

# JBL Professional Series

## Model 4320 studio monitor

**Professional two way loudspeaker components:**

**15" long-excursion low frequency driver and horn-loaded high frequency assembly with acoustic lens.**

**Smooth response, uniform spatial distribution, and high power-handling capacity.**

**Computer designed crossover network with 12 dB per octave attenuation and adjustable high frequency intensity.**

**Rigidly constructed enclosure provides optimum acoustic loading for the loudspeaker components, yet is modest in size.**

**120 watt power capability.**

*Professional audio consultants and engineers are invited to compare the JBL 4320 with other loudspeakers, both on the basis of acoustical measurements and extended listening tests.*

This JBL loudspeaker system was designed to meet the need for a professional monitor capable of reproducing the full frequency and dynamic range of master recordings. It is equally well suited to the demands of medium sized auditoriums, theaters, and other installations requiring sound reproduction or reinforcement of the highest quality. In sound reinforcement applications, the absence of response peaks or directional lobes means that greater intensity can be obtained without acoustic feedback.

The JBL logo is displayed in white, bold, sans-serif capital letters on a dark grey square background.

# JBL Model 4320 studio monitor

## Enclosure

The acoustical enclosure of the JBL 4320 system is made of  $\frac{3}{4}$ -inch plywood for maximum rigidity with minimum weight. Joints are lock-mitered and wood-welded. Interior surfaces are heavily braced and padded to prevent unwanted resonance. For maximum structural integrity, there are no demountable panels; loudspeaker components mount directly from the front of the baffle board. A pair of ducted ports give added acoustic loading and increased efficiency in the 30-50 Hz frequency range.

## 2215 Bass Driver

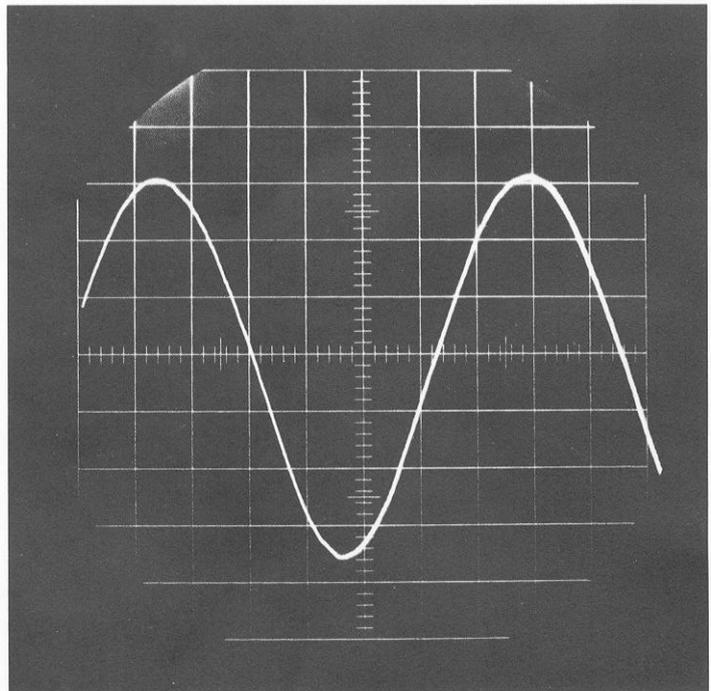
Low frequencies are reproduced by this massive 15-inch loudspeaker having a 4-inch edgewound copper ribbon voice coil operating in a magnetic field of 11,000 Gauss. Total magnetic flux in the voice coil gap is 450,000 Maxwells. Because of the sophisticated magnetic circuit and voice coil configuration, the coupling coefficient of the 2215 is extremely high: 10 watts of DC into the voice coil produces approximately 5.5 pounds of force acting on the cone. The cone itself is terminated in a ring of molded internally-damped foam developed by JBL. This exclusive termination allows cone excursions greater than  $\frac{1}{2}$ -inch while at the same time acting as a non-reflective acoustic termination for sound waves travelling through the cone. Model 2215 has a magnetic circuit weighing  $19\frac{1}{2}$  pounds, a free-air cone resonance of 20 Hz, and a BI factor of  $2.2 \times 10^7$  dynes per abampere.

## 3110 Frequency Dividing Network

Imperceptible transition between low and high frequency transducers is made by a dividing network whose circuit was determined by computer design and refined through extended acoustic tests with the components of the 4320 system. The network includes special reactive components to compensate for the complex impedance characteristics of the transducers and to maintain the desired 12 dB per octave slope in terms of actual acoustic output. A 3-position switch allows the intensity of the high frequency driver to be balanced to the liveness of the listening environment. The attenuation circuit uses a tapped auto-transformer rather than resistive pads so that coupling between amplifier and transducer is not adversely affected by the setting of the control.



Loudspeaker components of Model 4320.



This unretouched photo shows the actual acoustic output of the 4320 when driven by 75 watts of continuous sine wave power at a frequency of 30 Hz. A calibrated laboratory microphone was used to pick up the sound from 4320. The signal from the microphone was connected directly to an oscilloscope and the trace photographed.

