Professional Series
Model 4320 Studio Monitor

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

Rugged, professional components: 15-inch long-excursion low frequency loudspeaker, horn-loaded compression driver with acoustic lens, computer-designed frequency dividing network.

Rigidly constructed enclosure provides optimum acoustic loading for the loudspeaker system, yet its moderate size allows maximum versatility.

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.

The JBL 4320 is a professional monitor loudspeaker system designed to reproduce the extended frequency and dynamic ranges of master recordings. It is equally well suited for small auditoriums, theaters or other similar high quality sound reinforcement applications.

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Low Frequency Loudspeaker

Bass reproduction is accomplished by a 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. The sophisticated magnetic circuit and voice coil configuration produce an extremely high coupling coefficient: 10 Watts of direct current across the voice coil produce approximately 5.5 pounds of force acting on the cone. The cone itself is terminated by a special surround developed by JBL. This exclusive material allows cone excursions greater than one-half inch, increasing bass response and providing a non-reflective acoustic termination for sound waves traveling through the cone. The magnetic circuit weights 19.5 pounds, free-air cone resonance is 25 Hz and the Bl factor is 2.2×10^7 dynes per abampere.

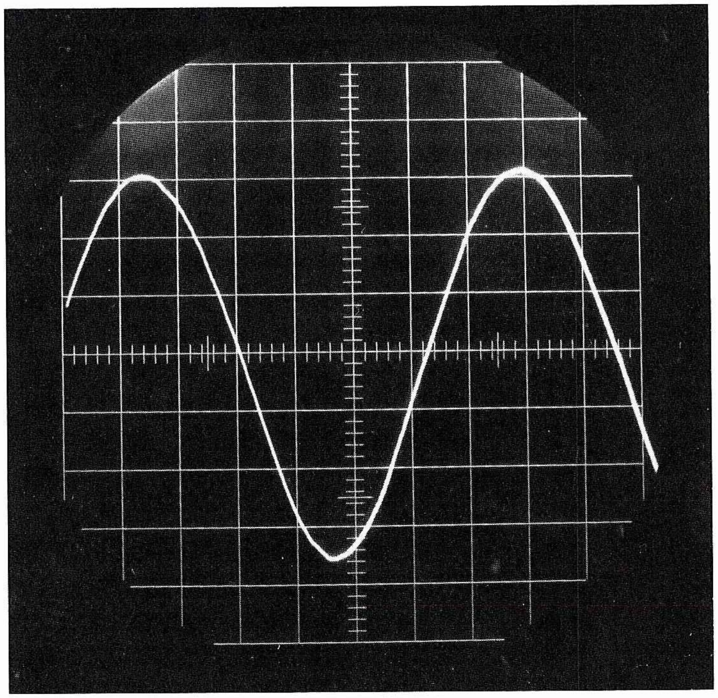
High Frequency Compression Driver

Above the crossover frequency of 800 Hz, a high frequency compression driver operates smoothly through a range greater than four octaves. The diaphragm, pneumatically drawn to shape from 0.002-inch dural alloy, is driven by an edgewound aluminum ribbon voice coil having a diameter of 1.75 inches, operating in a field of 19,000 gauss. A pure silver impedance-controlling ring counteracts voice coil inductance at high frequencies, resulting in greatly improved efficiency in this region. Energy from the diaphragm is directed through the concentric channels of a mathematically determined phasing plug, assuring that the wavefront arrives at the horn throat in the proper phase relationship.

Horn/Lens Assembly

The compression driver is coupled to a heavy cast aluminum exponential horn and slant-plate acoustic lens. The lens is designed according to advanced sound wave propagation theory and acts exactly as a divergent optical lens. Basic parameters of the device were derived using the formula for hyperbolic cylindrical lenses. It employs 11 plates set at an angle of 38°, spaced 0.25 inches center-to-center. The precisely calculated hyperbolic curvature of the projecting surface spreads sound evenly through a 120° lateral angle, restricting dispersion to approximately 40° in the vertical plane.

Loudspeaker system components of the 4320 Studio Monitor.

