

VON SCHWEIKERT AUDIO

WORLD-CLASS SPEAKER SYSTEMS FOR AUDIO AND HOME THEATER

VR-4SR Mk2

INSTRUCTION MANUAL

Released October 2007

VON SCHWEIKERT AUDIO

VR-4SR Mk2

TABLE OF CONTENTS

IMPORTANT NOTES.....	PAGE 2
BREAK-IN.....	PAGE 2
INITIAL SETUP.....	PAGE 3
WIRING.....	PAGE 4
BI-AMPING.....	PAGE 6
PLACEMENT.....	PAGE 6
PINK NOISE TEST FOR FOCUS.....	PAGE 7
REAR AMBIENCE DRIVER.....	PAGE 8
WOOFER TUNING/BASS RESPONSE ADJUSTMENTS.....	PAGE 9
TUNING WOOFERS FOR TUBE AMPS.....	PAGE 11
LACK OF BASS.....	PAGE 12
TROUBLE SHOOTING.....	PAGE 12
ROOM PROBLEMS AND TREATMENT.....	PAGE 13
CARE FOR THE FINISH.....	PAGE 13

INTRODUCTION

Thank you for investing in a Virtual Reality speaker system designed by Von Schweikert Audio. Used properly, the VR-4SR Mk2 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-4SR Mk2'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 which must be followed. The VR series are engineered to replicate the recording microphone's signal in reverse, allowing the original sound-field 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 NOTES:

Please read the following instructions regarding setup, as imaging and bass response must be optimized to your particular room. Since every listening room will have different dimensional ratios and reflective/absorptive coefficients, each setup will be different. A thorough break-in 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-4SR Mk2 can offer; optimum performance is only attainable by using the following instructions!

When unpacking the VR's, 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.

BREAK-IN

The VR-4SR Mk2's use proprietary drivers custom made for this system; stiff suspensions were designed to control the cone motion and will require several hundred hours before the suspensions become compliant. Since the crossover networks were designed using "aged" transducers with 300 hours of music played at 93dB (fairly loud), you will need to play the speakers for 300 hours before the transducers and crossovers "work" together properly. Since the fluidity and dynamic range of the speaker depends on free movement, you may notice a slight "brightness" in the midrange/treble area and mechanical "heaviness" in the bass for the first 100 hours. The sound engineered into the VR's will take approximately 100-300 hours to achieve, so we recommend that you not make a critical judgment of their sound until break-in is accomplished.

Break-in is best done by playing loud rock or jazz music for several days straight. We suggest placing 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, since sustained high volume playback at clipping will burn the speaker's voice coils. Make sure that you set the volume level *before* putting one of the speakers out-of-phase and installing the quilts. Note that low powered amplifiers will burn the voice coils much faster than high powered amps due to the onset of early clipping in low powered amplifiers. Use caution when breaking in your new speakers; clipping is easy to hear and sounds metallic, harsh, or "buzzy." If you get to this point, you'll need to turn down the volume a couple of notches to avoid burning the voice coils. If you choose not to break in the speakers before setting them up, 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 as the source. If you have a "clean" amplifier with 100-200 watts of power, you will be able to play the VR-4SR Mk2's loudly over a long period of time without damaging the voice coils.

SETUP

1. Please do not install the spikes until the proper placement has been determined. *If you try to move the speakers around with the spikes installed, you can damage your floor and/or rip out the spikes, so please be careful and install the spikes only when you are confident that the speakers have been placed in the proper position.* 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 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 that's not a concern at this time.

2. Turn off the rear ambience drivers by rotating their volume controls counter-clockwise *until the setup is complete.* You need to achieve correct image focus *before* setting the level of the rear ambience tweeter, please refer to the section regarding the REAR AMBIENCE DRIVER on page 8.

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. You can see that these two considerations are in direct conflict, so some compromise must be made initially for either loud bass or an open sound stage. During optimization, you will be balancing these two considerations, as both are necessary for realistic sound reproduction.

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 VR's 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. Most acoustic experts recommend toe in, as this will give you

the best image focus and widest sound stage. However, since your taste may vary, you may well prefer the extra depth achieved with no toe in; i.e., the speakers parallel to the side walls.

