

# Von Schweikert Audio

World Class Reference Speaker Systems for Music and Film

## VR-4jr

~ INSTRUCTION MANUAL ~

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**T**hank you for investing in a Virtual Reality speaker system designed by Von Schweikert Audio. The Virtual Reality design was perfected over a 23- year period after several years of research at California Institute of Technology and consists of Acoustic Inverse Replication and is driven by the Global Axis Integration Network. Please visit our website at [www.vonschweikert.com](http://www.vonschweikert.com) for further technical information.

When set up correctly, the VR-4jr system can reproduce the sound of a live musical event to an uncanny degree. However, since this model is *extremely* transparent, it should be used only with electronics and cables that are transparent and neutral in tone quality. *Any coloration heard in your system is not generated by the speaker system*, as the VR-4jr is nearly a laboratory instrument. In fact, the VR-4jr is far more transparent and neutral than most commercial recordings, although even average recordings will allow you to hear the “magic” of the Virtual Reality Design!

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Since sound quality was our primary target, we used live musical instruments fed into the speaker to assess its design target during the final stages of “voicing” the system. When correctly installed, the VR-4 Series will give you many wonderful years of exciting musical reproduction, closer to the emotional truth of the composer, performer, and producer’s intent. In order to fully benefit from the VR-4’s powerful magic, please read the following instructions thoroughly. Although the VR series may appear to be conventional speakers, they have been designed to work *with* the listening room. Being a *Room Interactive* design, there are certain setup procedures that must be followed. The VR series are engineered to replicate the recording microphone’s signal in reverse, allowing the original soundfield to be recreated in your home. This technology is proprietary and will allow the full emotional content of the original performance to be heard by listeners anywhere in the room. Please see our White Paper for more technical information on the design. As with all high tech designs, there must be a commitment from the user to fully utilize this product. The following instructions will enable you to achieve world-class sound.

**IMPORTANT NOTE:** *Please read the following instructions regarding setup, as imaging and bass response must be optimized to your particular room. Since there exists no standard listening room dimensions or reflective/absorptive standards, each setup will be different. A thorough break-in (250 hours) must be conducted in order to realize the full benefits of the VR’s transparency and imaging accuracy, and several experiments with placement must be undertaken. In situations where these instructions are not followed, you may not achieve the ultimate sound the VR-4 can offer. Although the VR series retail at very reasonable price points, they are capable of world- class performance, far exceeding conventional designs. However, optimum performance is only attainable by using the following instructions!*

### SHIPPING DAMAGE

Please note that the spikes are wrapped up in a cardboard box. *Do not install spikes at this time since you will be moving the speakers around extensively while determining the correct place in the room for final installation.*

After unpacking the VRs, please note any hidden shipping damage. If you find damage, please notify the freight company who will then send an inspector. Do not discard the boxes or otherwise alter the contents, as the inspector will want to see the damage as you found it. Since Von Schweikert Audio has no control over the shipping companies or their damage claim policies, it is imperative that you follow the instructions from the freight company agent explicitly. Additionally, please retain all packing materials for later use in the event of a move.

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## **BREAK-IN**

The VRs use proprietary drivers custom made for this system. Raw drivers are broken in for roughly 200 hours at considerable volume to reach suspension behavior's "steady state" prior to actual loudspeaker development. By contrast, production units receive 12 to 24 hours of break-in. Since the fluidity and dynamic range of the speaker depends on free movement, you may notice a slight "brightness" or mechanical "heaviness" to the sound for the first 20 hours. The sound engineered into the VRs will take approximately 300-400 hours to achieve, so we recommend that you not make critical judgement of their sound until break-in is accomplished. Break-in is best done by playing loud music or a break-in disc for several days straight. If noise is a problem, place the speakers face to face, with one speaker system wired out of phase. Quilts may be placed over the speakers to reduce the radiated sound. This trick will cancel a lot of the sound that may disturb others. **However, please make sure that you are not driving the amplifier into clipping or distorting the speaker— it is difficult to hear distortion when quilts are used. Adjust the volume in advance!**

*Note that it may take several months or longer to break the speakers in if only quiet music is played at background levels.*

Classical music played quietly does not contain enough bass or dynamics (in most cases) to do a proper job, so we suggest using a CD player on repeat, using a loud rock album or break-in CD as the source. Please make sure that the amplifier does not go into clipping, though, as the heat generated may damage the drivers over a period of time. (Clipping sounds like buzzing or harshness). If the sound is "clean", however, you can put 200 watts of music power into the VR-4's over a long period of time without any damage.

