

M 9 5 0 0 M O N I T O R L O U D S P E A K E R S

O W N E R S M A N U A L

*M9500*



## GENERAL SYSTEM DESCRIPTION

The JBL M9500 monitor loudspeaker system represents a refinement of the principles that have guided JBL's high-level monitor system design over the last thirty years.

In keeping with contemporary monitoring practice, the system is essentially of two-way design. A horn-compression driver section covers the frequency range from 650Hz to 20kHz. Located above and below the high-frequency section are mirror-imaged low-frequency transducers in ported enclosures. The stereo pair of loudspeakers exhibits both vertical and horizontal symmetry for effective "point source" radiation and for accurate stereophonic imaging. All transducers make use of shielded neodymium magnets, and the systems can be used in proximity to video monitors with no interference.

The M9500 system uses stand-alone dividing networks that facilitate various electronic options, including bi-wiring, tri-wiring, and bi-amplification. The networks are designed around the finest components available and make use of dc bias on the capacitors for greater linearity.

A single M9500 system is capable of producing sine wave output levels of 110 dB Lp at one meter with extremely low distortion. In terms of wide band program, this translates into levels of 120 dB Lp for the stereo pair at normal listening distances of 2 and 3 meters.

The enclosures are made of thick sections of medium-density fiberboard, liberally braced, and have an attractive, scuff-resistant finish.

### ***Unpacking and Inspection***

The complete M9500 system is shipped in eight containers, as detailed below:

- 2 — Lower low-frequency enclosures
- 2 — High-frequency/horn enclosures
- 2 — Upper low-frequency enclosures
- 1 — Dividing networks (2 networks in one package, including 6 hook-up cables and 4 9-volt batteries)
- 1 — Low-frequency grilles  
(4 in one package)

Make sure that you have all containers. Unpack them carefully and inform your JBL dealer of any sign of damage. It is recommended that you save the packaging for future use.

## System Setup

The M9500 systems are modular, each consisting of a stack of three separate enclosures. The larger of the bass enclosures are placed at the bottom, and the high-frequency/horn modules stack on top and are aligned by the screws that protrude on the bass section. The smaller bass modules are placed on top of the high-frequency modules and are similarly aligned.

We recommend that you do not assemble the M9500 systems until you have determined their best location in your listening room or control room. In general, the listening angle for best stereo imaging should be in the range from 45 to 60 degrees and the loudspeakers should be placed no closer than about 25 or 30 cm (10" or 12") from the wall behind them. Sidewalls should be somewhat farther away, and the loudspeakers should be toed inward toward the primary listening position. The room itself should be quiet, well-damped, and free of obvious flutter echoes or standing waves.

Connect the loudspeakers to the networks using the cables provided. Note that there are different cables for high-frequency and low-frequency hookup; they cannot be intermixed. For positive contact, insert the Speakon® connectors and turn them one-eighth turn clockwise.

## Electronic Options

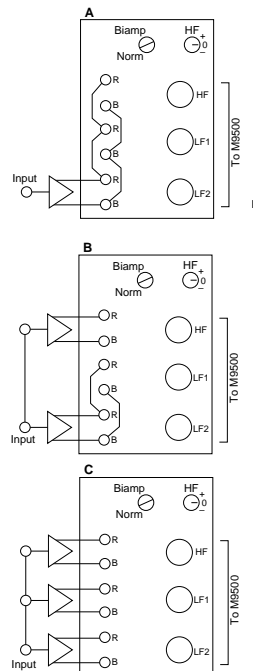
Your next concern is the amplifier/ loudspeaker operating mode. The various hookup options are shown in Figure 1. We will describe each of these options:

**Option A, single full-range amplifier.** This mode of operation requires a relatively large, high-quality amplifier capable of delivering up to 800 watts per channel into 4-ohms. Note that all sections of the network are connected in parallel with the straps provided.

**Option B, bi-wiring.** In this mode, identical power amplifier sections are fed full-range program; one amplifier is connected to the high-frequency portion of the system, and the other is fed to the low frequency sections in parallel. Many users will use a large stereo amplifier to drive the low-frequency sections and a smaller one for the high-frequency sections. Make sure that the stereo amplifier used for the paralleled low-frequency sections can deliver the necessary power into 4 ohms.

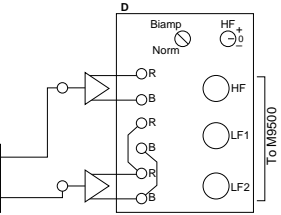
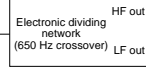
**Option C, tri-wiring.** This mode of operation is similar to B, but with each low-frequency section driven by its own amplifier. In this case, each low-frequency amplifier section will look into 8 ohms.

**Figure 1.** Electronic hookup options; views of the rear panel of the dividing network. A, single full-range amplification; B, bi-wiring with two amplifiers; C, tri-wiring with three amplifiers; and D, biampification with external electronic dividing network and separate high- and low-frequency amplifiers.



