

DEEP BASS

MX-2000



MILLER & KREISEL
SOUND CORPORATION

**MX-2000 Push-Pull
Dual Driver
Powered Subwoofer**

The Ideal Subwoofer:

It would be a speaker that lets you experience the richness, variety, and power of *real* deep bass — from the faint vibration of a gently bowed string bass to the thunderous impact of hard rock.

Technically speaking, it would be capable of high sound power levels all the way down to 20 Hz. High levels at low frequencies are necessary because the human ear has less sensitivity in the low bass portion of the sound spectrum than it does in the midrange portion — and this difference becomes progressively greater the lower the midrange sound power levels get.

Its response curve would avoid irregularities that produce coloration, and its distortion would be quite low to assure a *real* sound in musical instruments. And last but not least, it would have rapid response and

low overhang to avoid a 'muddy' sound.

Unfortunately, most subwoofers fail to meet one or more of the above criteria. Some provide fine detail but often lack the high output necessary at lower frequencies. Others provide high output, but concentrate it in a narrow range of the sound spectrum to produce that all too familiar and irritating "Boom-Box" sound.

Neither of these approaches is destined for greatness. For a subwoofer to be worth the attention of a discerning ear it must be able to render fine detail and provide high power — the attributes of the MX-2000.

The MX-2000

Bringing together great clarity; tremendous low frequency power and impact; plus the ability to seamlessly blend with any speaker, the MX-2000 establishes a new benchmark

MX-2000

**MX-2000 Push-Pull Dual Driver
Powered Subwoofer**

for subwoofer excellence.

Housed in the MX-2000's cabinet is M&K's most powerful amplifier and two proprietary high-performance drivers — mounted in M&K's Push-Pull Dual Driver configuration. These elements perform in harmony to deliver outstanding performance under both steady-state and dynamic music conditions.

Furthermore, driven by a 300 watt continuous RMS bridged power amplifier with a high-current power supply, the MX-2000 allows you to experience high output and wide dynamic range.

The Horizontal Push-Pull Dual Driver System

One of the key elements enabling the MX-2000 to achieve its high level of performance is the Horizontal Push-Pull Dual Driver System. This side-mounted, side firing, dual driver configuration lowers harmonic distortion, reduces cabinet coloration, and couples very effectively to the listening room in virtually any location.

The Physical Setup

Two side-firing 12-inch drivers are used in the MX-2000 — one on the left and one on the right side of the cabinet. The driver on the left side is mounted conventionally, revealing the front of its speaker cone with the grill cloth removed. The driver on the right side, however, is *inverted*, i.e., faces inward, revealing the back side of its speaker cone along with its magnet and frame. Although mounted opposite each other in the cabinet, both drivers "point" in the same direction (see diagram), and both share the same internal cabinet air space.

The Push-Pull Concept

In the MX-2000, when the left driver's cone moves out, pushing air away from the left side of the cabinet, the *back* of the *right* inverted driver's cone also moves out, simultaneously pushing air away from the right side of the cabinet. In the next (inward) half-cycle, both drivers' cones move in. The cones always move either towards each other or away from each other, and because they are mounted on opposite sides of the cabinet, the resulting output is a nearly spherical pressure wavefront emanating from the cabinet.

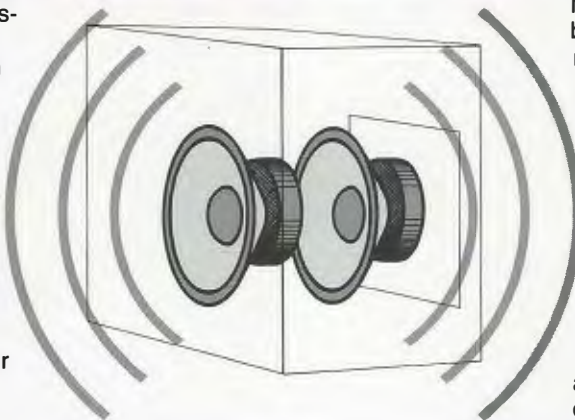
What substantially cancels the even-order harmonic distortion produced by the twin drivers is the fact that the left driver's cone is always located in the exact opposite

position, relative to its own magnet and internal structure, as is the right inverted driver's cone.

Pulsating Sphere Sound Propagation

The powerful pressure wavefronts generated by the Horizontal Dual Driver configuration radiate deep bass into the room much like a pulsating sphere.

BASS



Plus, the Dual Driver system in the MX-2000 practically doubles its efficiency — giving you even greater output and dynamic range than you would get from a single 12-inch subwoofer with a 300 watt amplifier.

Dynamic Balance

A common obstacle to clean sound reproduction in high-performance speakers is sound coloration caused by the cabinet itself. The MX-2000 addresses part of this problem with the Horizontal Push-Pull Dual Driver system — which *dynamically balances* some of the tremendous forces generated by the speaker drivers. This technique reduces vibrational energy imparted to the cabinet as a whole, thereby contributing to the MX-2000's ability to reproduce sound with clarity and detail. Additionally, vibration of individual panels is minimized by substantial internal bracing.

The M-2 Speaker Driver

The MX-2000 incorporates the new, M&K designed, M-2 driver. The M-2's large voice coil and magnet assembly give it an extremely high power handling capability, plus the ability to start and stop very rapidly in response to a musical signal. The M-2 is the tightest, cleanest, and most powerful driver M&K has ever offered!

