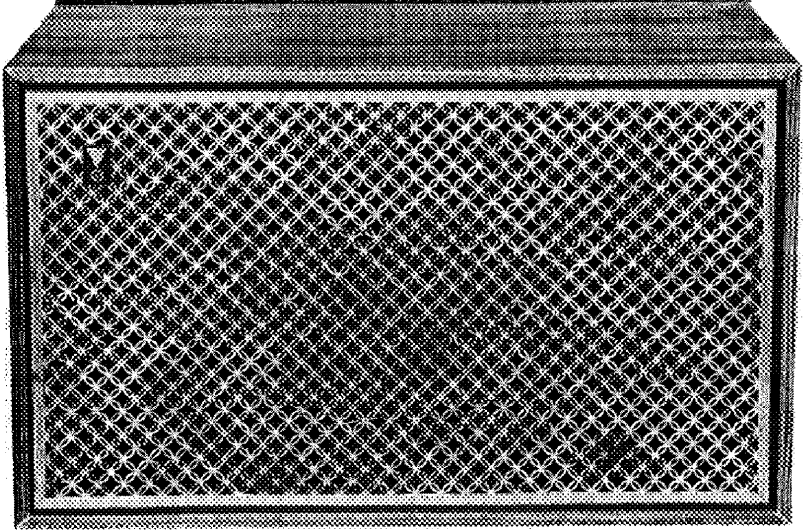
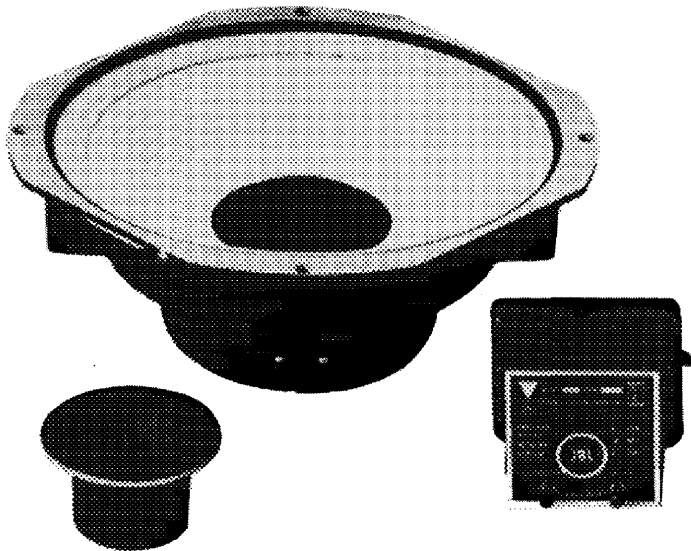


**JBL**

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lancer 99,  
athena S99 and SC99





The Lancer 99 and Athena S99 consist of identical transducers and enclosures. The Lancer 99 is furnished only **with the JBL SE408S (or SE408SE — export model) Energizer installed** and as a matched stereo pair of loudspeaker systems. Because the audio power source in the Lancer 99 is already installed (on the back panel — out of sight), no separate stereo power amplifier is required. All that is needed to complete the electronics portion of the system is a high quality stereo preamplifier. On the other hand, the Athena is available singly or in stereo pairs for use with separate integrated amplifiers or receivers.

The Athena and Lancer 99 are powerful and accurate enough to be used as recording studio monitors, small enough to mount on a shelf or wall brackets, or even on a decorator's bench. Reproduction from either a self-energized pair of Lancer 99's or a pair of Athena's offers spaciousness and clarity of sound associated with JBL's more imposing loudspeaker systems. With the Energizer installed, unparalleled performance is assured since the electrical characteristics are specially tailored to enhance acoustical reproduction.

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## Precision craftsmanship

Your JBL loudspeaker system has been crafted with the painstaking care afforded the finest musical instruments, and like such instruments, it will not deteriorate with age or use. It will continue to deliver unexcelled realism without loss of quality, without adjustment, without attention. By following the few simple recommendations in this booklet, you will be assured of performance which will remain clean and fresh year after year.

## Warranty

JBL products are covered by a two-year warranty and are guaranteed against defects in material and workmanship. Should it become necessary, JBL will replace defective parts and make appropriate repairs under this warranty. Of course, the warranty does not cover damage caused by misuse, accident or neglect. JBL retains the exclusive right to make such determination on the basis of factory inspection.

