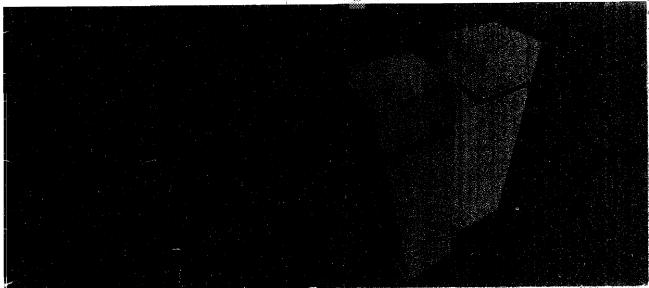
Owner's Manual

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Aquarius 4





Excellence is an elusive quality. It is so easy to recognize and so difficult to attain.

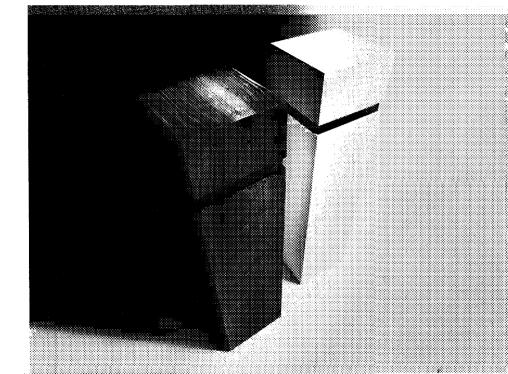
JBL craftsmen have been involved in the art of sound for more than a generation—signal and source, wood and fabric, transducers and acoustics—all of it.

Today these craftsmen continue to perform to the most rigid standards any craftsmen can submit to: those they impose upon themselves.

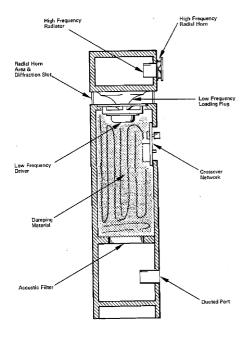
JBL loudspeakers are carefully engineered instruments, painstakingly crafted and assembled to watchmakers' standards. JBL enclosures express the excitement of creative design; they are elegant, solid and flawlessly finished. JBL transducers and electronics offer what has been characterized by devoted music listeners as the "incomparable JBL sound."

By following the few simple suggestions contained in this booklet, you can look forward to superb high fidelity reproduction that will retain its clarity and realism year after year.

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Mounted in the heart of the Aquarius 4 enclosure is an 8-inch, wide range transducer directed upward into a radial horn. This radial horn spreads low frequency sound waves through a 360° horizontal radial diffraction slot. High frequencies emerge in a 180° vertical plane from a 2-inch driver separately loaded by a radial horn located on the upper rear panel of the Aquarius 4. These right angle dispersion patterns interact with each other to create the impression of an immense sound stage that belies the modest dimensions of the Aquarius 4 enclosure.

The Aquarius 4

The diffraction principle of JBL Aquarius loudspeaker systems is the result of a sophisticated engineering development producing performance characteristics quite different than most "omnidirectional" loudspeaker systems. Aquarius loudspeaker systems achieve an unusually wide sound dispersion pattern without adding coloration or sacrificing definition.

Each transducer installed behind the various dispersion panels of Aquarius systems operates as a true horn driver. A computer-designed loading plug maintains optimum loading of the loudspeaker cone and guides sound energy in proper phase relationship so that it expands outwardly through the radial horn formed by the transducer mounting panel and the dispersion panel.

