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ENGINEERING STAFF REPORT

The JBL Model L110 Loudspeaker System

Author: Greg Timbers, Design Engineer

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System Performance

On-axis frequency response measurements at JBL are made on a large flat baffle, over 30 feet on a side, essentially into half space. Figure 1 shows the on-axis response of the L110 system at 6 feet, 5 W nominal power input. Anechoic measurements give substantially the same curve from 500 Hz up. The impedance curve is shown in Figure 2.

Figures 3 and 4 give typical horizontal polar characteristics. Another view of the horizontal dispersion is shown in Figure 5. Here we have plotted the effective horizontal radiation angle (inclusive angle between the 6-dB down points) with respect to frequency. Note that the power angle is approximately 150° through the majority of the frequency range.

The vertical polar plots in Figures 6 and 7 show the directional nature of the vertical line array. It should be noted, however, that over an inclusive angle of 45° the vertical response is quite smooth.

The crossover network employs 6-dB per octave slopes on all three drivers. Conjugate circuits have been used to smooth the impedance variations exhibited by the transducers so that a near theoretical voltage drive has been attained. Figure 8 shows the voltage drive curves with the system level controls set for flat acoustical output.

Second- and third-harmonic distortion characteristics are shown for a typical L110 system in Figure 9. The drive level is 1 W and the measurement distance is 3 feet.

In the design of this system, considerable attention has been paid to time domain relationships between the components, and the result is exemplary transient accuracy. Typical impulse signal response is shown in Figure 10.

The nominal sensitivity of the L110 is 89 dB SPL (1 W at 1 m). In a free field, an input of 10 W will product a level of about 90 dB SPL at 10 feet (about 3 or 4 dB higher in a typical indoor environment). Normal music levels, even for pop or rock, are in the 90-100 dB SPL range , so it is clear that the 75 W per channel continuous program nominal power rating of the system can more than meet these demands. Typically, 75 W per channel will produce sound pressure levels in the 104-105 dB SPL range in living rooms of average size.