*In addition to the established two-year warranty, JBL will, at its option, repair the speakers free of charge during their entire normal life if factory inspection discloses a manufacturing defect.*

Should your system ever require service, return it to the JBL dealer from whom it was purchased. If it is impossible to contact your dealer, please write directly to JBL describing the difficulty as fully as possible. Products returned to the factory must be sent prepaid and will not be accepted unless written authorization has first been obtained.

To establish the warranty, be sure to fill out and mail the enclosed warranty card immediately.

## Connections to Lancer 99

This section applies **only** to the Lancer 99, which is equipped with the JBL Energizer.

The loudspeakers installed in the same enclosure with the Energizer (L99 Master) are already connected to the Channel B Energizer output terminals. All that remains is to connect the second loudspeaker system and your preamplifier to the Energizer. (See drawing page 3.)

The two 30 foot shielded audio cables supplied with the Lancer 99 connect from the Channel A and B inputs of the Energizer to the Channel A and B outputs of your preamplifier, respectively. Then connect the 14 foot color-coded, prestripped #18 gauge wiring from the Lancer 99 Master to the other enclosure... red to red and black to black. The red wire connects the red Channel A Energizer terminal to the red terminal on the dividing network located on the back of the other cabinet. The black wire connects the black Channel A Energizer terminal to the black terminal on the dividing network. The terminals (binding posts) are spring-loaded. Simply depress the cap, insert the bare end of the wire in the opening, and release the cap. For more detailed information about connecting and operating the Energizer, see pages

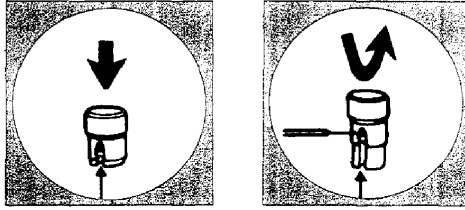


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8 through 12 in the Energizer owner's manual supplied with the Lancer 99. Be sure to read the manual carefully **before** operating the system.

## Connecting the JBL Athena

Connections are made from the pushbutton terminals on the dividing network located on the back side of each enclosure to your audio power source, as explained in the following paragraph.



## Wire size

Eighteen gauge insulated wire is the minimum size for speaker-amplifier connections up to 50 feet or so. Beyond this distance, a heavier gauge of insulated wire is recommended. Ordinary commercial lampcord is perfectly satisfactory for almost any connection likely to be made in a home installation. If you use plastic covered lampcord, you can keep track of which wire is which by noting that one of the plastic jackets is smooth while the other has a distinct ridge. By calling the ridged wire "red" and the smooth wire "black," you can make connections as if you were using color-coded wire.

First, strip the insulation from the very end of each wire . . . only  $\frac{1}{8}$ -inch or so. Then push down the terminal cap, insert the bare end of the wire in the hole and release. The black terminal connects to the amplifier "common" or "ground," and the red terminal connects to the amplifier 8-ohm tap.

If your amplifier does not have an 8-ohm output; or if for any reason you should want to try a different impedance, you can connect the loudspeaker system to a 4- or 16-ohm output. The specified 8-ohm rating of the system is a nominal figure which merely suggests the connection which should give the most efficient power transfer between the amplifier and the loudspeaker.

## Adjusting the system

A dividing network is located in back of each cabinet and has a control knob so that you can make the sound brighter or mellower to suit your personal listening taste and the particular acoustics of your listening room. It adjusts the amount of power fed to the high frequency unit and has no effect on the frequency **range** of your system or the crossover frequency. Turning the knob clockwise gives greater emphasis to the treble range.

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The proper setting should be determined while the system is reproducing normal program material and with the tone controls on your amplifier or pre-amplifier set at their normal positions. If musical reproduction seems shrill or unnaturally brilliant, turn the control counterclockwise to a lower setting. Once the control is set for best overall results, it need not be changed. You can compensate for differences in individual recordings with your amplifier or preamplifier controls.

In a room which has a lot of overstuffed furniture, carpeting, heavy drapes, etc., the control probably will have to be almost all the way up. In a room which is acoustically "live," where reflective surfaces are facing each other, the control will have to be turned down proportionally.