Performance Characteristics

JBL Aquarius loudspeaker systems offer the discerning music listener these distinctive features:

- Acoustically, Aquarius loudspeakers double the size of the listening room. Sound appears to be emanating from an area considerably larger than the environment in which they are placed.
- Aquarius systems fill the environment with sound without overpowering the listener—even at concert hall volume levels.
- —The expansive sonic image produced by Aquarius loudspeaker systems permits much greater freedom of movement within the listening environment. Optimum stereo effect is not confined to a relatively narrow angle between loudspeakers.
- Bass coupling of Aquarius loudspeaker systems is acoustically contoured to provide rich, solid bass fundamentals, even in a small room.
- Aquarius systems retain a well-defined stereo image. Solo instruments and other program material requiring directional identification are properly placed.

A number of loudspeaker systems can handle large amounts of power, others are highly efficient. JBL products are unique in their ability to combine both attributes. The Aquarius 4, for example, will convert a 1 Watt input of "white noise" into a sound pressure level of 73 dB measured at a distance of 15 feet. This is approximately twice as loud as ordinary conversation and represents a comfortable listening level, demonstrating that the Aquarius 4 delivers substantial output from very little input power.

Specifications indicate that the Aquarius 4 has impressive performance characteristics, yet they cannot convey the full impact of an extensive listening experience. The powerful bass fundamentals and life-like voice projection exhibited by the Aquarius 4 are qualities found in few loudspeaker systems, regardless of size or price.

- 1. "White noise" is a rigorous test simulating average musical program material under laboratory conditions. It provides a controlled means of energizing all the transducers of a loudspeaker system simultaneously. "White noise" encompasses all audible frequencies just as white light includes all the colors of the visible spectrum. Produced in the laboratory by a signal generator, "white noise" sounds very much like the hiss heard between FM radio stations.
- 2. A decibel (dB), in this context, is a unit expressing relative loudness of sound. Three dB is approximately equal to the smallest change in loudness of program material ordinarily detectable by the human ear.

Low Frequency Loudspasies

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Magnetic Assembly Wt 8.5 pounds Flux Density 8500 gauss Sensitivity** 40 dB

High Frequency Direct Radiator No. of the last Diameter 2 Inches Voice Coll - Number, copper Assemble Will Table Council Flux Consily 12,000 gauss EIA Seculity is 14 db Pinish Ciled Walnut & Catha Milita AU'X UET 10' deep Dimensions 102 x 25 x 25 cm 6000. Shipping Wi.

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Connecting the Aquarius 4

IMPORTANT: When connecting or disconnecting loudspeakers from an amplifier, the amplifier must be turned off. Making connections while the amplifier is operating could seriously damage the loudspeaker system and void the warranty.

Eighteen-gauge insulated wire (ordinary household lampcord) is the minimum size recommended for loudspeaker connections up to 50 feet. Beyond this distance, heavier gauge insulated wire is recommended; 16-gauge from 50 to 100 feet and 14-gauge from 100 to 200 feet. If lampcord is used, wires can be differentiated by noting that one of the insulating jackets is smooth, while the other has a distinct ridge. By considering the ridged jacket "red" and the smooth jacket "black," wiring connections can be made as if using color-coded wire.

Connections to the audio power source are made using the two pushbutton terminal posts located on the back of the loudspeaker system enclosure. The holes in JBL terminal posts do not allow the connecting wire to pass all the way through,

preventing the possibility of a short to the other terminal post or to nearby electrical conductors.

To make a secure connection, strip approximately ¼ inch of the insulation from the end of the wire, push down the spring-loaded terminal post cap, insert the bare wire into the exposed opening of the terminal post and release. (Insertion of the wire into the opening will be easier if the stripped wire is first tinned with a soldering tool and solder).





- 1. Depress colored button, exposing hole in terminal post.
- 2. Push stripped end of lead wire into hole and release button. Never apply twisting force to the terminal post.

Locate the loudspeaker output terminals on the back of the receiver or power amplifier. For each loudspeaker system, connect the wire from the black terminal post to the amplifier output terminal labeled "common," "ground" or (-), and the wire from the red terminal post to the remaining 8-ohm speaker output.3

terminal which is usually isolated from the other connectors. This should not be confused with the "ground" designation sometimes used to describe two of the terminals in each set of loudspeaker connections.