## **INITIAL SETUP**

Please do not install the spikes until the proper placement has been determined. You will be moving the speakers several times in order to listen to different aspects of the optimization, and the spikes will only make the movement more difficult. Since the spikes tighten the bass dramatically, and also increase the image focus, do not worry unduly about these two parameters until later in the setup process. Without the spikes, the bass may be too "thick" and the image will not be as tightly focused, but these effects will be eliminated after break-in, correct placement, and use of the spikes.

Also, turn off the rear ambience drivers by rotating their volume controls counter-clockwise *until the setup is complete*. Please refer to the section regarding the REAR AMBIENCE DRIVER.

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## **Starting Location:**

There are a number of considerations regarding initial placement, particularly involving bass response and basic imaging. In general, bass response is strengthened when the speakers are placed close to the rear or side walls, while imaging is enhanced by pulling the speakers further into the room, away from walls. With your VR loudspeakers and the following suggestions you will be able to achieve *both* deep and powerful bass *and* an open sound stage.

**ROOM CONFIGURATIONS:** If you have a room with fairly rectangular dimensions, you can place the speakers on either the long or short wall. If your room is cubic, you will have far better results placing the speakers diagonally. See next section.

**ON LONG WALL:** Placing the speakers on the long wall enables you to achieve a very large and wide sound stage. In fact, using an equilateral triangle as your starting point, you can space the speakers as far apart as the listening distance, even if this is 15 feet. Since the VR's have very wide dispersion, there will be no hole in the middle effect. Place the speakers about 2-5ft from the rear wall, with this distance being the bass optimizer. If you wish to achieve more depth, move them further into the room. If you wish more bass, place them either closer to the rear wall or closer to the side walls.

\*Note: Do not use the same distance from the rear wall *and* side wall, as this distance will result in too much boost at this wavelength. Stagger this distance by 40-70%.

Do not toe the speakers in at first, place them parallel to the side walls. In general, the sound stage will be constrained to the distance between the speakers, so if you have the VRs only six feet apart, you will hear a small sound stage. Since there will be a lot of overlap between the left and right channels, the center image will be very dense and monophonic. To correct for this, separate the speakers further; 8 feet to 12 feet apart is not too much in a large room, but remember, the spread depends on the listening distance. If you have to spread the speakers well apart but can't sit far enough back due to furniture and cosmetic considerations, you may have to toe the speakers in, with the tweeters aimed directly at your ears.

**ON SHORT WALL:** Placing the speakers on the short wall and sitting far back in the long end of the room may give you a concert hall experience if your room is large. Long reverberation times due to long distances from boundaries can impart a 'grand' sense of scale with classical music, although smaller rooms might curtail this effect somewhat. Also, *too* much boundary reflection will result in echoes that may interfere with the direct sound and blur imaging somewhat. If you suspect this condition, clap your hands while standing at the speaker position. If you hear distinct echoes, you will have to treat the room with specialized tuning products from Michael Green, RPG, ASC tube traps, Sonex, generic foam panels, and the like. If decorating is a consideration, try using rugs hanging on the side- walls at the first reflection point, and behind the speakers, directly

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in the center. Your dealer can recommend tuning products he/she carries and may be able to install them. If your dealer does not offer this service, call the above- mentioned tuning companies for further information.

*CUBIC ROOM DIAGONAL LOCATION:* Rooms with mathematically repeating dimensions (like 16 x 16 x 8', for instance) will have a midbass/lower midrange 'loading' effect due to the similar ratios of boundary distances. In this case, it will help to locate one speaker on each side of a corner and fire the speakers diagonally into the room. Note that you will also need to place your listening chair at a diagonal position as well, at an equilateral triangulated distance.

Diagonal placement is an extreme measure but may be necessary if you wish to achieve the ultimate in accurate frequency response. Diagonal placement will prevent a portion of the standing wave energy from boosting certain frequencies, since the reflection patterns are broken up in this configuration. The distances to each side-wall is critical, and experimentation will be required with placement of not only the speakers themselves, but also your seating position and wall treatment. It may be necessary to use absorptive or dispersive devices on the wall to ameliorate the wall reflections that may cause tonal imbalances or imaging confusion. See your dealer.