Naturally, sustained performance at this ear-splitting intensity would never be required during normal use. A 75 watt sine wave signal represents a far more difficult job for the speaker than its rated power capacity of 120 watts program material. Yet it can be seen that the acoustic output is an almost perfect sine wave. Moreover the rugged edgewound copper ribbon voice coil and sophisticated suspension enable the 2215 woofer to operate indefinitely without breakdown, even at highest power levels.

### 2420 High Frequency Driver

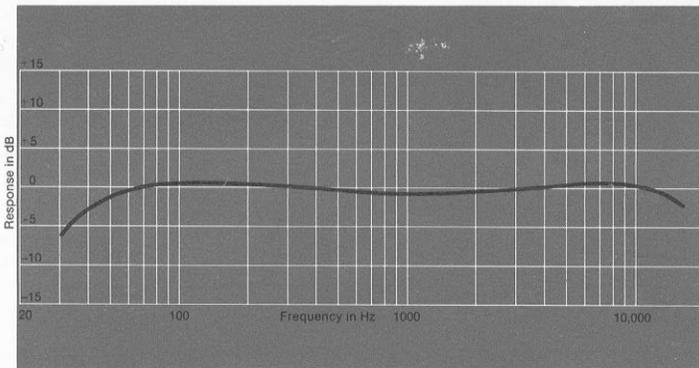
Above a crossover frequency of 800 Hz, the 2420 high frequency driver operates smoothly through a range greater than 4 octaves. The diaphragm of the 2420 is hydropneumatically drawn to shape from 0.002-inch dural alloy and is driven by a 1 3/4" edgewound aluminum ribbon voice coil operating in a field of 19,000 Gauss. A pure silver impedance-controlling ring counteracts the voice coil inductive component, resulting in greatly improved efficiency through the highest octave of audible frequencies. Energy from the diaphragm is conducted to the horn throat through concentric channels of a mathematically determined phasing plug; sound waves are conducted to the horn throat in constant phase relationship.

### 2307 Horn-Lens Assembly

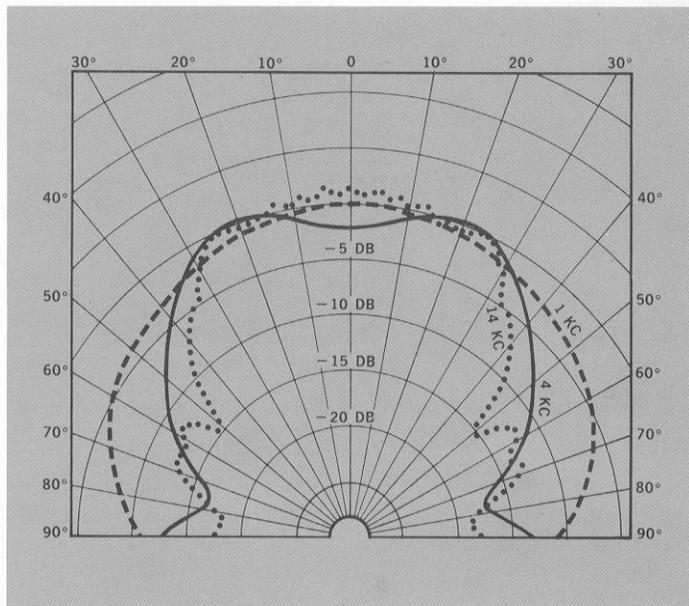
The 2420 is coupled to a heavy cast aluminum exponential horn with slant-plate acoustic lens. The 2307 lens is designed according to advanced wave propagation theory and acts exactly as a divergent optical lens. The formula for hyperbolic cylindrical lenses is used to determine the basic parameters of the 2307. It employs 11 plates set at an angle of 38°, spaced 0.25 inches center to center. Because of the precisely calculated hyperbolic curvature of the front of the lens, sound is spread evenly through a 120° lateral angle, but restricted to approximately 40° in the vertical direction.

### Test Parameters

The accompanying graphs and specifications were compiled from measurements made under standard laboratory test conditions. The loudspeaker system was mounted flush in the center of a large flat baffle in an anechoic environment. A calibrated condenser microphone was suspended at a known distance from the sound source, sufficiently far to be safely out of the near field. All associated electronic equipment was checked and calibrated before tests were run.



Response contour of system. Measured on-axis response of a typical production 4320, including all peaks and dips, does not deviate more than 2 dB from the above curve.



Polar response of 4320 in the horizontal plane. The above curves were traced by an automatic recorder with the high frequency assembly located in a free-field environment. Power fed to the high frequency driver was adjusted to give the same 0 dB reference in all cases.

Note that even without help from the adjacent reflecting surfaces which are present when the assembly is installed in a cabinet, the distribution pattern is extremely smooth over a wide horizontal angle. There are no prominent lobes, and all three curves follow each other closely even though they cover a frequency range of almost 4 octaves.