Note that many amplifiers have a chassis grounding

The specified 8-ohm impedance rating is a nominal figure which suggests a connection giving the most efficient power transfer between amplifier and loudspeaker system. However, 4- or 16-ohm amplifier terminals can be used without danger.

Placement

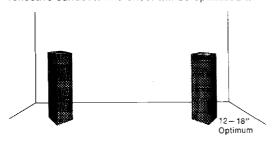
Since the acoustic characteristics of listening rooms differ widely, experimentation with placement will provide optimum realization of the wide sound dispersion pattern of the Aquarius 4.

The dramatic spaciousness of the Aquarius 4 can be most fully realized by locating the system between 12 and 18 inches from a reflective surface, such as wood paneling or an undraped wall. The system can be placed as close as 3 inches from a reflective surface; however, the sound quality will appear slightly less "open." Performance will be seriously restricted if the enclosure is placed closer

3. Connecting both speakers as described will insure proper "in phase" operation; i.e., their cones will respond to a monophonic signal by moving simultaneously in the same direction, and not opposite to each other. Inadvertent out-of-phase operation (which occurs when one set of speaker wires is reversed with respect to the other) will not harm the system, but may cause some acoustical "cancellation" which will have the audible effect of reducing low frequency response.

than 3 inches to a reflective surface, or if it is placed so that the high frequency radiator is adjacent to a sound-absorbing surface.

Low frequency performance will be enhanced, and increased richness will be obtained, if the enclosure is positioned in the corner of a room, again observing a clearance of 12 to 18 inches from reflective surfaces. The effect will be optimized if



Placement of the Aquarius 4 is extremely flexible.

Above is an example demonstrating the utilization of reflective surfaces to optimize the performance characteristics of the system.

A variety of alternate arrangements is possible.

the enclosure is the same distance from each of the two walls forming the corner. Rotating the Aquarius 4 so that the high frequency radiator is oriented toward the apex of the corner, as in the illustration, will aid high frequency dispersion, adding to the fullness of reproduced music, or other program material, and increasing the apparent acoustic size of the listening room.

For stereo performance, the two loudspeaker systems should be arranged symmetrically on each side of the listener. The exact distance between units is not critical. Tests indicate that Aquarius 4 loudspeaker systems usually provide more encompassing stereo reproduction when placed farther apart than the interval generally recommended for conventional loudspeaker systems. In a rectangular room, for example, a wider stereo image will be achieved if the enclosures are positioned along the longer wall. An Aquarius 4 may be placed much closer to chairs, couches or tables than conventional loudspeakers without hampering performance. Of course, no loudspeaker system can operate properly with a large absorptive object directly between the grille and the listener.

Listening Room Acoustics

The sound reflecting or sound absorbing qualities of the listening room will affect the sound quality of a loudspeaker system. Room acoustics can be tested by listening to the echo of a sharp sound, such as hand clapping.

A room having large windows, paneled walls and a hardwood floor or ceiling will be acoustically "live" and will echo noticeably. A room containing overstuffed furniture, carpeted floors or draped windows will be acoustically "dead" and will echo very little or not at all.

Ideally, there should be a reasonable balance between absorptive material and sound reflecting surfaces. If there are two large reflecting surfaces facing each other, the "bounce" between them will make sounds run together and the music will lack definition. Large, flat wall surfaces should be broken up with bookshelves, drapes, screens or tapestries.

Adjusting the System

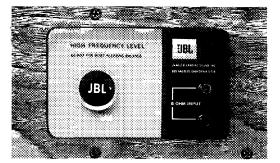
The frequency dividing network used in the Aquarius 4 is provided with a level control to permit adjustment of the high frequency radiator to specific room acoustics and personal listening preference. It does not affect the transition frequencies, nor does it limit the upper frequency response of the loudspeaker system.