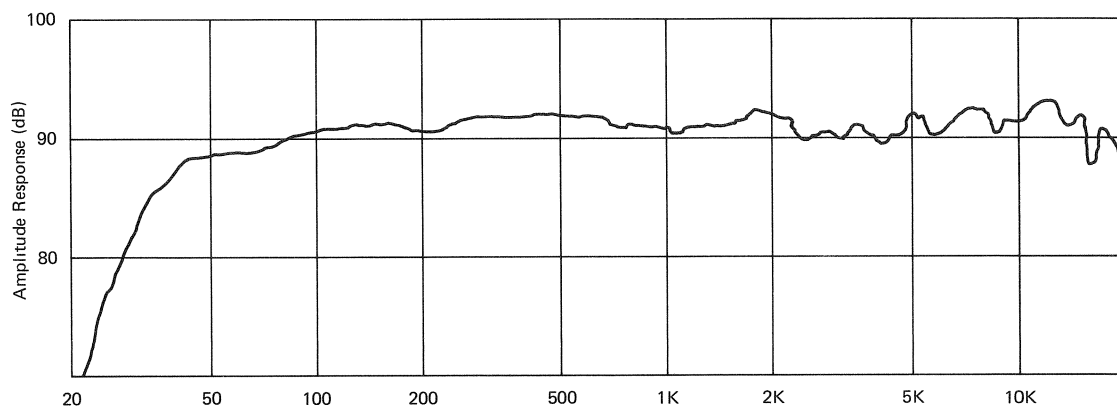


Figure 1

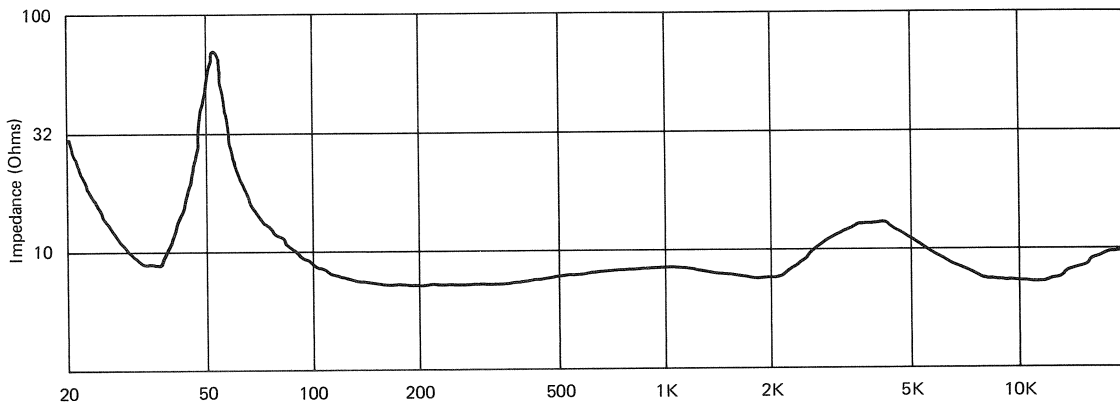


Figure 2