By using two of these drivers, the MX-2000 achieves superior transient capabilities, and gets more radiating area than it would with a single 15-inch driver.

300 Watt RMS Power Amplifier

For high output levels — especially at the lowest musical frequencies — a large amplifier is a must. The faithful reproduction of deep bass requires *power*! And it is the MX-2000's 300 watt RMS internal amplifier, based on M&K's time tested and highly reliable amplifier topology, that gives it this power — making it one of the most powerful amplified subwoofers available.

Furthermore, a newly introduced high current power supply gives the MX-2000 outstanding transient capabilities plus exceptional dynamic headroom.

Building on Excellence

M&K's 15+ years of experience in the design and manufacture of subwoofers is unmatched. Each M&K powered subwoofer achieves optimum performance through careful matching of its cabinet, speaker drivers, and internal amplifier. Moreover, maximum flexibility is built in, making it easy to connect and sonically balance to your own system.

You can drive the MX-2000 with any amplifier, electronic crossover, or preamp. An independent control lets you set the bass level wherever you choose. And, a separate continuously variable adjustment lets you set the upper roll-off frequency anywhere from 50 Hz to 125 Hz.

The Only Choice

Building on M&K's legendary high level of subwoofer excellence, the MX-2000 becomes M&K's finest achievement in a subwoofer — blending seamlessly with any high performance speaker — from M&K Satellites to the best electrostatic panels. And, with its remarkable output capability, superb transient response and low distortion, it is "the only choice".

Amp Power: 300 watts RMS
Frequency Response: 20 — 125 Hz $\pm$ 3db
Impedance: Preamp Input 15K ohms
Power Amp Input 600 ohms
Weight: 105 lbs.
Dimensions: 23" (H) x 18 $\frac{5}{8}$ " (W) x 25 $\frac{1}{2}$ " (D)

10391 Jefferson Boulevard, Culver City, CA 90232
(213) 204-2854
TELEX 18-2429
FAX (213) 202-8782



**MILLER & KREISEL
SOUND CORPORATION**

MX-100

MX-90

MX-80

PUSH-PULL DUAL DRIVER POWERED SUBWOOFERS



MILLER & KREISEL
SOUND CORPORATION

Push-Pull
Dual Driver
Powered Subwoofers

MX-100
MX-90
MX-80

Over 17 years of M&K experience as the industry's leader in high-performance subwoofers culminates in a new level of subwoofer performance: the MX Push-Pull Dual Driver Powered Subwoofers.

Using technology from the top-of-the-line MX-2000 in smaller and more affordable packages, these subwoofers are ideal deep bass sources for the audio/video world of the '90s.

The remarkable and innovative Push-Pull Dual Driver configuration significantly outperforms single-driver subwoofers by increasing efficiency; lowering harmonic distortion; reducing cabinet coloration of the sound; increasing maximum output

and dynamic range, and coupling extremely well to the listening room.

Push-Pull Dual Driver System

In each M&K MX subwoofer, two proprietary 12" M&K subwoofer drivers are used — but the key to *push-pull* performance is in the way that these drivers are mounted.

One driver is mounted conventionally on the cabinet's front baffle. The second driver, however, is located at the cabinet's bottom. The key is that this driver is *inverted*. The front of its cone faces inward, so that the *back* side of the cone, magnet, and frame are exposed.

MX-100

MX-90

MX-80

Push-Pull
Dual Driver
Powered Subwoofers

When the front of the forward-firing speaker's cone moves out, the back of the inverted driver's cone also moves out, both drivers simultaneously pushing air away from the cabinet. In the next (inward) half cycle, both drivers' cones move in. The cones always move either towards or away from each other.

Although both speaker drivers fire into the room *in pressure phase*, they actually operate *out of phase* relative to each other. Therefore, the even-order harmonic distortion products created by one driver's voice coil moving away from its magnet are substantially cancelled by the other driver's voice coil moving into its magnet.

The Push-Pull technique also substantially increases driver stability under extreme transient excursions where single driver subwoofers reach or exceed their limits.

The result is significantly greater bass articulation and clarity, particularly in transient peaks, making for a much more musically detailed deep bass presentation.

Dynamic Balance

A common obstacle to clean sound reproduction in high-performance speakers is sound coloration caused by the cabinet itself. The Push-Pull Dual Driver System also addresses this problem.

The fact that the drivers are always moving opposite each other dynamically balances the tremendous forces they apply to the cabinet as a whole, thereby reducing sonic coloration caused by the cabinet itself. In addition, substantial internal bracing and unusually heavy driver mounting baffles further minimize unwanted vibration.

The resulting clarity and musically detailed sound is better than can be achieved with conventional single driver cabinets. The level of sonic accuracy achieved in MX subwoofers is the sum of each of these critical performance factors.

Amplifier and Power Supply

Each MX powered subwoofer has its own built-in power amplifier, optimally matched to its cabinet and driver for the highest level of performance and maxi-

mum ease and flexibility in installation.

They combine M&K's new amplifier topology with new power supplies for powerful, low-distortion bass amplification. Significant headroom above each amplifier's RMS power rating provides dynamic musical peaks at high output levels even at subsonic frequencies below 20 Hz.