Adjustment should be made while the loudspeaker system is reproducing normal program material with the amplifier tone controls set at the middle (generally referred to as "flat") position. Begin by rotating the control fully to the right. At this setting, the high frequency radiator will operate at full volume.

If high frequency material (such as violin overtones, bells, triangles or chimes) seems over-emphasized, turn the control slightly to the left to reduce the high frequency output of the system. After each adjustment, listen to a variety of program material until the ear becomes attuned to the new sound and can compare it to the previous performance

of the system. Experimentation with positioning of the loudspeakers, as previously outlined, will also be beneficial.

Once loudspeaker positioning and the network level control have been set for optimum balance in the listening environment, compensation for differences in individual recordings should be made with the tone controls on the audio power source.



The High Frequency Level control, located on the rear of the enclosure, allows adjustment of tonal balance to accommodate a variety of specific room acoustics and personal listening preferences.

Power Capacity

The specified power capacity indicates the continuous program power level that can be accepted by a JBL loudspeaker system without damage. Its peak power capacity is considerably greater than the continuous rated value, as indicated by the remarkable transient response of JBL loudspeaker system components. The Aquarius 4 will reproduce clean sound at comfortable listening levels when driven by an amplifier having an output of as little as 10 Watts RMS per channel.4 However, for reproduction of the full dynamic range of contemporary recordings at high volume, a quality amplifier delivering up to 75 Watts RMS per channel will provide optimum performance. Such an amplifier has the reserve power necessary for accurate reproduction of transients, which can reach momentary peaks equivalent to ten times the average power level.

In almost all cases, the volume level generated by a JBL loudspeaker will become noticeably discomforting to the ear before the loudspeaker can be damaged by excessive power from the amplifier. There is virtually no danger of damaging a JBL loud-speaker if it is operated within the following guidelines:

1) the signal from the amplifier, regardless of its rated power, is not distorted; 2) the amplifier is not driven into clipping (another form of distortion which occurs when the power output limitations of the amplifier circuitry are exceeded); and 3) the power cord or audio connectors are not inserted or unplugged while the amplifier is operating.

However, a powerful wide range amplifier can accidentally damage any loudspeaker under certain conditions. For example, rewinding a tape recorder with the playback volume turned up can generate "squeals" powerful enough to burn out the high frequency unit. Similarly, powerful low frequency pulses extending down into the subsonic range can eventually damage the low frequency loudspeaker. If the phonograph pickup is accidentally dropped with the volume control full up, or if the system is played very loudly with excessive bass boost, nearly the full rated power of the amplifier can be channeled into dangerous subsonic energy.

System Components

The components used in every JBL product are designed and produced by JBL personnel to exacting standards. JBL loudspeaker frames are massive rigid structures. Magnetic assemblies are precisely manufactured of low-reluctance iron, energized by large, high grade magnets. Voice coils are held to within one turn of design specifications. Stamped frames, punched magnetic structures and mass-produced voice coils would be less expensive; however, the resultant loss of structural integrity, magnetic force and acoustic efficiency would tend to degrade low-distortion performance and transient response-qualities that have become JBL hallmarks.

4. The RMS (root mean square) rating of amplifier power is the most stringent method currently used in the audio industry. An amplifier rated at 60 Watts RMS per channel, for example, is generally considered to be a high-powered unit. The same output expressed in terms of "Music Power" would be 160 Watts.

Do not move loudspeaker cones by hand. The clearance between the voice coil and magnet assembly is so small that any attempt to move a cone manually can easily force it out of alignment. Low Frequency—Full, deep bass response is provided by an 8-inch, wide range loudspeaker exhibiting an accuracy of reproduction that has no precedent in units of comparable size. Its 2-inch edgewound aluminum voice coil is precisely centered in an intense magnetic field allowing precise control of the cone and high frequency duraluminum center dome, pneumatically drawn to shape from .003-inch dural aluminum alloy. A highly flexible suspension effectively absorbs mechanical vibrations traveling through the cone material and allows extreme excursion with perfect linearity. The low-loss magnetic assembly concentrates all of the essential magnetomotive energy, supplied by a powerful Alnico V magnet, in the one place where it contributes most to loudspeaker

dynamic range are further increased by an

lower sections of the enclosure.