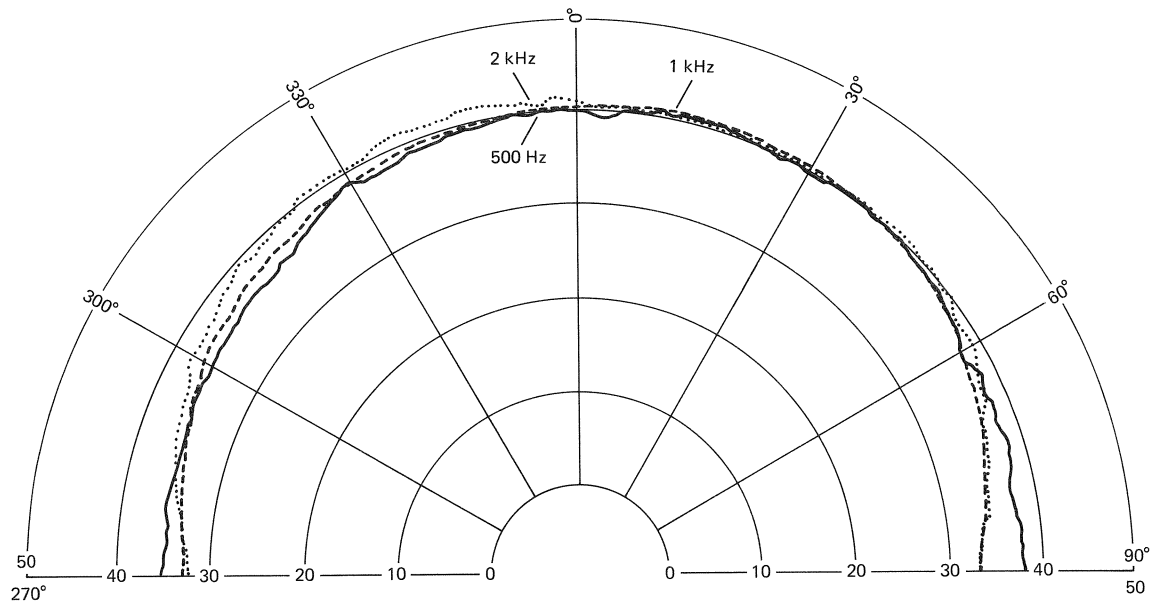


Figure 3

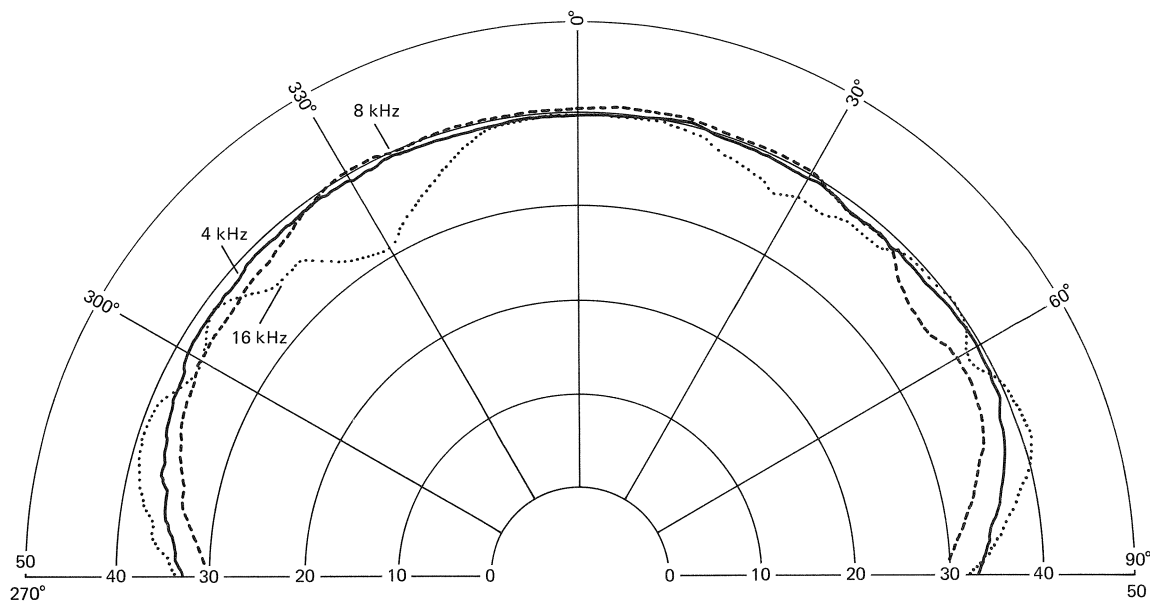


Figure 4

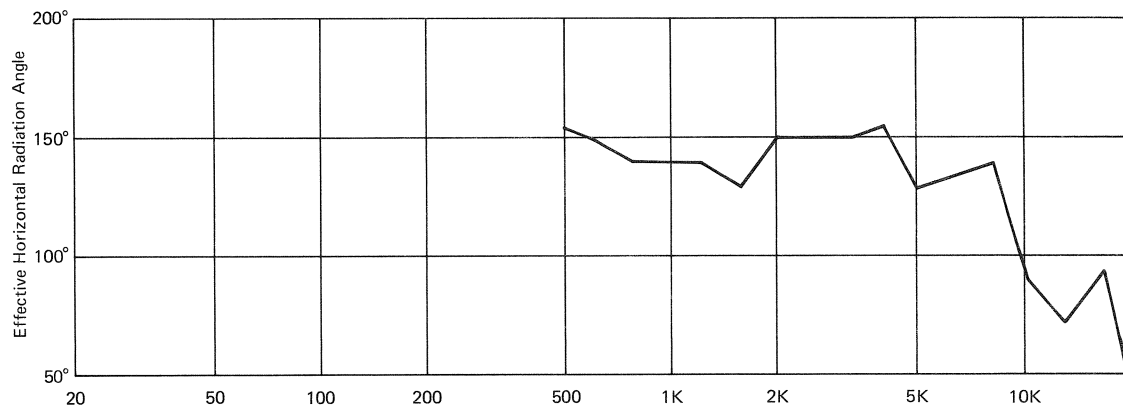