The MX-80 delivers a continuous output of 75 watts RMS, with peak capabilities of more than double that figure. The MX-90 has a continuous output of 125 watts RMS, also with more than double peak capability. The MX-100 delivers a conservative 200 watts RMS, with even greater peak capability than its counterparts, due to its very high-current power supply.

In addition to the above power ratings, the Dual Driver system increases the subwoofer's sound radiating efficiency by 3 db in comparison to a single driver subwoofer. Therefore, any single driver subwoofer would have to have twice the power rating of an MX subwoofer for the same output level and dynamic range.

The Dual Driver system also doubles a subwoofer's power handling capacity and lowers each driver's excursion requirements, making for even lower distortion.

Subwoofer Drivers

Several innovative features in each M&K proprietary subwoofer driver provide very low distortion and powerful musical detail and clarity. Polyamide dual voice coils and undercut cores, for example, are common to all M&K subwoofer drivers.

In addition, each cone is treated with a polymer damping compound that is uniformly applied to both surround and cone for improved performance.

The new driver created for the MX-80 uses performance advances made in the development of M&K's top-of-the-line M-2C driver to bring a new level of musical bass performance to its class.

The new MX-90 driver adds a larger voice coil and magnet assembly for lower distortion, higher power handling, and better transient response.

And the MX-100's new M-2C driver is M&K's finest — the same one found in the top-of-the-line MX-2000. With it, M&K

engineers created the unique combination of a newly designed aluminum shorting ring assembly and an "asymmetrical" voice coil design to lower distortion and increase linear displacement, achieving tremendous dynamic range and powerful low bass.

Low Pass and High Pass Filters

In sharp contrast to the shallow filter slopes typical of other powered subwoofers and crossovers, M&K MX subwoofers use M&K's 36 db/octave low pass cutoff above 125 Hz. A separate low pass "Filter" adjustment allows the user to set the upper rolloff point to any frequency between 50 and 125 Hz.

The sharp 36 db/octave filter above 125 Hz makes MX subwoofers truly non-directional, unlike subwoofers with shallower slopes whose location can be identified by the subwoofer's reproduction of mid-bass and midrange signals.

Separately available from M&K are the VF-100 (6 db/octave) and LP-1S (18 db/octave) high pass filters. Designed to be located next to the user's preamp and amplifier, they avoid the need to run long leads across the room to and from a high pass filter built into the subwoofer.

The bass output level of MX subwoofers is continuously variable by a gain control on the subwoofer to match any loudspeaker or room environment, and they can be driven by the low-level signal of a preamp or crossover, or by the high-level output of an amplifier.

The Only Choice

Building on M&K's legendary high level of subwoofer excellence, the MX Push-Pull Dual Driver series of subwoofers elevates the standard for subwoofer performance.

In the high-performance audio/video world of the '90s, these subwoofers are ideal for listeners looking for deep bass to match the high quality of the audio/video source material of the '90s.

With tremendous output capabilities, low distortion, a remarkably "quick" sound, and impeccable musical detail, these subwoofers are indeed "the only choice."

Amplifier: MX-100 200 watts RMS
MX-90 125 watts RMS
MX-80 75 watts RMS
Frequency Response: 20 - 125 Hz $\pm$ 3 db
Impedance: Preamp Input 15K ohms
Amplifier Input 200 ohms
Weight: MX-100 78 lbs.
MX-90 70 lbs.
MX-80 64 lbs.

Dimensions (H $\times$ W $\times$ D):
MX-100, MX-90: 23" $\times$ 15 $\frac{1}{4}$ " $\times$ 19 $\frac{1}{2}$ "
MX-80: 23" $\times$ 15 $\frac{1}{4}$ " $\times$ 17 $\frac{7}{8}$ "

Finish: Walnut, Oak and Black Oak veneers.

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FAX (213) 202-8782



MILLER & KREISEL
SOUND CORPORATION

TOP OF THE LINE

SUBWOOFERS



MX-2000 Push-Pull Dual Driver Powered Subwoofer

The new standard of subwoofer excellence has arrived—the M&K *MX-2000*. Reaching a new pinnacle in performance, the MX-2000 powered subwoofer proudly becomes the top of the audio industry's *only* eight model line of subwoofers.

The MX-2000 achieves this status by bringing together great clarity and detail; tremendous low frequency power and impact; high sound power levels down to 20 Hz; plus the ability to seamlessly blend with any speaker.

The 300 watt continuous RMS MX-2000 incorporates M&K's remarkable new Horizontal Push-Pull Dual Driver System—producing the tightest,

cleanest and most powerful bass M&K has ever offered. This innovative system delivers superior transient performance; lowers harmonic distortion; reduces cabinet coloration and vibration; and couples remarkably well to the listening room.

Building On Excellence

Fifteen years of unmatched experience puts M&K at the forefront of the subwoofer industry. No other manufacturer offers as wide a variety of styles and sizes of high-performance subwoofers. From the very affordable to the state-of-the-art, M&K subwoofers are unsurpassed in audio and audio/video system performance.

And, M&K offers the ultimate Satellite-Subwoofer systems, with a

choice of five highly acclaimed Satellite speakers. These small speakers are optimized for music or multi-channel surround-sound home theatre systems, and actually outperform large speakers.