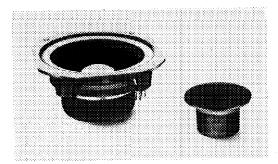
assembly energized by a grain-oriented Alnico V magnet. Its %-inch copper voice coil drives a unique shallow cone, compounded to provide optimum mass, density and stiffness, carefully damped to prevent stray resonance, even at peak loudness levels. The result is pure high frequency reproduction extending beyond the range of human audibility. Dividing Network—Unlike conventional network design, the Aguarius 4 dividing network provides driver and high frequency radiator are operating simultaneously. These overlapping bands have

High Frequency-High frequencies are reproduced

by a 2-inch radiator having a 1½-pound magnetic

broad transition bands in which the low frequency been carefully determined to increase the overall diffused sound image of the Aquarius 4 without adding undesirable coloration to its performance. The 8-inch wide range loudspeaker operates beyond the crossover region up to 8000 Hz; performance—the voice coil gap. Efficiency and similarly, the high frequency radiator is brought into operation below the crossover frequency to function from 3000 Hz to beyond the range of acoustic filter and a ducted port, located in the human audibility.

JBL dividing network component tolerances are much more stringent than normal industry practice. For example, JBL networks use only non-inductive, non-polarized capacitors—not electrolytic types. The special inductors used have extremely low insertion loss so that none of the driving power to the loudspeaker system is wasted in the network. To meet JBL production tolerances, each inductor is calibrated on a sensitive electronic bridge and its value set precisely.



Loudspeaker System Components 8-inch Low Frequency Loudspeaker 2-inch High Frequency Direct Radiator

Component Removal

If it should be necessary to remove the loudspeaker system components for testing or repair, disconnect the amplifier and proceed as follows:

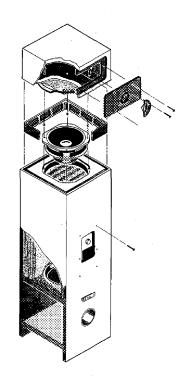
High Frequency—The high frequency radiator and its mounting panel are removed as an assembly. The panel is held in place by six Phillips-head machine screws threaded into T-nut fasteners which are attached inside the enclosure. Carefully unscrew the machine screws without applying pressure that might dislodge the T-nuts. Lift the panel assembly from the enclosure and cut the lead wires from the dividing network. The high frequency transducer and radial horn are secured to the mounting panel by three machine screws and T-nuts. Remove the screws, radial horn and spacers. Carefully apply gentle, firm pressure to the back of the high frequency unit to separate it from the mounting panel. When reinstalling the high frequency unit, strip approximately %-inch of the insulation from the lead wires and use standard wire nuts for reconnection. 5

5. A quick connector is used on some applications,16 eliminating the need to cut and splice the wires.

Low Frequency – After removing the high frequency radiator mounting panel, reach into the enclosure and remove the four hex-head cap screws (use %-inch wrench) that secure the upper section to the main enclosure. Lift the upper section until the high frequency lead wires, inserted through two small holes at the side of the low frequency radial horn, are exposed. Gently pull the wires through the holes to complete removal of the upper section of the enclosure. The grille assembly can then be lifted out of place and removed. Finally, lift the low frequency loudspeaker from the enclosure and disconnect the lead wires at the pushbutton terminal posts.

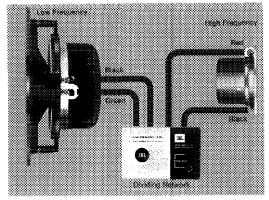
Dividing Network—The dividing network is mounted inside the enclosure and held in place by machine screws and T-nuts. Remove the six screws on the back panel of the enclosure, depress the acoustic padding surrounding the dividing network and lift it from the enclosure.