Figure 5

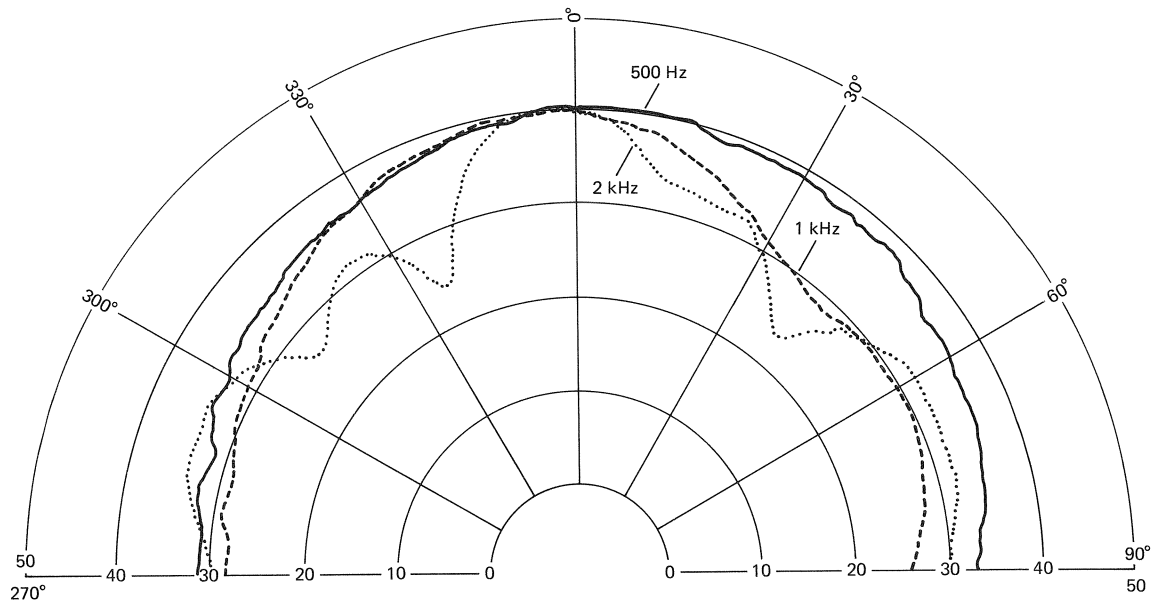


Figure 6

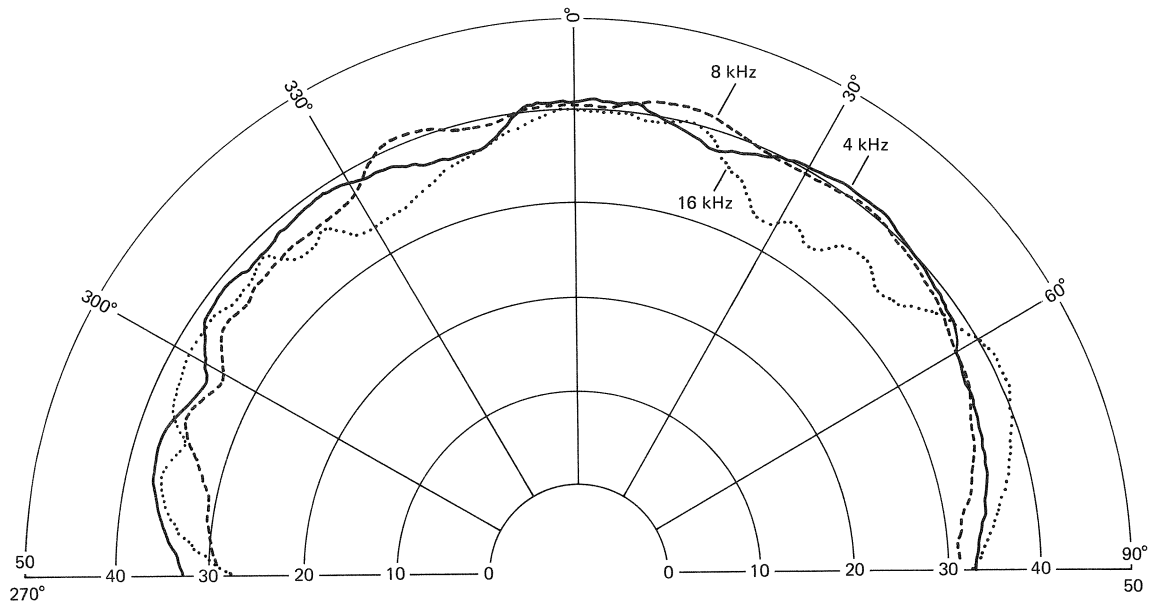