The Only Choice

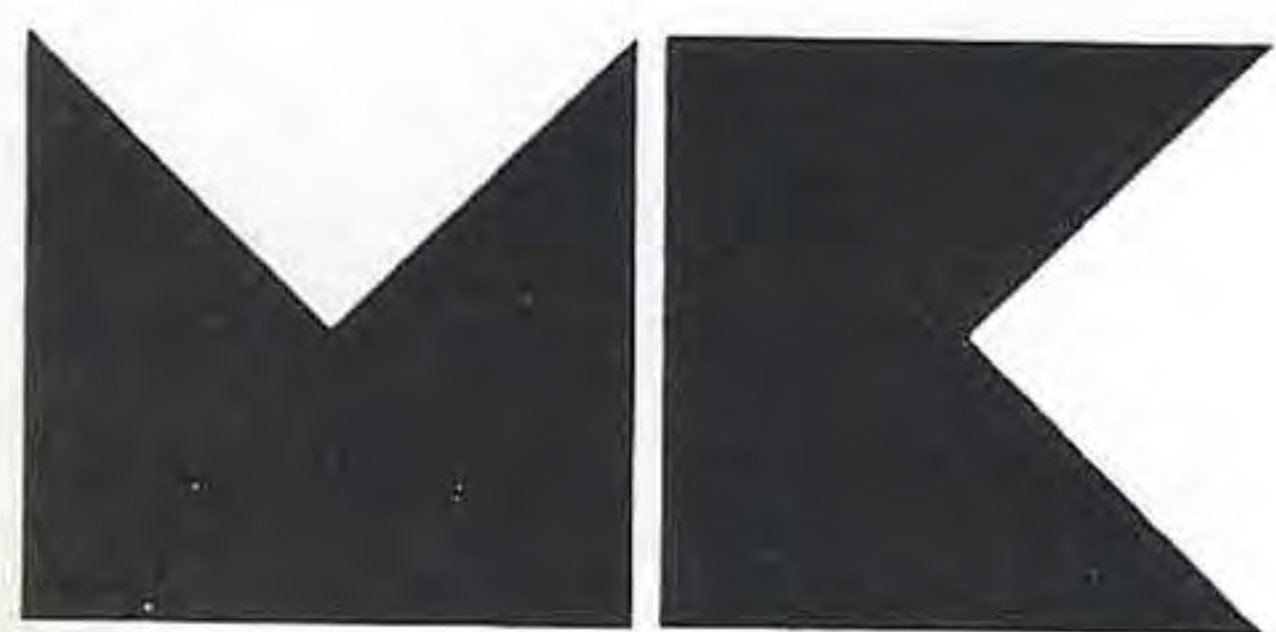
Building on M&K's legendary high level of subwoofer excellence, the MX-2000 becomes M&K's finest achievement in a subwoofer—blending seamlessly with *any* speaker. For high-performance audio and audio-video systems, the MX-2000 is "the only choice."



MILLER & KREISEL
SOUND CORP.

10391 Jefferson Blvd. Culver City, CA 90232 213/204-2854

OPERATION MANUAL POWERED SUBWOOFERS



MILLER & KREISEL SOUND CORPORATION
10391 Jefferson Boulevard, Culver City, CA 90230 USA · 213/204-2854

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A. INSTALLATION

The performance of your subwoofer is greatly dependent on its location. Section C, Achieving Maximum System Performance, discusses woofer placement in detail. **READ THIS SECTION BEFORE DECIDING ON YOUR SUBWOOFER'S FINAL LOCATION.**

You will notice that the subwoofer has no power switch. It is designed to remain plugged in 24 hours a day. This eliminates any need on your part to operate power switches in two parts of your room to be able to listen to music. When the subwoofer is not operating, its power consumption is negligible and it is perfectly safe. If you do wish to turn the subwoofer off and on with the rest of your system, we suggest using a switched outlet on the back of your amplifier or receiver. Do not use the switched outlet unless its power rating is sufficient for your subwoofer. A minimum of 150 watts is required for all models except the V-1B and MX-1000. These subwoofers require a minimum of 200 watts.

THE V-100, MX-100, AND MX-2000 SHOULD NOT BE PLUGGED INTO A SWITCHED OUTLET.

DO NOT PLUG THE SUBWOOFER IN UNTIL ALL SYSTEM WIRING IS COMPLETE.