*FLOORING:* If you have a hardwood floor, (especially without carpeting), there is the possibility that vibration and resonance will be transferred to the floor, which will then act as a passive radiator. The floor resonance will sound like extra midbass is being added to the sound, and will smear the bass notes as well, since the floor will vibrate long after the woofers stop moving. On bare hardwood floors, it will be necessary to decouple the speakers with the spikes placed on the discs or rubber decoupling feet supplied or products such as Sorbothane by Audioquest. **The use of spikes is best suited for carpeted floors and will result in some transmission to wood floors.**

In two story homes with wood floors on the second floor, we have noticed a tendency for the floor to absorb deep bass due to sympathetic resonance. In this case, the speaker will sound like it does not have bass, so the cure would be to either move the speakers closer to a boundary where the floor is not flexing as much or to decouple the speaker completely from the floor. That can be accomplished by making a platform from wood filled with sand, or using a granite base several inches thick. In addition to the induced resonance, there will be upper frequency reflections that will affect the midrange/tweeter balance, usually boosting the treble/upper midrange and destroying the image solidity. If you have hardwood floors, installing a thick rug in between the speakers and the listening chair will normally correct this problem.

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**CARPETED FLOORS:** Using the spikes after break-in and correct placement will tighten up the bass and lock in the soundstage. Make sure that you level the speakers so they don't rock, and use the locking nuts to make sure the spikes won't vibrate loose.

### WIRING

The best sound staging and transparency from the VR-4 series results from bi-wiring the speakers, but if a bi-wire set is not initially available, connect the main speaker wire to the upper midrange/tweeter inputs then connect the *Data Link* and jumper plates between the bottom binding posts. A 30" jumper wire can be connected between the *Midrange/Tweeter* and *Sub* posts, if the use of the *Data Link* is not desired. However, we recommend using this only as a temporary solution, since we designed the speakers expressly to be bi-wired. When bi-wiring you have two options. The first, when using shotgun bi-wire is to directly connect to the upper *Midrange/Tweeter* posts on the upper unit and *Sub* posts on the lower Sub cabinet, disconnecting the *Data Link*. The second, when using bi-wire terminated at one end is to directly connect to the *Midrange/Tweeter and Sub* posts located on the Sub cabinet, and then connect the *Data Link*.

\*If you connect the main cable to the woofer and then use a jumper upwards to the M/T (by wire, by jumper plates, and by *Data Link*), you will be able to hear a slight loss of clarity, since there will now be two to four connections in the signal path instead of just one to the high resolution tweeter.

Also, make sure that you make a very tight connection between the binding post and the spade lugs on the cables. A loose connection will be apparent as a loss of depth and sweetness. Use a contact enhancing fluid once a month on all RCA plugs and binding posts for best results. There will be attendant increases in sweetness, air, soundstage depth, and smoothness equal to an upgrade in cables, but at far less cost.

Although we have tried almost ten different brands and types of speaker cables, we can only give general recommendations due to the fact that the driving amplifier has as much to do with the type of desired wire as the speakers. Since there are hundreds, if not thousands of available amp/wire combinations, we are not in the position of having heard these combinations.

**However, in general, stranded wire usually has a softer, fuller, sound, while solid core wire has tighter bass. You can use these traits to "tune" the overall sound of your system.**

Please use your VR dealer's expertise when selecting wires and cables, as he has the experience with both the speakers and different amplifiers and can help you make an intelligent selection.

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**BI-AMPING THE VR-4 SERIES:** If the tightest bass is desired, use a solid state amplifier on the woofer modules. If you value “image float” and liquid-sounding midrange/treble response, use a tube amplifier on the M/T’s. You will not need an outboard crossover, since the crossovers in the speakers will still continue to work. Although it is true that louder output can be obtained by high-pass filtering the tube amp, the loss of transparency is usually not worth it, and the clean volume obtainable without a high-pass crossover will be usually satisfying for anyone but a metal head. (Note: if you are a metal head, welcome to high-end audio!) You will need a preamp that has twin outputs, but if you have only one set, use high quality Y-jacks available from your high-end dealer.

Balancing of the volume levels when using amps with different input sensitivities can be accomplished by outboard level controls available from your dealer at very modest cost. If the amplifiers have input sensitivities which are fairly close, even if they are different brands, there will be no need for level controls.

**VERTICAL BI-AMPING:** If two stereo amplifiers of the same brand and model are available, try using this method of wiring. One channel will drive the woofer module, while the other channel *of the same amplifier* will drive the upper M/T’s. This wiring may sound much better than simply switching the amp to the mono-block “bridged” mode.