In free space a listener sitting 45° off axis would hear almost exactly the same overall response as someone directly on axis. The reflected sound present in any normal listening environment effectively swamps out even these minor differences, so that coverage is uniform through a lateral angle of approximately 120°.

JBL

Professional Series

## Architectural specifications

The loudspeaker system shall consist of a 15" low frequency loudspeaker, horn-loaded high frequency driver, and frequency dividing network installed in a tube-ported enclosure. Loudspeakers, network and enclosure are to be manufactured and assembled by a single manufacturer. Components shall be removable from the front of the enclosure.

The low frequency loudspeaker shall have a 4-inch edgewound copper ribbon voice coil operating in a magnetic field of at least 11,000 Gauss, with 450,000 Maxwells total flux. The magnetic assembly shall weigh at least 19 pounds.

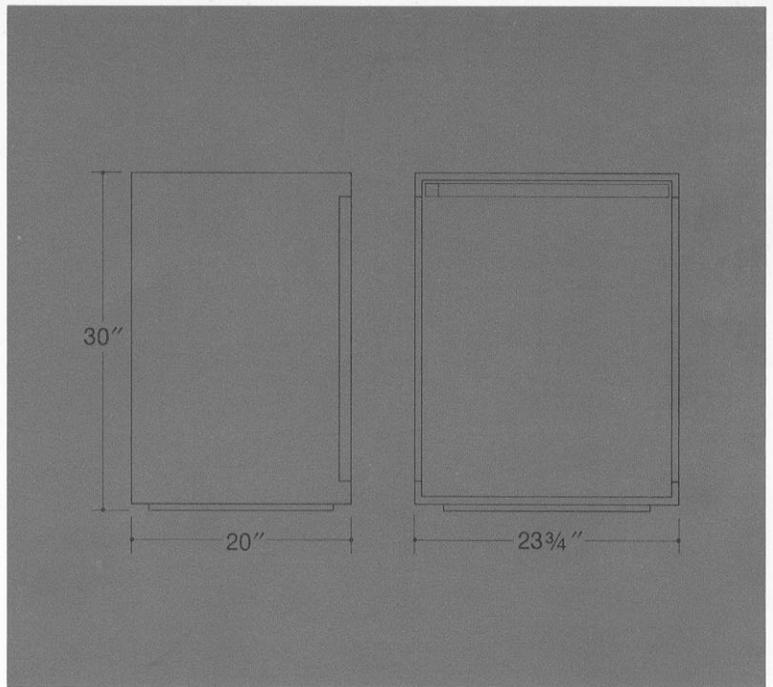
The frequency dividing network shall have a cross-over frequency of 800 Hz and shall be of the parallel L-C type, with additional components to compensate for the complex impedance characteristics of the transducers. High frequency attenuation shall be accomplished with a tapped autotransformer.

High frequencies shall be reproduced by a horn-loaded compression driver with a duraluminum diaphragm and 1 $\frac{3}{4}$ " edgewound aluminum ribbon voice coil operating in a magnetic field of at least 19,000 Gauss. A pure silver impedance-controlling ring shall be included to increase efficiency at high frequencies. The horn shall be made of heavy cast aluminum and shall be coupled to a slant-plate acoustic lens which distributes sound evenly through a horizontal angle of 120° and a vertical angle of 40°.

With the high frequency attenuation control set for flattest response, the on-axis frequency response of the complete system shall be  $\pm 3$  dB from 40 to 15,000 Hz. Power capacity shall be no less than 120 watts program material and 60 watts continuous sine wave. The EIA sensitivity of the system (30 feet on-axis with one milliwatt input) shall be approximately 48 dB. These specifications include the effects of the dividing network and any interaction between transducers. Performance claims which are extrapolated from characteristics of individual loudspeakers are not acceptable.

The enclosure shall be solidly constructed of  $\frac{3}{4}$ -inch stock with all joints tightly fitted and glued. Overall dimensions shall be no greater than 30 inches high by 24 inches wide by 20 inches deep. Finish shall be textured gray with charcoal grille fabric.

The system shall be JBL Model 4320.



## Model 4320 specifications

Power capacity:	60 watts RMS, 120 watts program
Crossover frequency:	800 Hz
Nominal impedance:	Designed to operate from 8 to 16 ohms. (Minimum impedance is approx. 12.5 ohms at 175 Hz.)
Dispersion:	45° x 120°
Frequency response:	30 Hz to beyond audibility; $\pm 3$ dB 40 to 15,000 Hz
EIA sensitivity:	48 dB (30 feet with 1 milliwatt input)

NOTE: Unlike many "theatre type" loudspeaker whose sensitivity peaks in the mid-range, the JBL studio monitor exhibits substantially the same sensitivity through the full range of audible frequencies. Measured sensitivity below 500 Hz or above 2000 Hz may be considerably greater than that of other systems with higher EIA sensitivity ratings.

Finish:	Textured grey with charcoal grille fabric
Dimensions:	30" x 23 $\frac{3}{4}$ " wide x 20" deep
Weight:	86 lbs.