B. WIRING THE SUBWOOFER

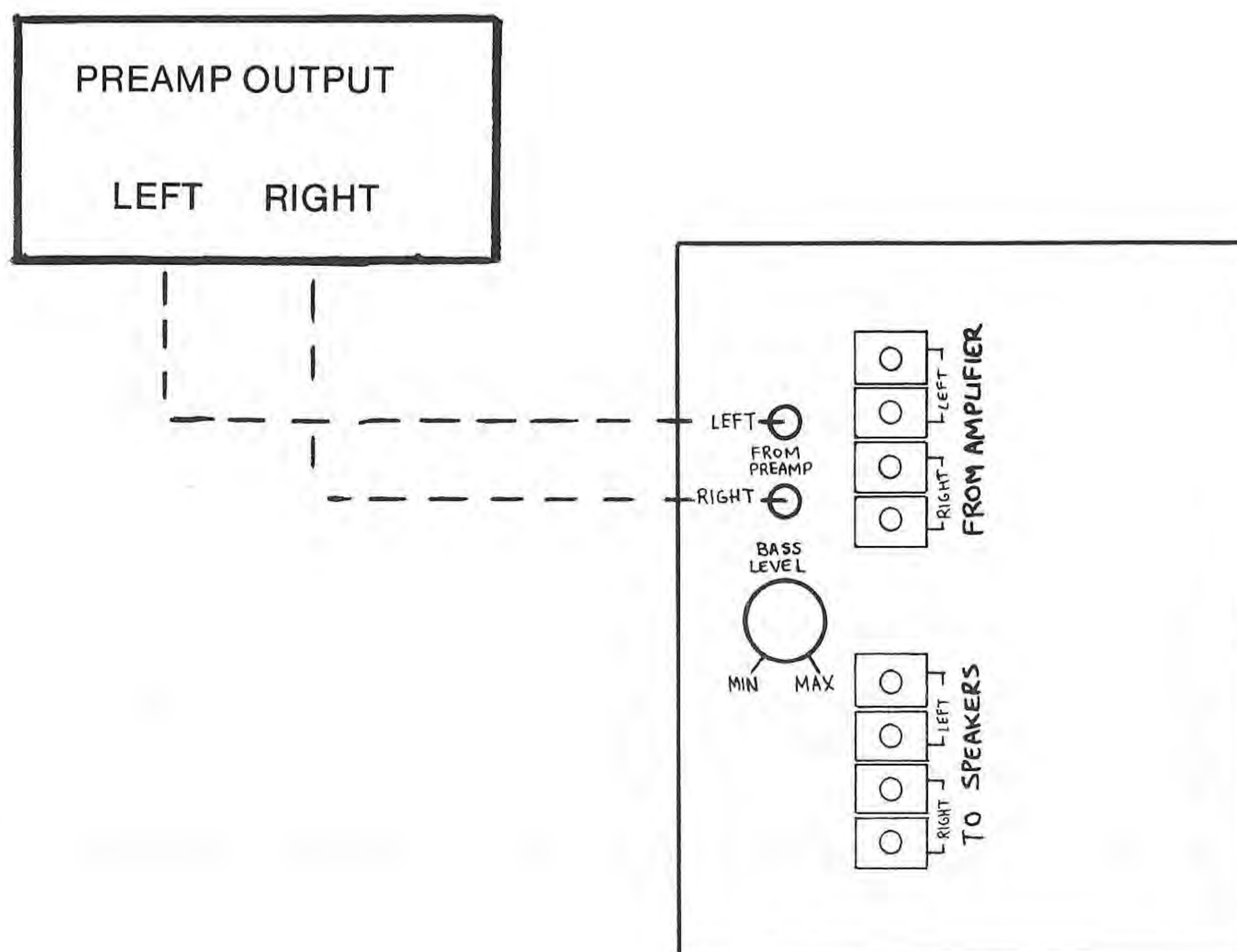
You can connect your subwoofer into your system using one of two different methods. In terms of driving the subwoofer, both are equivalent as they are paralleled at the subwoofer input. If you can use the preamp inputs, you will have slightly better sound and more flexibility in using your system, particularly in regards to biampification.

1. If your system consists of a separate preamp and power amp (or receiver with PREAMP (or MAIN) outputs and POWER AMP (or MAIN) inputs), you can drive the subwoofer with a low level signal from your preamp or an external crossover or High-Pass Filter. An external crossover is not necessary as an internal filter rolls off the response of the subwoofer (See Section C, "FILTER" Adjustment).

To wire the subwoofer in this mode, run standard RCA phono cables from the "PREAMP OUTPUT" of your preamp or "LOW PASS" output of your crossover or High Pass Filter. In this mode, your Satellite speakers should be directly connected to your power amp.