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 the sound stage focus. 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 Echo Busters, RPG, ASC, 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 in the center. Your dealer can recommend tuning products that he 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 distance 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 which 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 rubber decoupling feet, see your dealer. In addition to the induced resonance, there will be upper frequency reflections which will affect the midrange/tweeter balance, usually boosting the treble/upper midrange and destroying the image solidity. Installing a small rug in between the speakers and the listening chair will normally correct this problem.

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.

CARPETED FLOORS: Install the spikes after break in – this is easily accomplished with two people, one tipping the speaker back while the other installs the spikes. *Be careful not to let the M/T unit fall off the woofer module! If one person installs the spikes, remove the M/T modules before attempting to install the spikes.* 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. You will be amazed at the improvement to both the bass response and the image focus after installation of the spikes.

WIRING

The VR-4SR Mk2 was designed to accept all forms of speaker cables, so you will find three pairs of binding posts on the back of each speaker system: two pairs on the woofer module and another pair on the midrange/tweeter module. See below for information on what these binding posts can do for you.

SINGLE CABLE:

Connect the speaker cable to the binding posts ***on the upper midrange/tweeter unit***, then connect the supplied Data-Link jumper to deliver the signal downwards to the woofer module. Note that there are metal jumper links that connect the bottom two pairs of binding posts together; these must be used with the Data-Link jumper in order to transfer the signal to both woofer and midrange/tweeter crossover boards when using the single speaker cable.

NOTE: we recommend using this only as a temporary solution, as we designed the speakers expressly for bi-wiring. ***DO NOT connect the main speaker cable to the woofer module, as you will be able to hear a loss of clarity in the midrange and treble frequencies due to three connections in the signal path instead of just one.***

BI-WIRING:

Using two separate pairs of speaker wires to deliver the signal to the woofer and midrange/tweeter modules will result in superior image depth, cleaner upper midrange/treble, and a larger sound stage. These benefits are due to the isolation of the powerful bass signals from the more delicate treble frequencies as the signal travels up the speaker cables. Since there is generally ten times more voltage present in the bass signal, the generation of a magnetic field in the positive and negative conductors will interfere with the more delicate treble signals. This magnetic modulation is easy to hear on a high resolution speaker like the VR-4SR Mk2 but may not be as audible on lesser speakers. Using two separate conduction paths will enable the bass frequencies to be separated from the treble frequencies due to the high impedance “seen” by the signals due to the internal crossover networks. In other words, since there is a “high impedance” (to low frequencies) in the midrange/tweeter crossover, bass frequencies WILL NOT travel from the amplifier up to the midrange/tweeter unit, even though both speaker cables are connected to the same binding posts on the amplifier! The opposite effect occurs in the woofer cables, where no midrange/tweeter frequencies will travel due to the high impedance “seen” as the result of the woofer crossover. Crossover filters work due to the reactances supplied by the inductors and capacitors; inductors generate a “high impedance” to midrange/treble frequencies and capacitors generate a high impedance to bass frequencies -- it's like pouring water on the side of a hill: the water will never travel uphill against gravity!

WOOFER MODULE BINDING POSTS:

Note that two pairs of binding posts are offered on the woofer module, and are generally connected together with the metal straps provided when *only* one cable is to be used. These two pairs of binding posts on the woofer module enable a “quad” cable hookup for bi-wiring – this setup requires the use of the Data-Link. If you have previously purchased a “quad” biwire cable, with all four conductors inside one jacket, the woofer module is where you will connect the four wires. **DO NOT USE THE METAL STRAPS IN THIS APPLICATION, AS YOU WILL NEGATE THE BENEFITS OF BI-WIRING.**

If you have not purchased a “quad” bi-wire set, do not plan on using this type of cable -- a twin set of separate cables is greatly preferred, due to the lack of mutual conductance from close proximity and the elimination of the extra connections required of the supplied Data-Link jumper cable.