## Placement

For best possible stereo performance, the two systems should be placed symmetrically with respect to the main listening position. The accepted rule of placement for stereo speakers is that a person sitting in the usual listening area should see an angle of about 40° between the two sound sources. Therefore, the distance between the speakers depends upon their relationship to the listening area. They may be located at any height above the floor, but somewhere near ear level usually gives the more natural sound source.

Apart from the requirements for satisfactory stereo coverage, placement of the loudspeaker systems has a great deal to do with how the music installation sounds. If possible, you should experiment with the placement of the loudspeaker systems before deciding on a final arrangement. Performance in the very low bass region is even more dependent upon the dimensions of the room and the placement of the loudspeakers than the inherent qualities of the speakers themselves. Very often, moving the system only a few feet will make the difference between a boomy, unnatural sounding system and one which is realistic and clean. There should be no overstuffed furniture or other obstructions between the loudspeakers and the listening area, and you will get better bass if the loudspeakers are not placed by open doors or near thin panelling.

*If you have the Lancer 99, the energized unit should always be placed at least one-half inch away from the wall or other large surface so that the Energizer face plate is exposed to unobstructed air circulation. (See page 10 in your Energizer owner's manual.)*

## Internal components of the Lancer 99 and Athena S99

The loudspeaker components installed in the Lancer 99 and Athena are precision devices, individually crafted and tested. After each unit has been checked by JBL's Quality Assurance technicians, it is installed in the acoustical enclosure and the complete system is inspected and tested again to ascertain that its performance is exactly the same as other Lancer's and Athena's.

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**Low frequency loudspeaker** Low frequencies are reproduced by the LE14A, a 14-inch transducer whose large voice coil, massive magnetic assembly (11½ lbs.), and remarkably large cone diameter enable it to faithfully reproduce powerful bass fundamentals. A 4-inch edgewound copper ribbon voice coil is precisely centered in a magnetic field having a total flux of 250,000 maxwells. All of the essential magnetomotive energy provided by the powerful magnet is concentrated in the one place where it contributes most to ideal performance ... the voice coil gap, and stray fields (wasted energy) are non-existent. The voice coil drives a molded cone that is freely suspended and terminated with JBL's exclusive Lans-a-loy surround to prevent spurious resonance or "hang-over," and results in smoother midrange performance. The cone itself is further damped with another exclusive JBL material (Lans-a-plas) for even smoother performance through the vital midrange. It is this damping compound which gives the cone its white color. Its extremely long, linear cone travel and large radiating area allow the LE14A to reproduce very low frequencies without audible distortion...even at high power levels. Efficiency and dynamic range are further increased by the use of a ducted port, carefully tuned for optimum performance.

The special "step down" frame of the LE14A enables it to deliver spectacular bass—solid and clean, tight and well-defined, even in relatively small enclosures. Exhaustive listening comparisons and detailed laboratory tests were required before the final design of the LE14A was approved. As in the design of all JBL transducers, we had to make sure we had found the **best** way to reproduce sound ... to impart the type of free, spacious quality associated with a live performance.

**High frequency loudspeaker** Frequencies above 2,000 cps are reproduced by the JBL LE20-1 high frequency transducer (acoustically identical to the LE20). Like all high frequency units found in JBL systems, the LE20-1 is designed to match the performance characteristics of its associated low frequency transducer. *The discriminating audiophile will immediately appreciate the silky, "transparent" quality of the LE20-1...its utter clarity and precise delineation of even the most complicated treble waveforms provides natural sparkle and life to reproduced music.*

To achieve pure, distortionless high frequency reproduction, JBL engineers first built a heavy magnetic assembly producing a field of more than 16,000 gauss in the voice coil gap. In this intense field, the small, light moving assembly responds with verbatim accuracy to delicate treble frequencies. Next, a shallow cone of small diameter (less than 2 inches) was designed. By approximating a "point source" of sound, high frequencies are distributed evenly through a wide angle so that each listener hears the same tonal balance and the same blend of direct and reverberant sound.

Finally, JBL experimented with countless cone materials and assembly methods to make sure that the LE20-1 reproduced all frequencies within its range with equal efficiency. After the optimum material, mass, density and stiffness were found, additional damping was added at three carefully controlled locations to

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prevent any stray resonances from occurring, even at peak loudness levels.