FIGURE 1

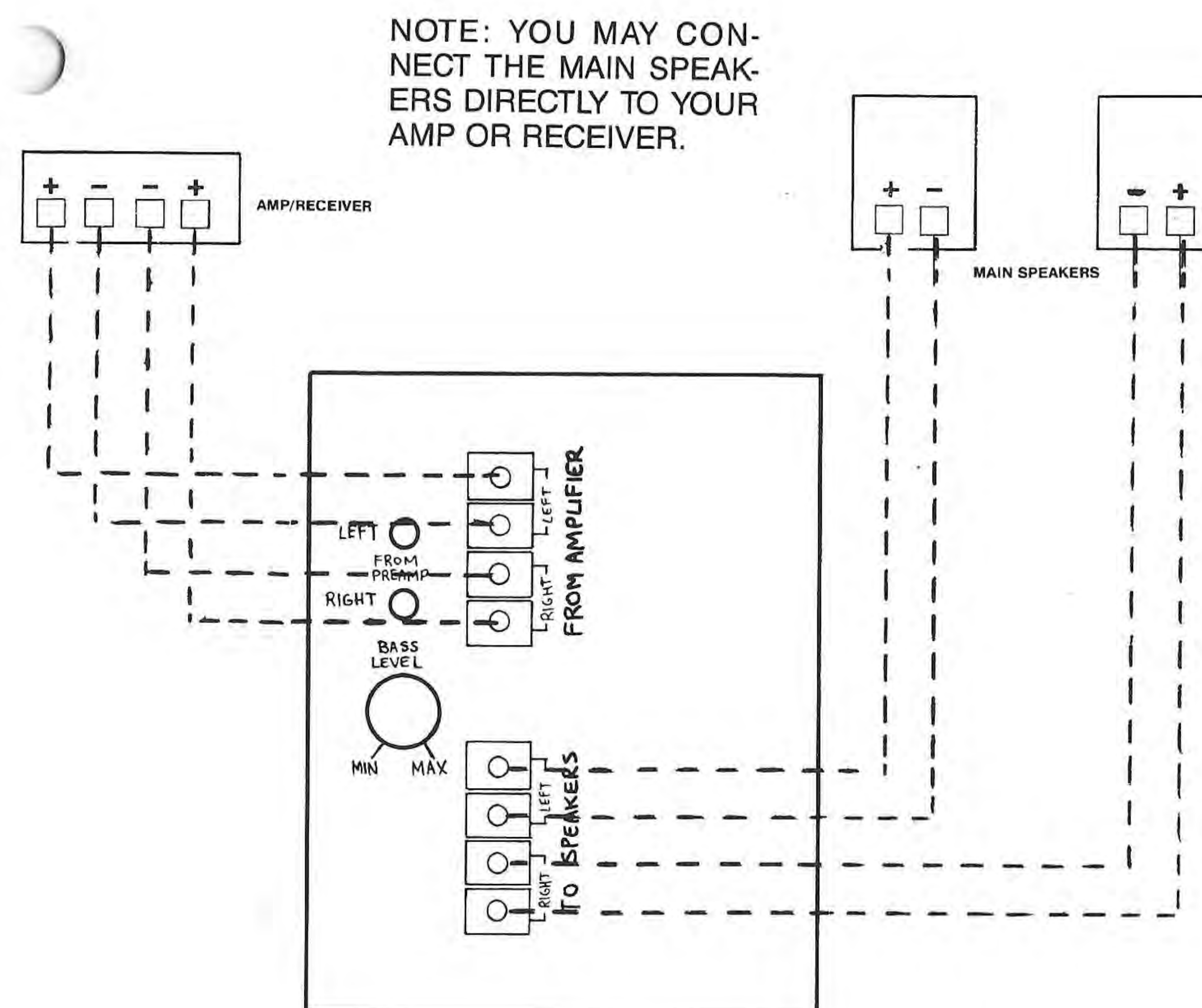
WIRING WITH A PREAMP OR CROSSOVER



2. If your system is powered by a receiver or integrated amp, the subwoofer should be fed with the speaker output of your receiver or amp. The leads that normally run to your speakers should be connected to the "FROM AMPLIFIER" terminals on the subwoofer. Then run leads from the "TO SPEAKERS" terminals on the subwoofer to your Satellite speakers. Be sure to maintain proper phasing when connecting the wires. The Positive (+) lead should go to the RED (+) terminal and the Negative (-) lead should go to the BLACK (-) terminal.

FIGURE 2

WIRING WITH A RECEIVER OR AMP



NOTE: THERE IS NO HIGH-PASS FILTER BUILT INTO YOUR SUBWOOFER. THIS METHOD OF WIRING INTRODUCES NO ROLLOFF TO THE SATELLITE SPEAKERS.

If you wish, you may connect your main speakers directly to your amplifier.

Once the speaker leads or preamp cables are in place, you are ready to power up the woofer. Set the "BASS LEVEL" control on the subwoofer to the "MIN" position. Then plug the line cord into the AC outlet. You should hear a "thump" from the woofer. You will also hear a similar sound when the subwoofer is unplugged. This is the normal sound of the power supply charging and discharging.

Now play some music through your system. With the "BASS LEVEL" control set to "MIN," you should hear only your Satellite speakers. If all is working normally, advance the "BASS LEVEL" control, first to confirm that the woofer is working. Then advance it until you hear a proper balance between the Satellite speakers and the subwoofer. You may need to experiment a bit to get the balance just right.

If there is a problem anywhere in your system, unplug the subwoofer and retrace the above steps. If it persists, contact your dealer.

C. THE "FILTER" ADJUSTMENT

The control labelled "FILTER" sets the upper rolloff frequency of the subwoofer. It is continuously variable between 50 and 125 Hz. This control lets you fine-tune the sound of your system by precisely matching the rolloff of your Satellites and Subwoofer.

In most cases, 85 Hz will provide the best blend. If you do not wish to experiment with this adjustment, we recommend you leave it at 85 Hz.

Some M&K subwoofers have the "FILTER" adjustment under a small black or red plug. If your subwoofer has this plug, gently pry it out and make the adjustment using a small screwdriver. Be sure to save the plug. If it is not replaced, you will hear a whistling sound through the hole in the backplate.

The "FILTER" adjustment provides a rolloff of 12 db/octave up to 125 Hz. Above 125 Hz., the subwoofer rolls off at a rate of 36 db/octave.

We recommend that you experiment with this control to get the maximum benefit from your subwoofer. The goal is to get balanced acoustic output in your room, taking into consideration that rooms typically reinforce bass frequencies around 100 Hz. This may mean that you have an electrical gap (or sometimes an overlap) between the satellites and subwoofer.

The best method of fine-tuning is to make the final adjustment by ear, moving the control in small increments and listening carefully to the results. When the system sounds best, you will have succeeded in even further improving the sound of your subwoofer.