**HORIZONTAL BI-AMPING:** If two different stereo amps are available, one amp can drive the woofers and the other amp, perhaps of lower power, can drive the M/T’s. This works well with large solid state amps driving the woofers, with a smaller tube amp driving the upper end. We have heard of systems with 200 watts per channel on the woofers, with 20-30 watts per channel of tube power driving the M/T sections. This may seem like an imbalance, but since the most power is needed to drive the woofers, it may work very well!

## PLACEMENT

The VR-4s are Room Interactive, meaning that the VRs were designed to work in an average listening room, not an anechoic chamber. Speakers that measure very good in an anechoic chamber will usually sound too bass heavy and directional when placed in a room due to boundary effects and room gain in the bass region. The bass response of the room (boundary gain) has been factored into the VRs, along with the reflective nature of boundary surfaces such as wood, plaster, glass, and so forth. Since the VRs are quasi-omnidirectional transducers, designed to be the inverse of the recording microphone, their sound output will react with the listening room in a positive manner *only if properly placed*. There are two components of sound that reach the listener’s ears:

1. The direct arrival, or initial wavelaunch of the speaker itself;

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2. The secondary waves, which are reflected from the room's boundary surfaces.

The reflected sound is delayed according to the distances involved from the speaker to the boundaries, then back to the listener. It is important for the reflected sound-field to integrate properly with the initial wavelaunch, since out-of-phase reflections will interfere with both frequency response and image focus. It is not difficult to determine where the best placement will be in any given room, since you will be using a pink noise listening test discussed later. See Pink Noise Test.

In every room, there will usually be more than one magic spot for the VRs to sound their best. However, finding those spots is not intuitive, due to the nature of reverberation characteristics and room dimensions, which vary enormously from room to room. The VRs, being Virtual Reality simulators, are designed to load the room very similarly to the way a live instrument would load the room. Only in this way can your ear/brain hearing mechanism be lulled into believing that you *could* be listening to an actual performance, and not simply 'canned' sound. If you had a grand piano at the end of the room where the speakers are playing, it would involve the entire room with semi-omnidirectional sound, and your ear/brain hearing mechanism will clearly know this. The VR Virtual Reality design will simulate this huge soundfield, with its involving depth and dimension. However, correct placement is required to achieve the best possible sound quality. Amazingly, moving the speaker only a few inches can make the difference between good sound and great sound due to the reflective properties of your room! Note that this fact is true with any speaker system.

**PINK NOISE TEST TO FIND FOCAL POINT OF ARRAY:** Since the VR-4 Series is Quasi-Time Aligned by use of the specialized *Global Axis Integration Network*™ crossover circuit and thus results in a focused phase-array driver complement, there is an optimum seating distance. If you must situate the speakers close together, with a close listening position for near field applications, such as in a recording studio, you may have to toe the speakers out slightly if you find that the image is "bunched" together towards the center. **In order to find the focus point of the array, use the following technique:**

**PINK NOISE LISTENING TEST FOR FOCUS:** Play a pink noise source such as a CD with test tones or an FM tuner set between stations (with muting turned off). You will notice *one of two* sonic effects when listening to pink noise:

1. If you **are** in the focal point of the array, you will hear a "ball" of noise that appears to float between the speakers. Although noise will appear to emanate from the speakers themselves, the center image will be stronger, with a slightly different tone quality to the phantom center image. The sound from the speakers themselves will seem slightly detached from the pink noise ball, and slightly softer in volume level. The center "ball" of sound will be very strong, and you will be able to detect that the "ball" of sound is round, with depth to the image. This is a 'locked in' image with correct focus.

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2. If you are **not** sitting in the focal point, the noise will be diffuse, without a center image. Although you will hear noise coming from the center, it will sound as diffuse as the sound coming from the speakers themselves. Even though the speakers will image music when set up like this, the imaging will be diffuse and non-localized. There won't be enough 'body' to the images, and it will be hard to hear space between the instruments. There is a distinct lack of image focus in this situation.

To find the focal point of the VR system, move forwards and backwards slowly while listening to the pink noise 'ball'. You can either rock in your listening seat, or move back and forth by several feet if you are way out of the equilateral triangle (using a director's chair for this works great). If you have a fixed seating position that can not be moved due to furniture considerations, you will have to move the speakers either closer together, or further apart, depending on the strength of the pink noise 'ball'. If the speakers are closer together than 8 feet, try spreading them further apart.