**Crossover network** Transition between the LE14A and the LE20-1 is controlled by the LX4-1 dividing network designed specifically for these units (electrically identical to the LX8). The crossover frequency is 2,000 cps. The high frequency output has a three step attenuator, which provides 3 db of attenuation per step. Like all JBL dividing networks, Model LX4-1 is carefully designed and tested to complement the exact characteristics of the JBL transducers with which it is to be used.

The function of a precision crossover network is considerably more complicated than merely feeding low notes to the low frequency speaker and high notes to the high frequency unit. It also protects the high frequency assembly from excessive power at frequencies below those it was designed to handle. What is vitally important is the way the network controls the loudspeakers in the frequency range where the transition is made. Circuit values are adjusted until acoustic response is smooth and uniform through the crossover region, and maintained through the full audio spectrum. Thus, the effects of individual speaker characteristics, impedance fluctuations, and the physical separation of the two sound sources are all taken into account in the complete system design.

Such sophisticated engineering demands extremely close production tolerances. Ordinary networks often use electrolytic capacitors with tolerances of plus or minus 20 to 50 per cent. Thusly, response through the crossover region is ragged, and characteristics vary from unit to unit. In all JBL networks, however, only non-inductive, hand-wound aluminum foil capacitors (not electrolytic or "non-polarized" as used by other manufacturers) are used and individually tested to meet rigid JBL tolerances. To meet JBL production tolerances, **all** network components must check out within plus or minus one per cent of the established design value. The result is imperceptible transition between the low and high frequency sound sources and you are conscious only of a single, smooth, integrated source of sound. There is never an audible "jump" from one loudspeaker to another.

## Lancer 99 audio power source

JBL engineers have long recognized the intimate relationship between a loudspeaker system and its audio power source. The load presented to an amplifier by a dynamic loudspeaker is incredibly complicated. . . . it varies widely depending upon the design of the loudspeaker itself, upon the kind of enclosure which houses the speaker system, and it changes from moment to moment according to the frequency content of the program material being reproduced.

The JBL SE408S Transducer/Energizer in the Lancer 99 is a new kind of audio power source which takes the place of a conventional stereo power amplifier. It is the first audio power source designed by electronic engineers and loudspeaker experts working together. . . . the first to include the complex reactive characteristics of the loudspeaker as an integral part of its circuitry. . . . the first to use the exclusive JBL T-Circuit.



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The characteristics of the Energizer are matched to the exact requirements of the Lancer 99 in two ways:

First, the SE408S utilizes specially designed, replaceable plug-in equalizer boards for each stereo channel. The equalizer boards are designed specifically for use with the Lancer 99 speaker components and enclosures. This enables final frequency response to be contoured to the requirements of the speaker system/enclosure, to assure smoothest possible response.

Secondly, each equalizer board also controls the operation of a special current feedback loop so that the internal impedance of the Energizer supplies exactly the right amount of damping for the speaker system and its enclosure. With insufficient electrical damping, a loudspeaker's transient response suffers—it tends to generate spurious signals independently from the program signal. If the audio power source supplies too much damping, low frequency performance is sacrificed. But when the electrical characteristics of the power source are exactly matched to the loudspeaker/enclosure combination, the system is said to be "critically damped." Then and only then can the full potential of the loudspeaker system be realized.

The exclusive JBL T-Circuit (patent pending) in the Energizer is an analog computer-type operational DC amplifier, the most nearly perfect amplifying circuit ever developed. The T-Circuit is **inherently** linear in operation. Distortion is so low that it cannot be measured accurately even with the most sensitive test equipment available. All stages are direct-coupled, including the output stage, which means that the loudspeaker system is completely under the control of the Energizer all the way down to zero frequency.

Because the Energizer is non-microphonic, generates negligible heat, and draws power from the AC line only as needed by the requirements of the program signal, there is no need to separate it from the transducers which it drives. Instead of being designed as a freestanding unit, the SE408S Energizer is mounted directly into the Lancer 99 Master enclosure. Loudspeakers and audio power source become complementary parts of a single integrated system, both electrically and physically.

Each JBL Energizer is meticulously assembled by JBL craftsmen in JBL's own electronics facilities to the exacting standards of the JBL Engineering Department. JBL does not have an assembly line. We do not spot check completed products. Instead, **every** JBL Energizer is subjected to more than 25 hours of life cycling and critical testing before it is sold. Each subassembly, each circuit, each function of every Energizer is exhaustively tested with regularly calibrated laboratory test equipment to make sure that it meets or exceeds JBL production specifications. Moreover, **each** transistor used in the Energizer is carefully tested **before** insertion into the circuit. Once installed, the Energizer needs no further attention, no periodic tests, no routine maintenance. It is quite possible that you will never have to—or feel impelled to—touch this portion of your high fidelity system again.