D. ACHIEVING MAXIMUM SYSTEM PERFORMANCE

1. LOCATION

You may wonder why one subwoofer is sufficient in a stereo system. A single subwoofer can handle bass for both stereo channels because our ear-brain hearing system cannot perceive direction of bass sounds below about 150 Hz. Your ear determines the direction of low frequency sound (such as a drum being struck) from the higher frequency transients and overtones that are reproduced by the Satellite speakers. This allows you to put the subwoofer anywhere in the room, regardless of the location of the Satellites. Additionally, M & K powered subwoofers have exceptionally sharp (36 db/octave) low pass filters that remove the midbass and midrange heard through many subwoofers that allow the ear to identify the subwoofer's location. This allows you to put the subwoofer anywhere in the room, regardless of the location of the Satellites.

In most apartments and houses, much of the output of a subwoofer is lost through the room walls or by cancellation. This results in uneven response and poor low bass. To overcome this problem and improve bass response, proper room loading is extremely helpful, especially to ensure realistic "impact" and "sock." Loading takes place when the woofer is located close to any wall or floor surface. The woofer "couples" to that surface, which reinforces the energy radiated by the woofer.

Maximum loading takes place when the woofer is in a corner, but this is not necessarily the ideal location. In some rooms, a corner location will excite room resonance modes, resulting in a "muddy" sound. In these rooms, a center location on a wall will be the best location. We highly recommend experimenting with placement of the subwoofer, listening carefully to changes in the sound with each new location.

In some rooms (especially in those with wooden floors) the subwoofer may cause the floor to vibrate enough to color the sound in the room. If you experience this problem, try isolating the woofer from contact with the floor with a foam rubber pad or risers that are adequate to support the subwoofer's weight. Alternately, spiked feet (available from several different suppliers) that tightly couple the woofer to the floor may reduce this coloration as well.

Because the subwoofer generates a great deal of energy, its output may vibrate anything close to it. If you think you are hearing the subwoofer as a separate source of sound, check to make sure that you are not hearing the vibration of objects close to the woofer. If this occurs, you may have to damp the vibration of these objects.

Please also note that the subwoofer backplate acts as the heat sink for the internal amplifier. Under high power operation it may become very hot. Allow at least six inches of clearance between the back of the subwoofer and the wall. Make certain that there is also six inches of clearance between the back panel and drapes or other objects. Do not allow the speaker wires to rest against the back plate or heat sink.

2. CORRECT PHASE RELATIONSHIPS:

With any system utilizing a subwoofer separate from Satellite speakers, a simple test must be performed to insure optimal bass blending. Because your ears will not be the same distance from both the Satellites and the subwoofer, there is a possibility that the difference in time that each speaker's bass signal takes to reach your ear may cause bass cancellation in the region where the speakers overlap. To find the correct phase relationship, you must reverse the relative phase between the Satellites and the subwoofer.

First play music through your system, listening carefully to the mid-bass region (100-200 Hz). This is the area where electric or string basses and drums predominate. Then reverse the positive and negative speaker leads for BOTH channels. This is done on the back of both Satellite speakers or at the subwoofer "TO SPEAKERS" terminals, but never at both locations. The Positive (+) lead should be switched to the Negative (-) terminal and vice versa. Both channels are switched in identical fashion. Now listen to your system again, concentrating on the mid-bass. If you hear less bass, the original connections were correct. If you hear more bass, the new connections are correct.

For the smoothest transition between your Satellites and subwoofer, try moving the Satellite speakers towards and away from your listening position, making changes in small increments. This will integrate the output of the separate speakers to "focus" the sound much as a camera lens can be adjusted to resolve the sharpest image. When you hear the best image localization of instruments and have maximum mid-bass impact, you have found the optimum location.

3. USING A STEREO PAIR OF SUBWOOFERS:

Using a second subwoofer will give you the ultimate in bass performance. Not only will you hear improved impact and definition, along with added spaciousness in the bass, but you will hear a dramatic improvement in dynamic range.

