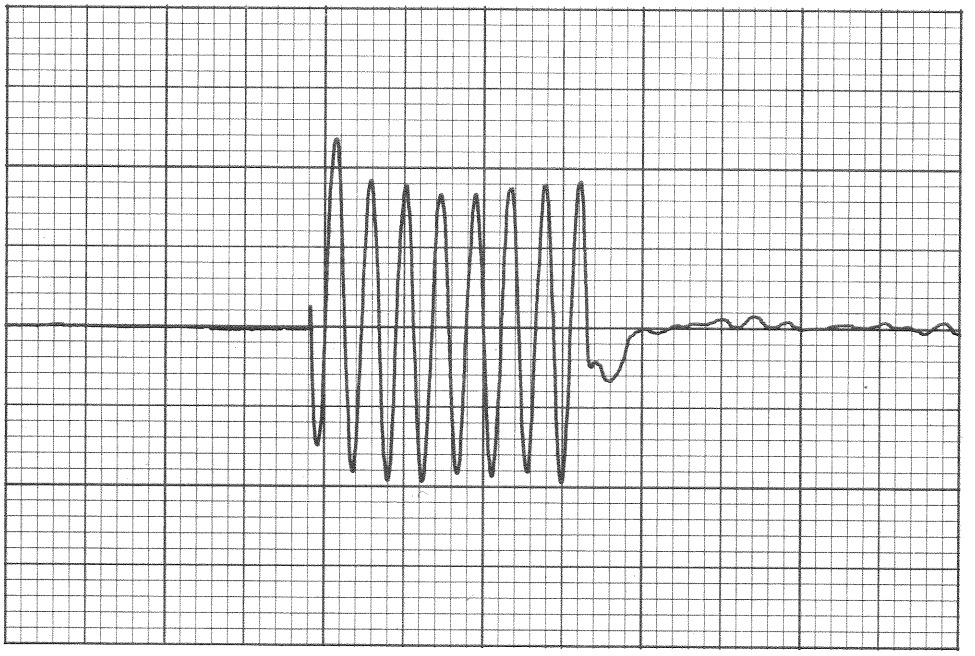

Figure 14 3 kHz Tone Burst

ESR # L50 6/78 Printed in U. S. A.