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*Power output is 80 watts continuous RMS, 40 watts per channel, at any frequency from 10 to 30,000 cps. Harmonic distortion is less than 0.15% from 20 cps to 20,000 cps at 80 watts or any level less than 80 watts. Intermodulation distortion is less than 0.15% at 80 watts or any level less than 80 watts (IHF standard—60 and 7,000 cps, 4:1 ratio). Further specifications are found in JBL publication SB400, available from your JBL dealer or the factory.*

## In case of trouble

Your loudspeaker system cannot produce sound by itself. It only **reproduces** the electrical signal supplied by other components in the system. It has no way of differentiating the desired program signal from unwanted electrical noise. The same qualities that enable it to reproduce music so faithfully make it respond equally well to any background noise or distortion which may be present in any area of the electronics portion of your system. In short, your system responds with verbatim accuracy to the electrical signal supplied by the audio power source, and it will reproduce extraneous noises such as hum, rumble, crackle or hiss just as accurately as the desired program material. Such noises do not originate in the loudspeaker system and indicate that one of the other components of the system, or the program source itself, is at fault. In the rare instance that something does go wrong with the loudspeaker system, one of the transducers either will stop working altogether, or there will be a distinct rattling or scraping sound whenever the system is used.

Fuzzy or blurred high pitched sounds usually can be traced to the recording itself or to a defective cartridge or worn pickup stylus. Problems with low frequency reproduction, on the other hand, are usually the result of room acoustics and the placement of the loudspeakers in the room. In addition, excessive bass boost or incorrect loudness compensation tend to give a muddy or "boomy" quality to reproduced music. One easy way to check your system for turntable rumble or other extraneous low frequency signals is to remove the loudspeaker grille and observe the motion of the low frequency cone while the system is playing at high volume. If the cone continually moves in and out more than  $\frac{1}{4}$ -inch or so, excessive low frequency power is somehow being fed to the loudspeaker system. Such problems should be discussed in detail with your Audio Specialist.

## Removing loudspeaker components

If the components have to be removed for testing or repair, proceed as follows:

- (1) First place the enclosure on its back on a clean, padded surface and remove the grille assembly. This is held in place by two friction clips and seats securely. One clip is centered at each end of the grille panel. **Gently** pull the fretwork grille away from the enclosure, a little at a time, working first at one end and then the other. Twisting or bending motions should be avoided and it is recommended that you handle the grille by its edges.

When replacing the grille, be sure that both of the metal fasteners are centered in their sockets before applying pressure.

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(2) The LE14A is mounted from the front of the baffle panel and held in place by four Phillips-head screws. When all four screws have been removed, carefully lift the LE14A from the enclosure. The green and black wires from the crossover network are connected to the speaker at spring-loaded terminal posts. Simply depress the colored caps and remove the wire.

(3) The LE20-1 high frequency transducer also mounts from the front of the baffle panel. A black, adhesive-backed foil ring covers the mounting screws of the LE20-1. Peel off the decorative foil slowly, being careful not to damage the paper cone in the center of the speaker. Then unscrew the Phillips-head screws and lift out the LE20-1.

Due to the length of the wiring from the LE20-1 to the dividing network, it is preferable to unsolder the red and black wires from the terminals. If this is not possible, sever the wiring as close to the terminals as possible so that there will be sufficient length remaining to resolder them.

(4) The dividing network is installed from inside the enclosure and held in place by two long machine screws. For access to the network mounting screws, first remove the LE14A as described above.

(5) When resoldering or connecting loudspeaker wiring, be sure to observe the following polarity for smoothest response through the crossover region:

LE14A — Green wire to the red terminal post of the LE14A, black wire to the black post.

LE20-1 — Red wire to the red terminal of the LE20-1, black wire to the unmarked terminal.

## Removing the JBL solid state Energizer from the Lancer 99

The JBL Energizer is mounted on the back panel of the Lancer 99 Master unit. Its mounting clamps are installed from inside the enclosure. For access to the mounting clamps, first remove the LE14A as described previously. To remove the Energizer from the enclosure, follow the instructions in the Energizer owner's manual.