**Option D, biamplification.** This mode of operation requires a dedicated electronic dividing network crossing over at 650 Hz. We recommend the JBL DX-1 with internal compensation made for the M9500 system. If this mode is used, make sure that the screwdriver adjustment on the back of each network is set in the "biamp" position.

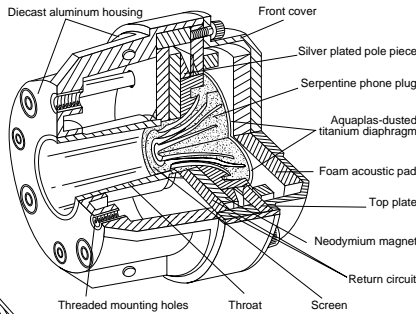
High-frequency trim switches on the back of the networks provide three settings (zero, plus, and minus) so that the systems can be trimmed for the acoustical characteristics of the listening space.



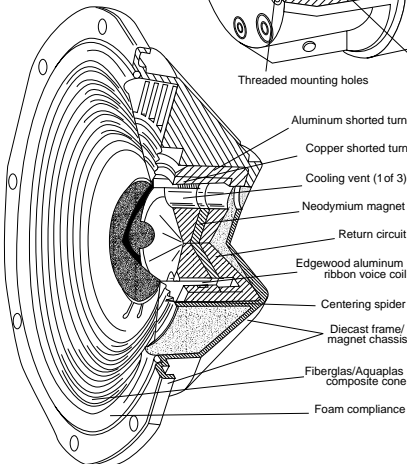
Regardless of the operating mode you choose, we recommend that only the finest hookup wire be used between the amplifiers and dividing networks. We recommend that the wire size be no smaller than 3.3 square millimeter cross-section (#12 AWG). The inputs to the networks can accommodate spade lugs, pins, bare wire, or individual banana connectors.

The internal 9-volt battery that is used to bias the capacitors will normally last at least 5 years. You may test it by pressing the gold logo on the front of the network. If the LED on the front of the network illuminates, the battery is functional and need not be replaced.

## The Transducers



**Figure 2.** Cutaway view of JBL 475Nd high-frequency compression driver. Note the curved (equalized) paths from the diaphragm to the driver's output.



**Figure 3.** Cutaway view of JBL 1400Nd low-frequency transducer. Note both aluminum and copper shorting rings.

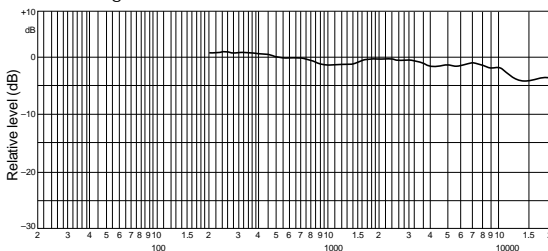
The JBL model 475Nd compression driver used in the M9500 has a smooth titanium dome 101 millimeters in diameter that has been lightly coated with Aquaplas™ damping compound. Its aluminum ribbon voice coil operates in a magnetic flux field of 1.65 tesla (16,500 gauss). Mid-band efficiency is 20%, while at the peak value of driver impedance it is in excess of 50%. The driver uses JBL's Coherent Wave™ phasing plug, which provides equalized path lengths from all sections of the diaphragm to the driver's output. The driver is mounted on the H9500 horn, a design used only in this system that provides smooth loading down to 500 Hz and exhibits consistent horizontal dispersion over its operating range.

There are two JBL model 1400Nd low-frequency transducers in each loudspeaker system. A single 1400Nd is capable of handling instantaneous input signals of 600 watts, corresponding to a midband peak output of 118 dB Lp at a distance of one meter. The transducer's second and third harmonic distortion have been reduced through the use of JBL's traditional aluminum shorting ring at the base of the pole piece, as well as through the use of a copper shorting ring on the top plate adjacent to the voice coil. The transducers make use of JBL's Vented Gap Cooling™ in which forced air, generated by cone motion, removes heat produced by the voice coil. Each driver is mounted in its own ported enclosure, and the two enclosures are "stagger tuned" to provide smoother and more extended low-frequency response.

Cutaway views of the high-frequency and low-frequency transducers are shown in Figures 2 and 3.

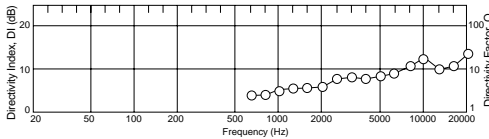
### Typical System Performance Measurements

The high-frequency response of the M9500 system was carefully established by making a series of measurements over frontal angles of 60° in both vertical and horizontal planes. This allows for optimal listening over a wide area. The frequency response averaged over the 60° horizontal and vertical angles, measured from 200 Hz to 20 kHz, is shown in Figure 4. Here, the network High Frequency trim is set in its zero position. The slight downward trend was incorporated, based on extensive listening tests to contemporary pop/rock and classical recordings.