Figure 7

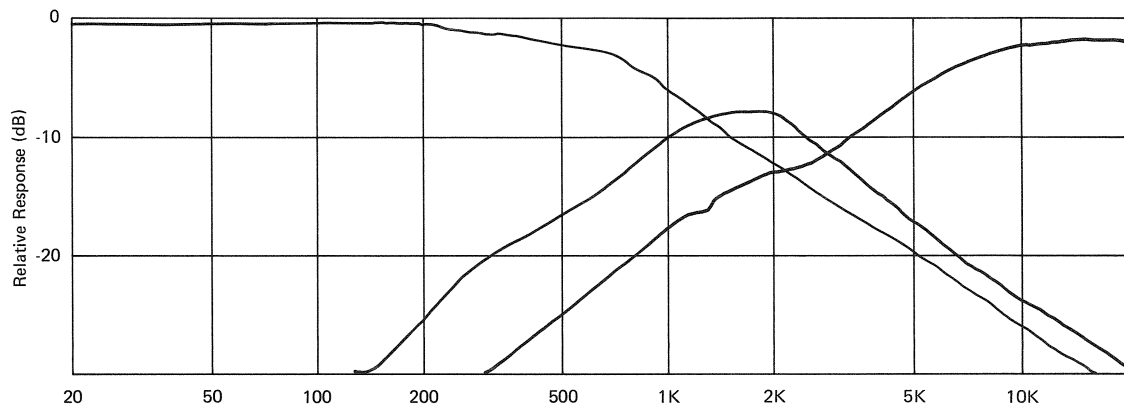


Figure 8

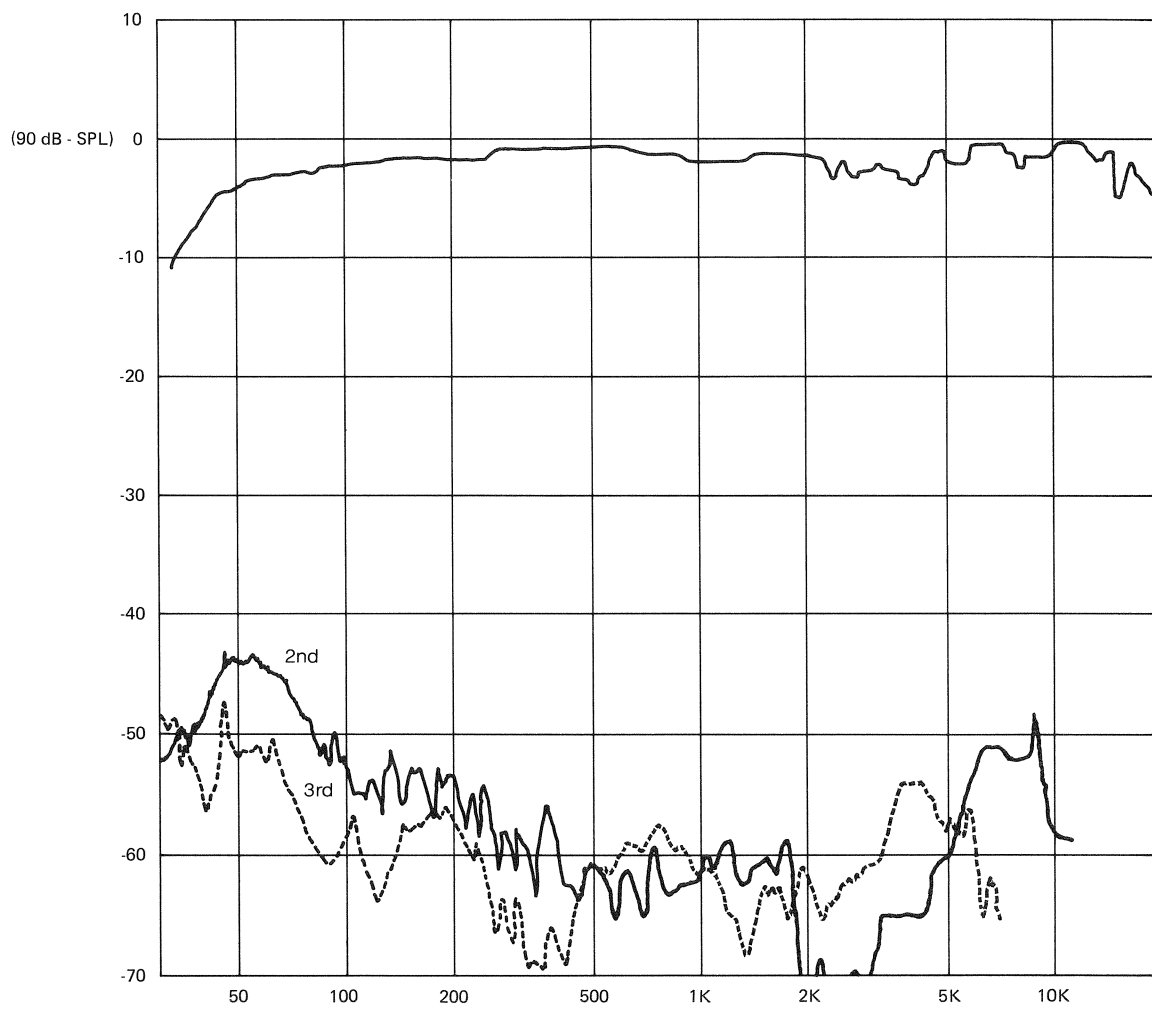


Figure 9