IMPORTANT NOTE:

The binding posts supplied on the VR-4SR Mk2 are among the finest quality available and can accept raw wire, spade lugs, pins, and banana plugs. According to WBT, the best sounding connection is made with raw wire, inserted into the side holes in the binding post shaft. After listening carefully, we concur; solder is not as transparent as a “direct” (raw) wire connection!

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.

Although we have tried almost thirty 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 all of these combinations.

However, in general, stranded wire usually has a softer, fuller sound, while solid core wire has a tighter and leaner sound. If you want a “richer” sound, use stranded wire, but if your system is too “warm” then use a solid core design to lean it out.

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. Note that VSA will not make any amplifier or cable recommendations, this is the function of the dealer.

BI-AMPING THE VR-4SR Mk2

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 electronic crossover, since the crossovers in the speakers will still continue to work. Although it is true that louder treble output can be obtained by high-pass filtering the tube amp, the loss of transparency is usually not worth it. 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.

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-4SR Mk2's are Room Interactive, meaning that they 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 increased bass response of the room (called boundary gain) has been factored into the VR-4SR Mk2's tonal balance, along with the reflective nature of boundary surfaces such as wood, plaster, glass, and so forth. Since the VR-4SR Mk2's 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 which reach the listener's ears:

1. The direct arrival, or initial wavelaunch of the speaker itself; this is the sound that is purely from the speaker system and should be dominant in your room.
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 flat 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 on Page 8).

In every room, there will usually be more than one magic spot for the VR's 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 VR's, 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 it's 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 most high quality speaker systems.

FOCAL POINT OF ARRAY: The VR-4SR Mk2 is Time Aligned by use of mechanically displaced voice coils achieved by the tilt-back M/T module and the specialized *Global Axis Integration Network*™ crossover circuit, which achieves the desired phase-consistent sound field over a wide listening area. 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 not need to toe the speakers in towards you, but you will need to sit with your ears on the tweeter's vertical axis for flattest frequency response. The treble response and depth of field will be differentiated when you compare zero toe in with full toe in, please experiment. Note that recording studio near-field monitoring will require substantial absorption or diffusion of the boundaries closest to the M/T modules.

In an average room situation, where the distance between the speakers is equal or lesser than the seating distance, use the following Pink Noise Listening Test to determine the best location for image focus:

PINK NOISE LISTENING TEST

Play a pink noise source such as a CD with test tones or an FM tuner set between stations (with muting turned off). The goal of this test is to determine whether the room's reflection patterns are interfering with the image focus built into the VR-4SR Mk2 design. You will notice *one of two* sonic effects when listening to pink noise, and #1 is what you want:

#1. If the speakers are placed properly and the room is neutral in reflective properties, your next step is to find the correct listening distance, where the focal point of the combined sound from the two speaker systems exists. In the correct seating area, you should 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 strong: this is the so-called *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.

#2. If you are **not** sitting in the desired 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. This is not the desired result! Even though the speakers may image music when set up like this, the imaging will be weak and lack depth and focus. There won't be enough "body" to the images and it will be hard to hear space between the instruments.

In the event that you hear two separated sources of noise, from the speakers themselves, without a

curtain of sound between them, your room's reflections and/or seating distance is destroying the coherent sound that was engineered into the VR design. To eliminate this unwanted effect, you will need to determine whether the room's reflections are at fault, or whether you are not in the "sweet spot."

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 best, as it is easy to move. 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 your former speakers were placed close together to achieve center fill, try spreading the VR-4SR Mk2's further apart. Their wide dispersion enables a larger sound stage.

Note: if the speakers can not 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 in order to gain a wide sound stage and reduce the tendency towards monophonic image focus.*

When 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 them 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, 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 isn't 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" sweet spot for your new VR-4SR Mk2 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.

In some situations, where the rear wall is highly reflective and the driving amp/cables are 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 20-40Hz 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 (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” bass) 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. 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-volumed enclosures, and a low tuning frequency.

In addition, the midbass rise normally associated with vented enclosures has been eliminated by the use of Zobel conjugate networks in the VR-4SR Mk2 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-4SR Mk2 is the direct result of engineering taken to the extreme.

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 omnidirectionally, 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 either 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.