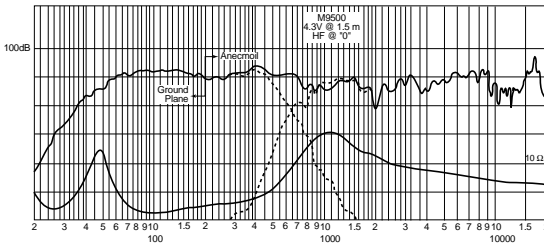
**Figure 4.** Averaged frontal angle response (60°, horizontal and vertical) of M9500 from 200 Hz to 20 kHz.

The directivity index (DI) of the H9500 horn is shown in Figure 5. The smoothly rising DI is a consequence of the gradual narrowing of the vertical dispersion angle above 2 kHz and contributes to the overall flatness of the high-frequency response of the system.



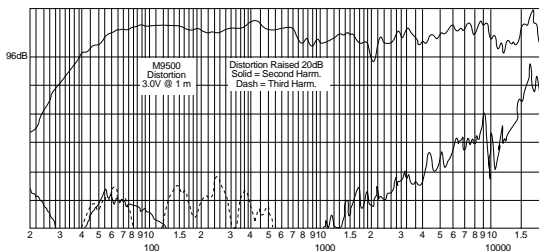
**Figure 5.** Plot directivity index (DI) and directivity factor (Q) of the H9500.

Overall system on-axis pressure response and impedance are shown in Figure 6. The contributions of the paralleled low-frequency sections and the high-frequency section are shown individually along with their acoustical summation. The overall slopes in the crossover region are a combination of electrical (network) and acoustical response.



**Figure 6.** On-axis response of M9500. Individual contributions of paralleled low-frequency transducers and high-frequency section are shown, along with their summation. The impedance curve is also given, showing a minimum value of 3 ohms in the 100 Hz range.

The second and third harmonic distortion of the system is shown in Figure 7. Here, the system is driven with sine wave input to produce an output of 96 dB Lp at a distance of 1 meter. An output of 96 dB with a sine wave input corresponds to extremely high system output with wide band program material. Distortion curves have been raised 20 dB, and the values seen here lie well below 1% for the lowest frequencies up to 4.5 kHz, reaching a value of only 1.6% at 10 kHz. Not many loudspeakers can demonstrate such low levels of distortion as shown here.



**Figure 7.** Second and third harmonic distortion for fundamental of 96 dB Lp at a distance of 1 meter. (Distortion raised 20 dB)

## Care and Maintenance of the System

Your M9500 monitors should give years of trouble-free service. Normally, the only routine maintenance will be cleaning. The grilles may be cleaned of dust gently with a vacuum cleaner using a brush attachment. If there should be stains on the grille, a soft bristle brush moistened with a dilute mixture of water and dishwashing detergent may be used. The same mixture may be used for cleaning the enclosure finish itself if it has become smudged.

As mentioned before, the 9-volt batteries in the dividing networks will last perhaps as long as their normal shelf life. You may expect them to last at least 5 years. If the LED no longer lights, remove the acrylic door on the front of the network and replace them.

## System Specifications

### Acoustic and Electrical Specifications:

<i>Sensitivity:</i>	95 dB for 2.83 V @ 1 meter
<i>Rated Impedance (LF parallel):</i>	4 Ohms
<i>Minimum Impedance:</i>	3.0 Ohms @ 100 Hz
<i>Frequency Response:</i>	35 Hz to 20 kHz (half space)
<i>Crossover Frequency:</i>	650 Hz
<i>System Polarity:</i>	EIA (positive voltage to red terminal produced outward cone motion)

### System Components and Physical Specifications:

<i>Low-Frequency Transducer:</i>	1400 Nd
<i>High-Frequency Transducer:</i>	475 Nd
<i>Horn Assembly:</i>	H9500
<i>Dividing Network:</i>	N9500
<i>Enclosure Volumes:</i>	78 liters (2.8 cu ft) 35 Hz tuning (upper LF) 115 liters (4.1 cu ft) 28 Hz tuning (lower LF)
<i>System Dimensions:</i>	140 mm H x 330 mm W x 403 mm D (55"H x 15.13"W x 15.88"D) Total depth including horn 521 mm (20.5")
<i>Weight:</i>	38.2 kg (84 lbs) upper LF 54.5 kg (120 lbs) lower LF 37.3 kg (82 lbs) horn assembly

JBL continually strives to improve its products. New materials, production methods and design refinements are introduced into existing models without notice as a routine expression of our design philosophy. For this reason, JBL M9500 Series Loudspeakers may differ in some respect from their published specifications and descriptions, but will always equal or exceed the original specifications unless otherwise stated.



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Printed in USA on recycled paper 9/95  
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