*\*Note: if the speakers cannot be separated more than a few feet due to room considerations, as in a video application, it may be necessary to toe the speakers outwards.*

If you are placing the speakers further apart than 8 feet, try toeing them in towards you, listening for the 'ball' to lock in. It really helps to have two people moving the speakers while you sit in the listening position, giving orders. Toe-in is often critical, with only 1" movements being very apparent. When you have found the correct spacing and listening distance, you will immediately know it, since the image lock-in is very obvious. The pink noise will become a very strong 'ball' of sound, just floating in between the speakers. Keep moving the speakers until you hear this ball of sound. As you move the speakers either closer together or further apart, and experiment with toe-in, you will hear changes that enable you to know if you are headed in the right direction. It is not really difficult, it's fun. Of course, experimenting with several types of placement schemes is valuable, for it will teach you how the speakers interact with your particular room. Only by careful experimentation will you find that 'magic' spot for your new VR-4 speaker system.

**REAR AMBIENCE DRIVER ADJUSTMENT:** The VR design has a rear-firing ambience driver which adds depth enhancement and 360 degree timbre fill-in. When breaking in the speakers, leave the Spatial Dimension Control all the way up in order to break-in the driver fully. However, when optimizing the imaging using the pink noise test documented above, turn the ambience driver off by rotating the control fully counter-clockwise. Once the speaker location has been determined, it is time to add some rear ambience. While listening to a variety of naturally recorded music, dial in successively more ambience, listening carefully to the change. If your rear wall behind the speakers is highly reflective, only a little ambience will be necessary if the speakers are fairly close to the wall. (Set control between 6:00 and 9:00 as referenced to a clock face). In some situations, where the rear wall is highly reflective and the driving amp/cables are

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somewhat overly detailed, it may be possible that *no* rear fill is necessary nor desirable. If you hear ‘brightness’ creep into the overall balance, it may be time to back off on the Spatial Dimension Control. In a room that’s fairly dead, with soft sounding gear, it may be necessary to use the Spatial Dimension control fully on.

### **BASS RESPONSE TUNING**

*BACKGROUND INFORMATION:* Since enclosed rooms will affect the bass response due to standing wave formation, a woofer-tuning feature has been designed into the VR series of speakers. Deep bass in the 20-30Hz range is highly desirable in a reference speaker design, since hall reverberation at low frequencies is a sonic clue to both depth and hall size. Classical music simply sounds anemic and artificial without deep bass. In addition, the wide dynamic range found in pop and jazz recordings depends on bass ‘slam’ and efficiency at low frequencies in order to sound like a live bass instrument such as bass guitar, synthesizer, bass drums, and upright string bass.

For this reason, a hybrid triple-chambered transmission line/bass reflex system was engineered which exhibits both deep bass and fast transient response, with a strong emphasis on tight bass. Although it is true that the measured transient response of a sealed woofer system has less ringing than hollow cavity type bass reflex cabinets (but not the VR design), the trapped rear wave of sealed enclosures results in low efficiency, while the compressed air load results in sluggish transient attack. For this reason, transmission line loading has much appeal, and makes more engineering sense, since both deep bass and fast transient response (resulting in “tight” sound) are optimized at the same time. Bass reflex systems, however, which are hollow (lacking 100% stuffing fill), have very unpleasant ‘hangover’ due to cavity resonance. This problem has been eliminated in the VR design by the utilization of a high stuffing density. This technique does not work with standard reflex woofers, nor conventional Theile/Small tuning alignments, however. The resistive damping in the form of acoustic foam and Dacron fill must be compensated in both the driver design and the cabinet tuning ‘alignment’. All VR Series use custom designed drivers with very high magnetic damping (low Qes) and stiff suspensions (high Qms). The tuning ratio is derived from a proprietary over damped Theile/Small alignment with a total Q of less than 0.6, while the woofers themselves have a total Q below 0.3. By using an over damped alignment, maximum tightness is assured due to oversized magnets, stiff suspensions, over-sized enclosures, and a low tuning frequency.

In addition, the midbass rise normally associated with dual woofer formats has been eliminated by the use of Zobel conjugate networks in the VR-4 Series woofer crossover. The inductor coils used at extremely low frequencies have to be massive to avoid saturation and hence are quite expensive and difficult to design. However, the extremely clean bass response of the VR series is the direct result of engineering taken to the extreme.

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*GENERAL TUNING INFORMATION:* Both the volume level of the bass and the frequency response of the woofer system can be altered easily by several methods in order to equalize the room's influence on the bass response. Although the VR bass systems measure ruler flat in larger rooms that have good dimensional ratios, (using both gated sine wave and maximum length sequence FFT signals), smaller rooms tend to have bass anomalies and overloading problems with low frequencies due to the long wavelengths involved.