Although JBI. loudspeakers are extremely rugged, the cone and other moving parts are subject to accidental damage. Exercise extreme caution whenever using a screwdriver or other tools in their immediate vicinity.



Replacement—To replace the loudspeaker system components, reverse the removal procedure. Mounting screws should be tightened just enough to prevent air leaks between the components and the enclosure. Transducer mounting screws should be tightened evenly to avoid the possibility of frame warpage.

Wiring—When reconnecting the loudspeaker system components, be sure to observe the following polarity:



The Aquarius 4 Enclosure

JBL cabinetry represents the finest quality available in the high fidelity industry. Engineered to provide perfect acoustic chambers for its complement of precision JBL transducers, the enclosure is massively braced to eliminate cabinet resonance that could occur due to the very high internal pressures developed by the loudspeaker system. The Aquarius 4 enclosure, like all JBL enclosures, features lifetime construction using only the finest available compressed woods, hardwoods and hardwood veneers—carefully selected, skillfully prepared and hand-rubbed to a rich lustrous finish enhancing the natural beauty of individual grain structure and color. The same care and craftsmanship are lavished on the alternate Aquarius 4 finish: a sealer/primer undercoat is applied to fine-grained birch, the surface is filled and sanded by hand, re-sprayed with a second coat of sealer/primer and followed by two coats of satin white lacquer to produce the velvet smoothness of the finished enclosure.

The dramatic visual qualities of the Aquarius 4 enclosure will enhance almost any listening room decor. It can be the center of attention, complementing the room furnishings, or it can be placed in a corner to deliver exceptional performance from less than a square foot of floor space.

Occasional dusting with a clean, soft cloth will maintain the original beauty of the Aquarius 4. The grille can be cleaned by gently dusting it with a vacuum cleaner. Since the finish is moisture resistant, a damp cloth will remove most household stains. A coating of high quality furniture wax or polish may be applied to the satin white finish to bring out its luster and to remove smudges.

The oiled wainut surface should be treated only with wax specifically formulated for use on oiled finishes. Conventional furniture waxes, polishes or cleaners are not recommended.

As the oil penetrates deeper and deeper into the walnut, the finish may appear to be drying out.

Many owners find it desirable to re-oil the enclosure surface from time to time. With each application, the beauty of the finish will become more obvious, and a warm, rich patina will eventually be obtained.

To re-oil a JBL finish, use any one of the several clear oil finishing preparations available through furniture or hardware outlets. Apply a liberal amount of the preparation over the entire finished surface of the enclosure. In ten to fifteen minutes wipe off the remaining oil with a soft, clean, dry cloth. Small surface scratches can usually be removed by gently rubbing them out with very fine steel wool (000 grit) and applying oil to the entire panel. Very deep scratches, dents or other serious damage should be repaired only by a qualified furniture refinisher.

Caution: Improper storage of wiping rags could result in spontaneous combustion. They should be thrown away or spread out to dry in a well-ventilated area before storage or disposal.

In Case of Trouble

A JBL loudspeaker system responds with verbatim accuracy to the signal supplied by the audio power source; it will therefore reproduce extraneous noises just as accurately as it reproduces desired program material. Noise seldom originates in the loudspeaker system. Its presence usually indicates that one of the other components of the music system, or the program material itself. is faulty. In rare instances when something does go wrong with the loudspeaker system, one or more of the component loudspeakers will stop working altogether or a distinct rattling or scraping sound (indicating a rubbing voice coil) will be heard whenever the system is operating.