## Power capacity of the JBL Athena

To enjoy the full dynamic range of modern recordings, you will want to use a high quality amplifier having at least 30 watts of undistorted output (15 watts per stereo channel or more). However, a greater reserve of amplifier power is desirable for effortless reproduction of intense transients that sometimes occur in music. The Athena can reproduce momentary transients whose peak power is equivalent to 150 watts or more. For this reason, the most powerful component high fidelity amplifiers can be used if desired, with little danger of overload. The most important thing is not the power rating of the amplifier, but rather the **quality** of the signal it produces.

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You should remember, however, that powerful wide-range amplifiers can accidentally damage **any** loudspeaker under the right conditions. For example, rewinding your tape recorder with the playback volume turned up can generate "squeals" powerful enough to burn out the high frequency transducer. Similarly, powerful low frequency pulses extended down into the subsonic range can eventually damage the low frequency transducer. Tubes or connectors should not be plugged or unplugged while the system is on. If the phonograph pickup is accidentally dropped with the volume control full up, or if you play the system **very** loudly with excessive bass boost, almost the full rated power of the amplifier can be channeled into dangerous subsonic energy.

## Maintaining the finish on your JBL enclosures

JBL cabinetry represents the finest quality presently available in the high fidelity field. The superior design and craftsmanship that go into its construction have been carried through to a beautiful wood finish. By taking the simple precautions outlined below, there is no reason why the finish cannot be maintained in its original condition.

**Lacquer finishes (tawny walnut)** JBL enclosures with a lacquer finish seldom if ever need any maintenance other than normal dusting. If small surface scratches are incurred, they can usually be removed by gently rubbing them out with 4/0 steel wool. **Be sure to rub with the grain.** No attempt should be made to remove any scratches that go through the lacquer finish. Deep scratches can only be repaired by skilled craftsmen, and competent professionals should be engaged to do this kind of work.

If desired, an occasional coating of any good furniture polish or wax can be applied to JBL lacquer finishes.

**Oiled finishes (oiled walnut)** Your JBL enclosures are sanded and rubbed until the surface is mirror-smooth, then hand finished with oil. It is a natural condition of this finish to appear as though it were drying out. This results because the oil is penetrating deeper and deeper into the grain. Consequently, it becomes necessary to re-oil the enclosure once or twice a year for the first year or two. With each application, the beauty of the finish increases, and a warm, rich patina will eventually be obtained.

The cabinet should be rubbed with a mixture of three parts boiled linseed oil and one part pure gum turpentine. Apply a liberal amount of the mixture over the entire finished surface of the enclosure **except** the fretwork grille. In ten to fifteen minutes wipe off the remaining oil with a clean, soft, dry cloth. (Make sure the cloth has no buttons, pins, etc.) If small scratches are incurred, they can usually be removed by gently rubbing them out in the same manner described above and then re-oiling the panel. Very deep scratches, dents and more serious damage should be repaired only by a qualified cabinetmaker.

The hand carved fretwork grille on each cabinet is especially made for JBL in the Orient. Unlike similar assemblies which are sometimes constructed of plastic or imitation wood, all JBL fretwork grilles have a satin lacquer finish (regardless of cabinet finish), to bring out the natural beauty of grain structure and color. Naturally, small variations may be noticed due to the color and grain characteristics which vary between individual samples.

To clean, go over lightly with a vacuum cleaner brush or a soft, dry paint brush, being careful not to poke or push against the delicate fretwork pattern. Do not apply oil or turpentine to the fretwork.

The Lancer 99 is available only in matched stereo pairs. It consists of the Master enclosure (Energizer installed) and the other half of the stereo pair. The shipping cartons will be marked E8-99 and S99, respectively.

Because it is not self-energized, the Athena comes with no accessories (shielded audio cables, power cord or loudspeaker wiring) and is available singly or in pairs. A stereo pair of Athena's is designated model S99 and S99-1. S99-1 refers to the Master enclosure, which has a cutout in back to accommodate the Energizer at a later date. S99 refers to the other cabinet in the stereo pair.

If you have any difficulty in achieving the fine performance built into your JBL system, please consult the Audio Specialist from whom you purchased your components. He will be happy to supply expert advice and assistance. You may also write directly to the JBL factory. Address your inquiry to the Technical Service Department.