*STANDING WAVE PHENOMENA:* Standing waves are dips and peaks in the bass response caused by the room boundaries. Although many people have heard the term, many don't actually know what causes standing waves and what to do about them. Since all speaker systems radiate bass almost omni-directionally, there are many path lengths that the waves take before arriving at the listening position. Although the first arriving bass wave will have flat frequency response, fractions of a second later the same waves have bounced off of the front wall, rear wall, side-walls, and the floor. These reflections both reinforce and cancel the original direct wave, depending on the wave-length vs. the path length. If the path length is an even multiple of the direct wave at any one given frequency, the reflection will reinforce the first wave since it will be mathematically additive and will cause a peak in the response at this frequency. However, if the path length is such that the reflected wave is out of phase with the main wave, there will be a cancellation in the frequency response. Researchers have found that the dips and peaks in the response can be very powerful, with 18dB variances across the bass range! Note that this effect occurs with ANY speaker design: **no** speaker system can overcome the law of physics.

When playing a recording with plenty of deep bass, a listener can walk around the room, finding that every foot or two, there is flat response, a peak, or a dip. By walking around the room, you can 'map' the response, finding the places where the pressure alternates from high to low. These alternating pressure zones are a natural part of room acoustics and must be dealt with by correct speaker placement.

*THEORY OF RECIPROCITY REGARDING BASS RESPONSE:* Since standing waves are not easily amenable to correction by equalizing the speaker passively, it is necessary to place both the speakers and listener/s in neutral zones. According to the mathematics of the pressure zones, the flattest response occurs when both the speakers and listener are at opposing ends of the room, directly against the wall surfaces. Since against-the-wall placement is not a prime location for soundstage 'openness' and imaging focus, we recommend placing the speakers out into the room, at least 12" from the back wall to start. Then, playing a repeating bass line, walk around the room in the general vicinity of the intended listening position. If you find that the smoothest bass response does not occur where you would like to place the listening seat, you can use the Law of Reciprocity to find the optimum spot.

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The physics of bass response are the same for the listener or the speaker when interchanged. That means that you can place one speaker where you wish to sit, then play the repeating bass line, and then walk around on the other side of the room where you want to place the speakers. When you find a neutral zone, where the bass is not too loud nor too soft, that's where you place that particular speaker. Next, do the other side in the same manner. Make sure you use a variety of recordings, since it is possible to optimize the placement accidentally for only one frequency range!

**TOO MUCH BASS OVERALL:** If you have optimized the placement, yet find that the bass is too powerful due to a very small room and/or mandatory corner placement due to the nature of the furniture arrangement, you can "tune" the bass balance. If the entire bass range is too loud, purchase Dacron Polyfill from the local five and dime store or sewing shop. It is synthetic cotton in appearance and is used for pillow stuffing. Simply place a handful of the Dacron in each vent tube; this will lower the efficiency of the vent tuning. If the bass is still too loud overall, place another handful in each vent. If the low frequency range has come into proper balance, stop there.

*If you have lost the deepest octave, you can push the Dacron into the enclosure instead of leaving it in the vent tube proper.*

**BASS RESPONSE TUNING FOR TUBE AMPLIFIERS:** Since tube amplifiers have "air and liquidity" in the mid and treble ranges, many audiophiles use them. However, the saturation, back EMF, and transient response delays of all output transformers will cause sluggish bass response which can be heard when using any speaker that has response below 50Hz. The deep bass can be tightened considerably by the addition of several handfuls of Dacron in each vent, which is then pushed into the enclosure with a broomstick. The stuffing can be done gradually, but if the bass become 'too' tight, it is a simple matter to remove the excess Dacron by reaching in and pulling some of the Dacron back out. (It takes a small hand to fit into the vent tube). It is entirely possible to tighten the VR-4s bass response to a degree not heard with other speaker systems, comparing directly with very small sealed woofers.

*Try using solid core wire on the woofer modules when using tube amplifiers if you are trying to tighten up the bass, since stranded wire will emphasize the bass fullness you are trying to equalize. However, using silver cables will also tighten the bass.*

The best possible bass response is obtained from high current solid-state amplifiers, making bi-amping the ideal choice for the critical audiophile who wishes to have the best sound in every part of the frequency range. See the section above regarding bi-amping.

