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# B460

## PRODUCT DESIGN BRIEF

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### General Requirements for a Subwoofer System:

A properly designed subwoofer system will benefit a conventional stereo system in the following ways:

1. Provide flat response down to 25 Hz. The octave between 25 and 50 Hz, so often short-changed in conventional stereo systems, contains more musical information than most audiophiles realize. Modern disc transfer systems no longer have need for low-cut filters, and older master tapes, subsequently remastered on these newer systems often reveal LF information not apparent in the original transfers. Newer recording methods have no LF limitations at all, and this information is routinely transferred to disc. When left intact, extended LF information can provide awesome listening experiences and subjectively draw the listener into the recording environment itself.
2. Provide cleaner midrange. By relieving the side channels of the responsibility of reproducing LF information below 60 or 70 Hz, a subwoofer indirectly produces cleaner midrange. The side channel woofers are no longer required to execute large, power consuming excursions, and there will be little tendency for LF signals to modulate midrange signals.

If there are no active elements in the high-pass network driving the stereo speakers, then there will be no degradation of the stereo program as its low frequencies are rolled off.

3. Provide realistic sound pressure levels. Because of the ear's reduced sensitivity to LF signals, substantial acoustical power must be provided in the 25-to-35 Hz band if the subwoofer is to be effective. It is not sufficient that the system merely go down to those frequencies; it must be able to generate SPL's of 110-to-115 dB in the listening environment.

### The JBL B460-BX63 Subwoofer-network Combination:

The B460 subwoofer easily meets the requirements outlined above. In the 25-to-35 Hz range, where so much of a subwoofer's activity takes place, a ported system has considerable advantages over a sealed system. Using a heavily damped 18" LF driver, developed for professional use, reactive acoustical energy storage in the enclosure augments the woofer cone's output with minimal cone excursion (and therefore low distortion). This action is centered at 26 Hz and is tightly controlled by electromagnetic damping through the magnetic circuit-amplifier combination.

The BX63 active-passive network low-passes the stereo program and combines the channels for monophonic drive to the subwoofer. The signal is rolled off at a rate of 12 dB/octave below 26 Hz in order to prevent needless power dissipation in the sub-sonic range. Above 26 Hz, the signal is rolled off at a rate of 12 dB/octave in order to smoothly match power output with the side channels.

There are balanced, differential outputs on the BX63 to facilitate bridging a stereo amplifier into the mono mode so that it can drive the 8460 with quadrupled output power. Typically, a dual 150-Watt stereo amplifier, driven in the bridged mode, will deliver comfortable peaks of 600 Watts.

Enclosure:

Material: high density particle board, heavily braced. Eight cubic feet net effective internal volume. Tuned to 26 Hz.

Driver:

Eighteen-inch transducer with four-inch ribbon wire voice coil. Coil is .960 inch long. Power capacity 300 watts continuous sine wave from 22.5 Hz up in this system. Rear of cone treated with special formulation (Aquaplas) to control mass precisely and to damp vibrations. SFG. Suspension characteristics are matched to coil/gap dimensions so that suspension is linear while coil is within linear range of its travel; when coil travel becomes non-linear, suspension becomes stiffer to retain control of cone travel. Aluminum voice coil support for heat sinking, mechanical damping (eddy current breaking), and reduction of impedance peak at resonance. Free air resonance 20.0 Hz.

BX63 Network:

External low level device with stereo passive high-pass, summed mono active low-pass. Normal and inverted LF outputs to allow bridging of most amplifiers for high-power single-channel operation.

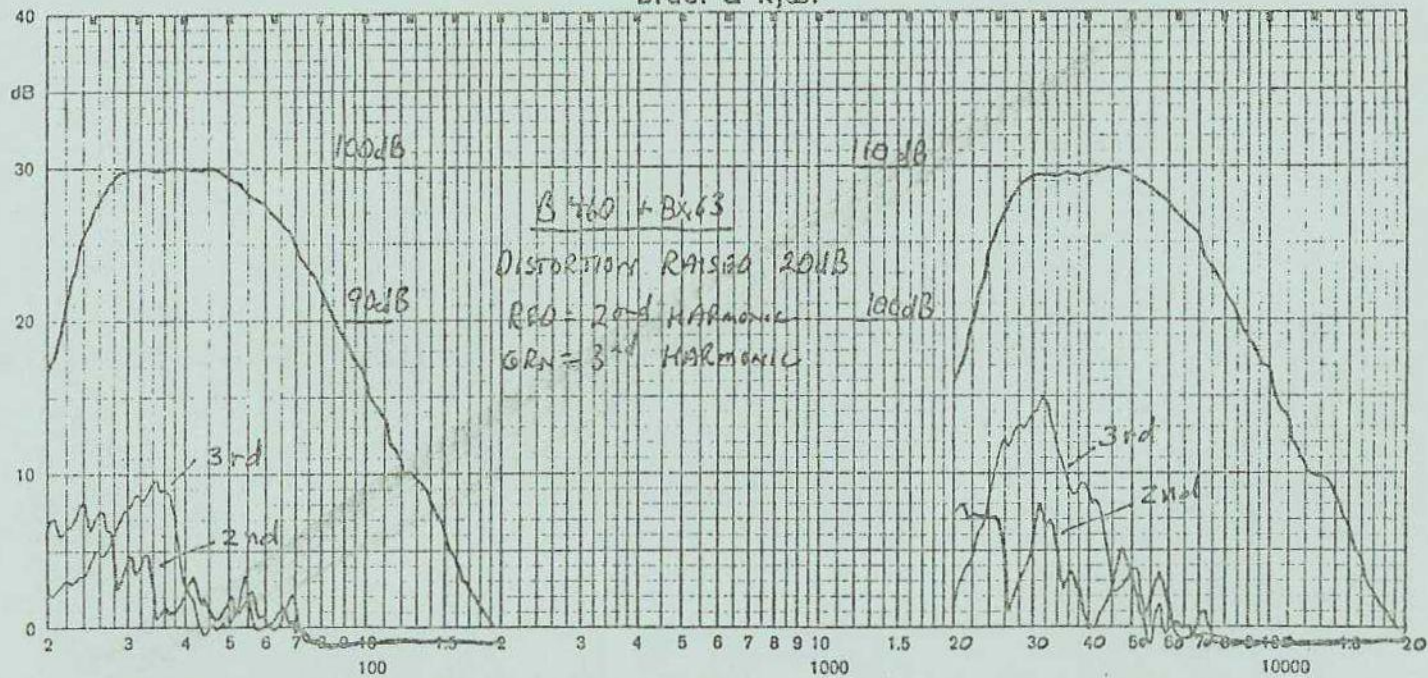
System characteristics:

Driver in vented enclosure is third-order quasi-Butterworth alignment. System resonance is 46 Hz, enclosure tuned to 26 Hz. Active low-pass circuit in network has maximum boost at 26 Hz, falling at 12 dB/octave below, and 12 dB/octave above. With network, system is quasifourth order. Maximum network boost is at vent tuning frequency for minimum cone movement.

With network, system is flat to 30 Hz, -3 dB at 25 Hz, under  $2\pi$  steradian loading conditions.

# B460 Response Through BX63 Network

Brüel & Kjær



3 watts at 1 meter

30 watts at 1 meter

# BX63 Electrical Response

Brüel & Kjær