If one channel of a stereo installation is not operating, examine the loudspeaker wiring and check the balance control. If wiring instructions were followed correctly, if the connections are clean and tight, and if centering the balance control does not remedy the situation, reverse the right

and left loudspeaker connections at the amplifier, taking care to turn the amplifier off before each connection or disconnection. If the previously nonfunctional loudspeaker system operates, the amplifier or one of the component program sources (tuner, phono, tape deck, etc.) is malfunctioning. In the event that the suspect loudspeaker system is still inoperative, it is probably defective.

To determine whether the defect lies in the amplifier or in one of the component program sources (after verifying that the loudspeaker systems are not defective) reverse the right and left cables from the program source at the amplifier. If the original channel is still inoperative, the amplifier is defective; if the previously inoperative channel functions, the program source is defective. If the amplifier is not faulty, alternately check each program source until the defective unit has been isolated. It is unlikely that more than one program source will be faulty at any given time.

Extraneous interference such as static or radio broadcast signals can be picked up by the component devices. When this occurs, the trouble-some unit can be identified by disconnecting inputs from the receiver or amplifier until the interference stops. Again, if the interference persists with none of the input devices operating through the power source, the receiver or amplifier itself is probably defective. Shorting plugs, available from your JBL Audio Specialist, should be inserted in unused phono inputs to help eliminate stray hum or signal pickup.

Hum may be caused by locating a turntable or tape recorder directly over or underneath the amplifier or receiver. The farther the audio power source is located from the phonograph cartridge or tape heads, the less chance there will be of picking up hum. The AC leads and shielded cables should be as widely separated as possible;
AC lines should never cross cables or speaker
wiring. Power line interference can be further
attenuated by using a heavy duty line interference
filter between the audio power source and the
AC wall outlet.

Fuzzy or indistinct high pitched sounds can usually be traced to the recording itself, a defective cartridge, a worn stylus or insufficient tracking force. Problems with low frequency reproduction are usually the result of room acoustics or placement of the speaker system. Excessive bass boost or incorrect loudness compensation tend to give a muddy or "boomy" quality to reproduced music. The music system can be checked for turntable rumble or other extraneous low frequency signals by removing the loudspeaker grille assembly and observing 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 ½ inch or so, excessive low frequency power is being fed to the loudspeaker system.

Acoustic feedback is the result of mechanical vibrations produced by excessive bass at very high volume levels. The loudspeaker system can produce enough low frequency energy to vibrate other objects in the room-including the record player and, by direct mechanical transmission, the stylus itself. These vibrations are reamplified again and again, producing very loud "rumble," or even a sustained howl that increases in intensity as the volume or bass control is turned up. Possible solutions: 1) locate the speaker cabinets as far as possible from the turntable, 2) adjust or replace the turntable shock mountings, 3) place the turntable on a rubber or sponge mat to further absorb vibrations. If the low frequency tone is still audible, it is probably the result of inherent turntable rumble rather than acoustic feedback.

Service

Should your JBL loudspeaker system require service, return it to the JBL dealer from whom it was purchased. If it is not possible to contact a dealer, write directly to the JBL Service Department 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. The warranty is recognized only when the unit is repaired by JBL or an authorized JBL Service Agency and if the serial number of the unit has not been defaced or removed.

In addition to the established five-year warranty, JBL will, at its option, repair the speakers free of charge during their entire normal life if factory inspection discloses an original manufacturing defect. To establish the warranty, fill out and mail the warranty card, packed with every JBL loudspeaker system, within ten days of purchase.

Summary

The Aquarius 4 exemplifies JBL's reputation for leadership in acoustic and visual design. It is our sincere belief that the Aquarius 4—like all JBL products—will provide undiminished listening pleasure for many years to come.

For Additional Information

If you have difficulty in achieving the fine performance of which your JBL loudspeaker system is capable, consult the JBL Audio Specialist from whom the system was purchased. He is equipped with the knowledge required to provide expert advice and assistance. If for some reason the JBL dealer is unable to assist you, write directly to the JBL Technical Information Department explaining the difficulty in detail.