**LACK OF APPARENT BASS:** In some rooms, especially those with 'soft' walls such as wallboard over studs, and open floor plans, it is possible to 'lose' bass response. Also, when sitting in a 'null', it is possible to perceive, incorrectly, that there is a loss of bass

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power. In these cases, it will be necessary to move either the speaker position or the listening position in order to optimize the response. By playing a recording with a repeating bass line, try walking around the room until you find the places where there is apparent bass. It will be necessary, in some cases, to reposition the speakers in order to allow the room to boost the bass by using the natural 'gain' of the boundary reflections. Simply move the speakers closer to the rear wall or side-wall in small increments until the bass sounds right.

### **LEAD TRAP**

The VR-4jr has a special compartment at the bottom of the cabinet, hidden by the removable bottom plinth. This compartment was designed to be filled with lead shot in order to damp spurious cabinet resonances. Bass and lower midrange frequencies will be tightened when the Lead Trap is filled, as the movement of the damping particles adsorbs vibration. We have found that two 25 lb bags of lead shot from a gun or sporting goods store is sufficient to fill the cavities in both speakers (the lead will not completely fill the chamber, it takes around 180 lbs to fill both chambers, but that may be excessive).

- Place the VR-4jr upside down on a soft surface, such as a towel, and remove the bottom plinth.
- Pour approximately 25-50 lbs of lead into the opening. Shake the speaker until the lead settles.
- Replace the door and plinth and you're done. Note that the midbass/lower midrange frequency bands are now cleaner and tighter.

### **ANCILLARY EQUIPMENT**

The VR Series is far more transparent than any other competing design, including electrostatics. (If you don't believe this, put any electrostatic next to a VR and use a transparent switching device such as a copper knife switch to directly compare the sound of the VR to the electrostatic. Make sure that you use the same channel, since the electronics may have a large difference in sound between the channels, and the same brand of cable. It may be necessary to use a metal film resistor to equalize the sensitivity of the louder speaker in order to make a fair test.) Since the VR design is quite transparent, lacking audible coloration and distortion, it is necessary to use only the finest sounding equipment available to drive the VR-4's. This does not mean you must purchase the most expensive gear, just *good sounding* electronics, especially in the front end. Many digital products have limited depth and excess treble brightness caused by overemphasis of harmonic structure. The VRs will enable you to easily hear the differences even between digital cables, which theoretically, should have no sound at all. Any sonic qualities you attribute to the VRs are actually coming from the chain preceding the speakers. When using neutral driving equipment, the VRs will be found to have virtually no sound of their own!

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Since there are thousands of different combinations of components, we cannot give any specific recommendations. Your VR dealer, however, is experienced with many types of components and should be consulted for best results. We have made an effort to seek out dealers who are experienced in the art of component matching and have full trust in their abilities, so please use their expertise when building a system around the VR series of loudspeakers.

**TROUBLE SHOOTING:** Your VR dealer should have the necessary resources to investigate any problems you may experience when setting up a world-class reference system. However, if you find that you need specialized help, either in acoustical or electronic interactions, please don't hesitate to contact the factory. Call (760) 410-1650 and ask for Customer Service. A qualified engineer will be there to assist you with any problems you are experiencing.

### **Bright Sound:**

A very common problem is brightness, and is wrongly attributed to the speakers since they are the apparent source of all sound. Some of the causes of brightness are:

1. *Powerline Noise.* Can be ameliorated with a proper line conditioner.
2. *Cable Resonance.* Too many brands of different cables, which interact improperly. Switch interconnects, including the digital cable, to a different brand.
3. *Digital Noise.* Use a powerline filter on DAC only. Many times the harshness is created by digital noise bleeding into the preamp, so don't put the preamp on the same filter as the DAC.
4. *Lack of Proper Break-in.* Please break speakers in 100-300 hours with loud music.
5. *Source Material.* Unfortunately, most commercial CDs are bright! Try using the Green Felt Pen and the Bedini Clarifier. Make sure you clean the CDs and do not allow them to get scratched.
6. *Transistor Sound.* Older transistor gear is bright and lacks depth. Invest in newer gear.
7. *Dirty Connections.* Proper maintenance of a system requires cleaning of all RCA connectors once a month; do not forget to clean the AC plug prongs. Tube sockets and pins need to be cleaned as well, and is a source of 'tube glare', along with tube deterioration itself. See your dealer for cleaners.
8. *Cold Equipment.* The entire system must be left on (excluding tube amplifiers) continuously for best sound quality. Cold equipment, especially transistor preamps and DACs, sound thin, sterile, and lack depth or dimension. Cold transistor amplifiers sound

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harsh, lacking depth. Most experts recommend leaving the equipment on to avoid the damage associated with cold turn-on, since the most wear to the electronic components in an amplifier results from the inrush of current from the wall into a cold part. Once the unit is left on, the voltages and temperatures stabilize, resulting in better sound and component life. If in doubt, check with the electronics manufacturer or dealer.