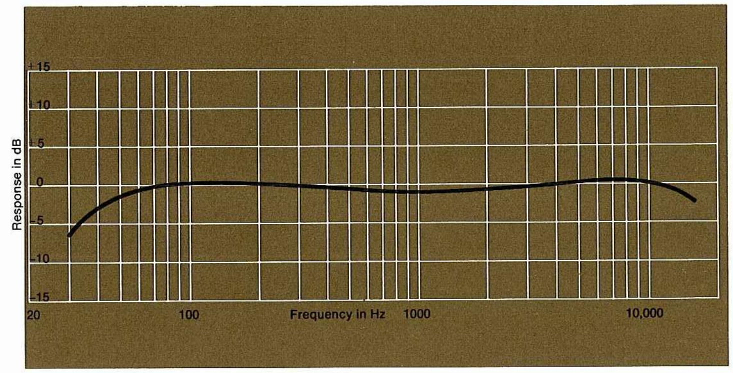


This unretouched photo shows the actual acoustic output of the low frequency unit when driven by 75 Watts of continuous sine wave power at a frequency of 30 Hz. A calibrated laboratory microphone was used to pick up the sound from the loudspeaker system. The signal from the microphone was connected directly 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 test signal represents a far more difficult job for the loudspeaker 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 low frequency loudspeaker to operate indefinitely without failure, even at highest power levels.

Frequency Dividing Network

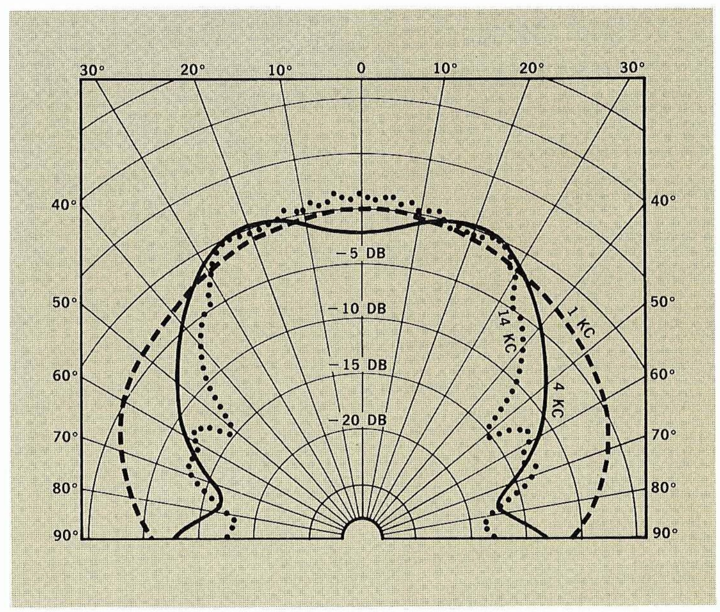
Imperceptible transition between low and high frequency transducers is achieved by a dividing network having a circuit determined by computer and refined through extended acoustic tests with the loudspeaker system components. The network includes special reactive components to compensate for the complex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



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.

Enclosure

As in all JBL loudspeaker systems, the transducers, frequency dividing network and enclosure are designed and tested to function as a single integrated system. The acoustical enclosure of the 4320 Studio Monitor is made of ¾-inch paneling for maximum rigidity with minimum weight. All joints are lock-mitered and wood-welded, interior surfaces are heavily braced and padded to prevent panel resonance and reflections. For maximum structural integrity, there are no removable panels; loudspeaker components mount directly from the front of the baffle board. A pair of ducted ports provide acoustic loading and increased efficiency in the 30-50 Hz. region.



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 masks even these minor differences, so that coverage is uniform through a lateral angle of approximately 120°.

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.

Architectural Specifications

The loudspeaker system shall consist of a 15″ low frequency loudspeaker, horn-loaded high frequency compression 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.