6 kHz

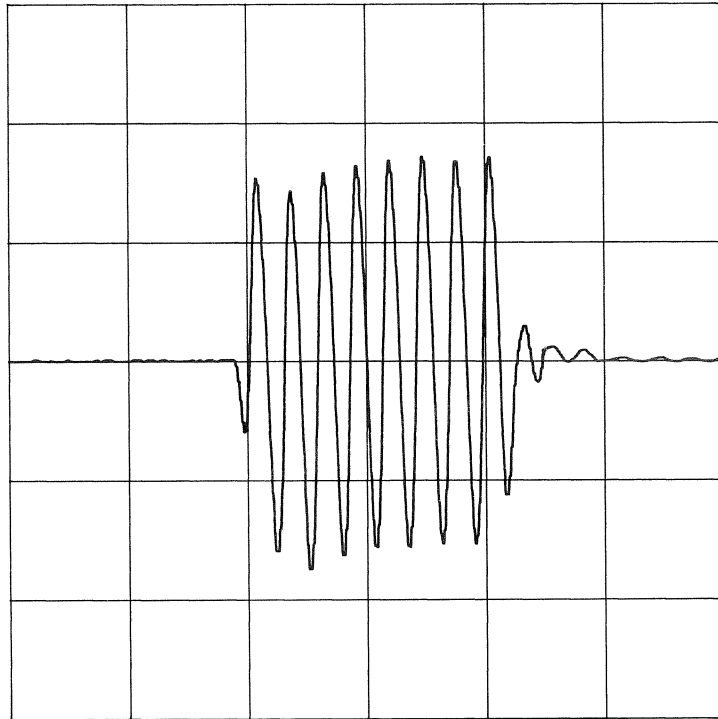


Figure 10a

500 Hz

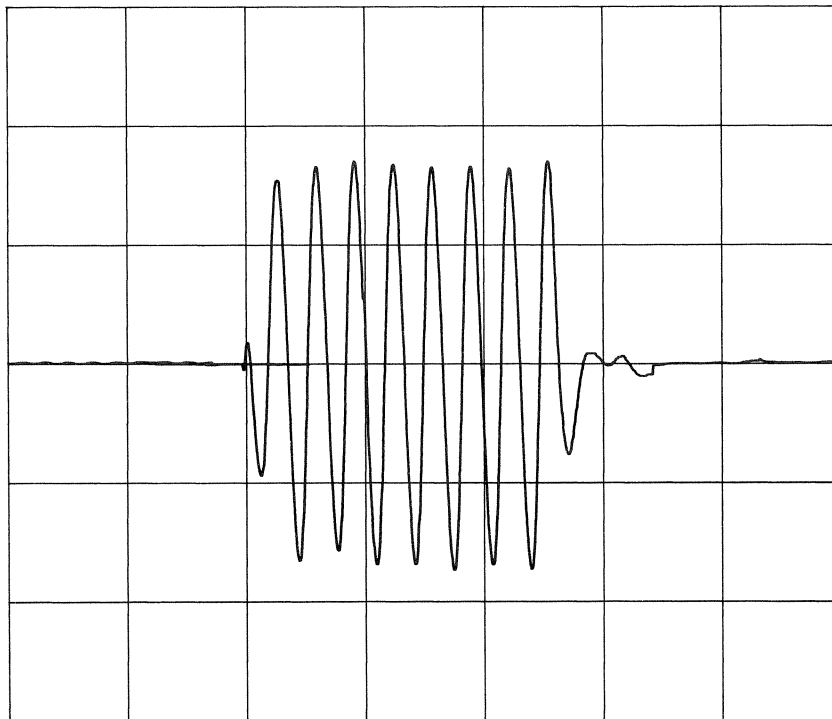


Figure 10b