9. *Bloated Image or Poor Focus.* Slap echo from hard walls, or too much rear Ambience.

10. *Room Effects: Boomy Bass, Harsh Highs.* Not many audiophiles realize how important their room acoustics are to the overall soundfield. No matter how good the speaker system and driving electronics, the room will have great influence over the final sound, whether for better or worse! Harsh highs can be created by echoes reflected from large wall surfaces with unbroken surfaces. If you can hear any echo when clapping your hands, you will need to use some room treatment products.

11. *Lack of Bass.* Check the wiring to the woofer modules and make sure they are in phase. Rooms can add or subtract bass response, but correct tuning and placement can ameliorate these problems. If your electronics or cables are really bright, you may feel that there is more treble than bass. Try substituting different electronics or cables and recheck your room placement.

## ROOM ACOUSTICS

Many books have been written about room acoustics, and there is not enough space in this manual to give detailed information on how to do it right. However, the general rule is to use 50% absorptive/50% reflective ratios when covering the room's surfaces, such as carpeting, drapes, stuffed furniture, bookshelves filled with books, records, etc. It is helpful to damp the first reflection points, which are the boundary surfaces halfway between the listener and the speaker cabinets. This includes the ceiling, walls, and floor. Hard plaster ceilings will reflect treble energy back down towards the listener, and should be treated with acoustic tiles (the soft and porous type) or damping pads made from foam or fiberglass. The walls can have a decorator rug, drapes, or diffusers at the first reflection point, and the floor can use carpeting. We have used plants and trees to diffuse the echo in our very large sound room, and found that this works better than simply absorbing the high frequency reverberation. Some of these diffusion devices are made by Acoustic Sciences Corporation (ASC), Echo Busters and RPG, along with others. Tube Traps by ASC are placed in room corners and will absorb bass boom and flutter echo in the mid/treble region. Michael Green offers Corner Tunes, which are placed in the upper corner joints of the wall/ceiling junction. Call your dealer for more info.

**One last thing: if your VR speaker system does not elicit goose bumps, your set-up is not optimized!**

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**CARE FOR THE FINISH:** Only Windex and a soft cloth should be used to remove fingerprints from the wood finish (wax is not necessary and will attract dust). Use a stiff brush to dust the cloth socks, being careful not to poke the midrange or tweeters in the upper module.

## SPECIFICATIONS

**Woofers System:** Twin 6.5" Extreme-duty drivers with aerospace composite cones and long-throw *Low Distortion Motors*, shielded for video use.

**Midrange:** Single 6.5" midrange with aerospace composite cone and long-throw *Low Distortion Motor*, shielded for video use.

**Tweeter:** Single 1" composite dome, silk laminated with two polymer resin coats: long-throw design using *Low Distortion Motor*, Ferrofluid liquid cooled, and shielded for video use.

**Cabinet Design:** Isolated, dual stacking cabinetry, utilizing triple-chambered transmission line loading with front vent on bass module and sealed for the midrange/tweeter module.

**Damping System:** Resonance-trap in woofer module provided for addition of lead shot. 25 to 40 lbs of shot can be added to stabilize the sound.

**Crossover Type:** *Global Axis Integration Network* for accurate off-axis frequency response and consistent phase.

**Ambience Retrieval System:** 1" soft dome mid/tweeter with rear-firing wave-guide, *Dimension Control* for setting effects level.

**Input Terminals:** Three sets of rhodium-plated five-way binding posts. Jumper straps and *Data Link* provided for non bi-wire cables.

**Crossover Points:** 200 Hz, 2.2 kHz.

**Frequency Response:** 25 Hz to 20 kHz (-2dB).

**Impedance:** 8 ohms nominal (Midrange/Tweeter). 4 ohms nominal (Woofers). 6 ohms average.

**Sensitivity:** 89 dB anechoic (91.5 dB in room with boundary boost).

**Power Rating:** 20 watts r.m.s. minimum, 300 watts r.m.s. maximum.

**Dimensions:** Midrange/Tweeter (12.5" H x 8" W x 18.5" D). Woofer (25.25" H x 9.5" W x 20" D) System (38.5" H x 9.5" W x 20" D).

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**Weight:** Midrange/Tweeter 26 lbs each. Woofer 52 lbs each. System 78 lbs each.

**Warranty:** Ten Years excluding abuse or burnt voice coils due to amplifier clipping.