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 a 2 lb bag of Dacron Polyfil from the local five and dime store or sewing shop. (Dacron is a synthetic cotton and is used for pillow stuffing).

There are two different ways to use the Dacron: a). filling the woofer cavity with more stuffing to reduce bass power, or b). partially blocking the vent to reduce the 20-30Hz tuning frequency range. A). To reduce the overall bass power, insert a ball of Dacron approximately the size of a large

grapefruit into the vent and push the ball upwards, into the woofer cavity. Do this in both speakers, and if one handful is not sufficient to reduce the overall bass level, continue to place Dacron balls upwards into the woofer cavity.

B). If the frequency range between 20-30Hz sounds too powerful in your particular room, simply place a large handful of the Dacron in each vent tube; this will lower the efficiency of the vent tuning. If the bass is still too loud, place another handful in each vent.

If the low frequency range has come into proper balance, stop there. If you change locations, you can always remove the balls of Dacron by reaching into the vent.

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 caused by the output transformers may cause sluggish bass response which can be heard when using any speaker that has response below 30Hz. 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. It is possible to tighten the VR-4SR Mk2's bass response to a degree not heard with other speaker systems, so don't be afraid to experiment!

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, open floor plans, and rooms with poor dimensional ratios, it is possible to “lose” bass response. Also, when sitting in a “null,” it is possible to perceive, incorrectly, that there is a lack of bass power in the speaker system itself. 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.

ANCILLARY EQUIPMENT

The VR-4SR Mk2 is far more transparent than any other competing design, including electrostatics. (If you don't believe this, put any electrostatic next to the VR-4SR Mk2 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.) Here at the factory lab, we have used several brands of electrostatic and ribbon speakers for comparison and have been consistently amazed at the results we are achieving with dynamic cone drivers!

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-4SR Mk2'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 VR's will enable you to easily hear the differences even between digital cables, which theoretically, should have *no* sonic signature! Any sonic qualities you attribute to the VR's are actually coming from the chain preceding the speakers. When using neutral driving equipment, the VR-4SR Mk2's will be found to have virtually no sound of their own!

Since there are thousands of different combinations of components, we can not give any specific recommendations for electronics or cables. 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 not well understood by your dealer, please don't hesitate to contact the factory by emailing your request to: albert@vonschweikert.com. A qualified engineer will assist you with any problems you are experiencing in achieving world class sound.

BRIGHTNESS: 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 300 hours with loud music.
5. *Source Material.* Unfortunately, most commercial CD's are bright! Try using the Green Felt Pen and the various CD treatments available, they work like magic.
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; don't 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 DAC's, sound thin, sterile, and lack depth and dimensionality. Cold transistor amplifiers sound 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. The electric bill will not reflect a huge price difference, as electronics at idle do not use much electricity (other than Class A amplifiers and tube amps).

9. *Too Much Rear Ambience Driver Level.* Turn down the rear driver if system is too bright.

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!

Rooms can add or subtract bass response, but correct tuning and placement can ameliorate these problems. See BASS TUNING section above.

Harsh highs can be created by echoes resulting 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.

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 artificial 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. Diffusion works better than absorption in larger rooms, but consult your Dealer for more information on room treatment. If your budget allows, contact Rives Audio (www.rivesaudio.com) to design your listening room. This company designs recording studios, concert halls, and home listening rooms to professional standards, they designed our listening space and a before/after comparison was simply astounding! Many audiophiles who continue to change components, looking for that "elusive" sound of live music, have not adequately addressed their listening rooms. Please optimize your room before making a judgment call on the "sound" of the VR-4SR Mk2! One last thing: if your VR speaker system does not elicit goose bumps on a daily basis, your set-up is not optimized -- every listening session should be an experience not soon forgotten!

CARE FOR THE FINISH

Only Windex and a soft cloth should be used to remove fingerprints from the veneer. If you want a higher gloss, use spray wax such as Pledge on a soft rag and apply to the finish. Never spray wax or Windex on the veneer itself, as the overspray may stain the grill cloth and/or transducers.

Happy Listening for all of us at Von Schweikert Audio!