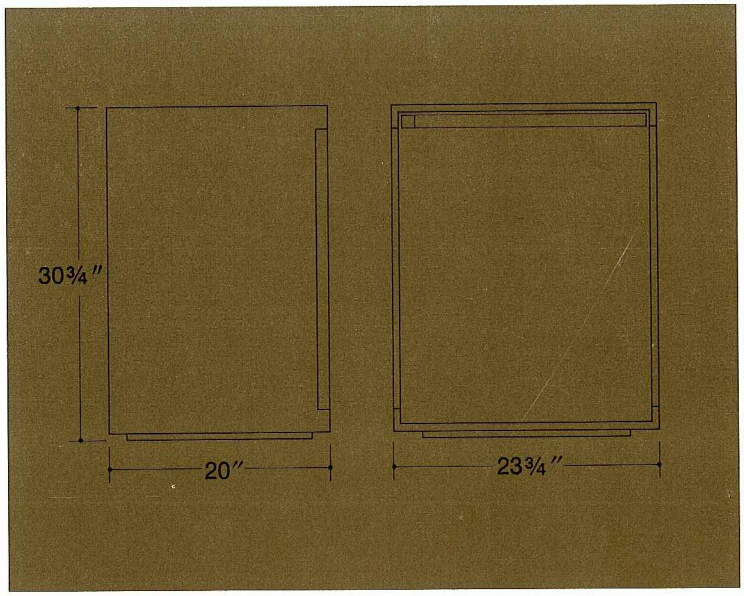
The frequency dividing network shall have a crossover frequency of 800 Hz and shall be of the parallel L-C type, with additional components to compensate for the complex impedance characteristics of the transducers. High frequency attenuation shall be accomplished with a tapped autotransformer.

High frequencies shall be reproduced by a horn-loaded compression driver with a dural diaphragm and 1¾″ 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 ±3 dB from 40 to 15,000 Hz. Power input 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 46 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 ¾-inch stock with all joints tightly fitted and glued. Overall dimensions shall be no greater than 31 inches high by 24 inches wide by 21 inches deep. Finish shall be oiled walnut or textured gray with charcoal fabric grille.

The system shall be JBL Model 4320.



Specifications

Power Input:	60 Watts sine wave, 120 Watts program
Crossover Frequency:	800 Hz
Nominal Impedance:	16 ohms
Minimum Impedance:	12.5 ohms at 175 Hz
High Frequency Dispersion:	120° horizontal, 40° vertical
Frequency Response:	40-15,000 Hz ±3 dB
EIA Sensitivity:	46 dB

Note: Unlike many "theater type" loudspeaker systems that exhibit sensitivity peaks in the midrange, the JBL Studio Monitor provides 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:	Oiled walnut or textured gray with charcoal fabric grille
Dimensions:	30¾″ x 23¾″ x 20¼″ deep 78 x 60 x 51 cm deep
Net Weight:	97 lbs 44 kg
Shipping Weight:	115 lbs 52 kg

Model 4325 Studio Monitor

The 4325 is housed in the same enclosure as the 4320 and is offered in the same finishes. The 4325 utilizes a low frequency loudspeaker that provides a slight emphasis in the midrange region and a dividing network having a 1200 Hz crossover frequency.

JBL

Professional Series

Professional Equipment Division

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The JBL 4320 Studio Monitor

Originally designed for Capitol Records in Hollywood, the 4320 was first designated as the C50SMS7 system. It was introduced in 1963, and it soon became a standard monitor within the EMI Recording corporate structure worldwide. Subsequent 3-way versions were produced. The familiar cream grey spackle finish of the enclosure supported a light mesh grille, later to be replaced by the black stretch fabric version shown here. The wide side relief features of the grille were necessary to accommodate the ±80-degree radiation characteristics of the horn/lens combination.

Acoustically, the combination of a woofer with smooth response up to about 800 Hz and a horn/lens combination extending the response uniformly beyond 15 kHz was almost ideal. Each exhibited flat on-axis response over its bandwidth, and the dividing network was virtually "from the textbook" in its simplicity.

Much of the success of the 4320 lay in the simple fact that it was an integral system which included a dedicated enclosure that was optimum in both volume and tuning. At the time it was making its ascendancy in the industry, both the Altec 604 and the Tannoy Gold, the other two major contenders for first place, were sold as individual drivers. As such, they were mounted in a wide variety of enclosures with various volumes and tunings, and with little regard for optimum system low frequency alignment.