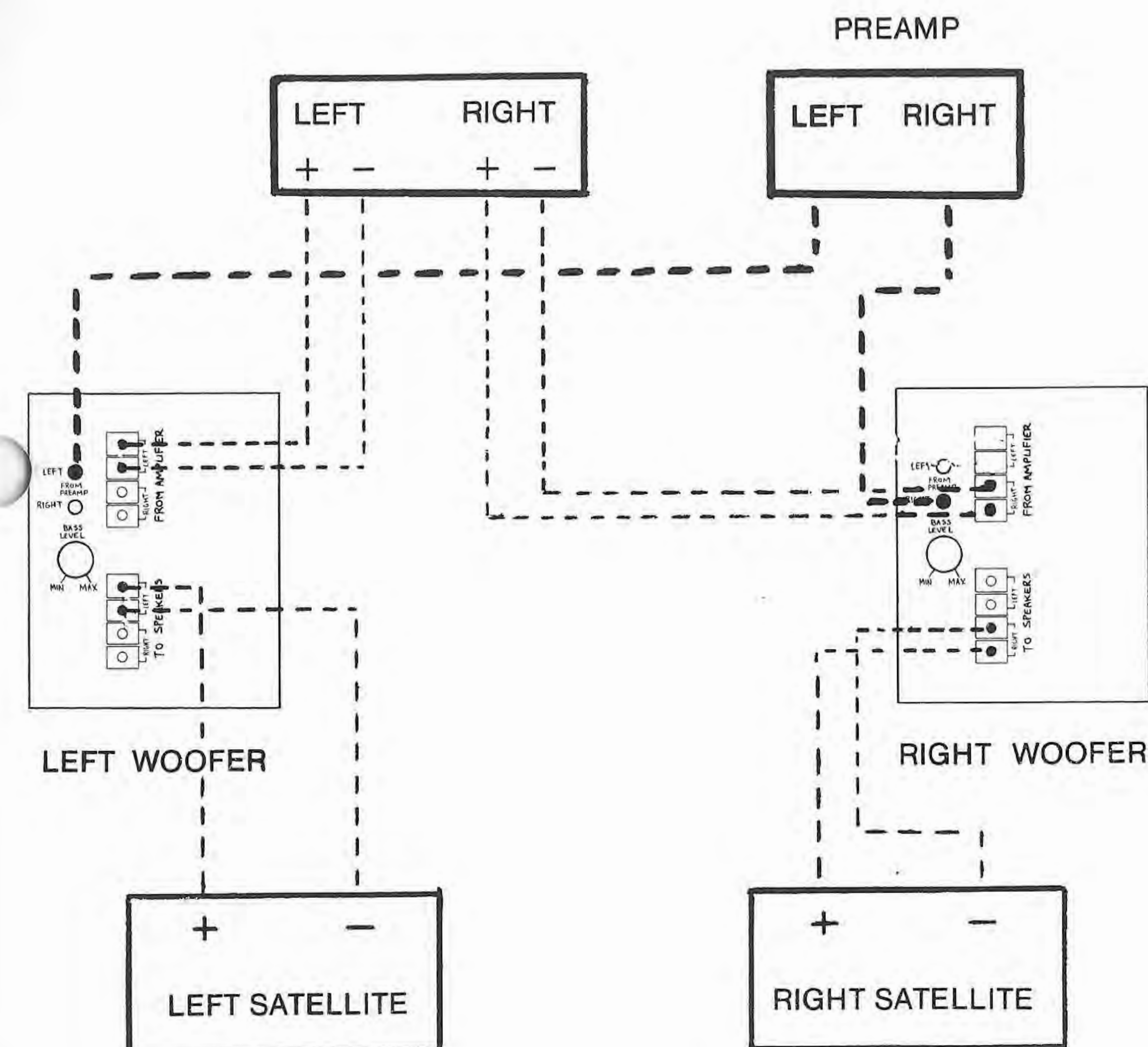
The method of wiring stereo subwoofers is dependent on the basic wiring mode described in Section A.

- If you are driving your subwoofer from a preamp or crossover, connect the left channel output cable to the left "FROM PREAMP" terminal on the left channel subwoofer. The right channel cable goes to the right "FROM PREAMP" terminal on the right subwoofer.
- If you are driving your subwoofer from an integrated amp or receiver, connect the left channel speaker cables to the left channel "FROM AMPLIFIER" terminals on the left subwoofer. Connect the left Satellite to the left subwoofer's "TO SPEAKERS" terminals. The right channel speaker cable connects to the right subwoofer, as does the right Satellite. See Figure 3.

PLEASE NOTE: Figure 3 shows both methods of wiring on one diagram. Please choose only one of the methods described above and in Section A. It is not necessary to connect your subwoofers to both your preamp and amplifier.

FIGURE 3

WIRING OF STEREO SUBWOOFERS



In either of the above cases, the gain of the subwoofer drops slightly. You may need to set the "BASS LEVEL" control slightly higher, but there will be no change in the quality of sound. If you wish, you may use a "Y" connector on the "FROM PREAMP" input terminals or jumpers between the left and right Positive (+) "FROM AMPLIFIER" terminals and between the left and right Negative (-) "FROM AMPLIFIER" terminals, depending on the wiring mode. Both will restore the gain.

If you cannot separate two subwoofers in your room, you may consider stacking them. This will give increased punch and impact due to a coupling effect that is in addition to that achieved by room loading.

F. TROUBLESHOOTING

The M&K amplifier circuit is designed for extremely high reliability. Internal and external fuses are provided for protection. If a fuse blows, you must replace it with a fuse of the correct value or your warranty will be voided. **ALWAYS UNPLUG THE SUBWOOFER BEFORE PERFORMING ANY WORK ON IT.**

If there is no output:

TEST

Make sure "BASS LEVEL" control is above "MIN."

Test all input cables.

Check to see if Red LED is lit.

SOLUTION

Rotate "BASS LEVEL" control clockwise.

Replace any defective cables.

If not, see "Replacing Fuse" below. If lit, turn "BASS LEVEL" control to "MIN." Then plug a standard RCA cable into the "FROM PREAMP" jacks. Lightly touch the plug at the free end of the cable. Turn the "BASS LEVEL" control clockwise. If you hear a buzz or hum when you touch the cable, the woofer is functioning properly. Look elsewhere in your system for the problem. If you do not hear any hum, contact your dealer for service.

If the output is low or distorted:

TEST

If you are using a receiver or integrated amp, make sure the input cables are in phase.

Check all input cables.

SOLUTION

Reverse the (+) and (–) connections at the "FROM AMPLIFIER" terminals on the subwoofer for ONE CHANNEL ONLY. If the problem remains, put the cables back as they were.

Replace any defective cables.

REPLACING A FUSE

If the above suggestions do not solve the problem (particularly if the red LED is out), it is highly probable that a fuse has blown. In most cases, this will be the external fuse, which is easily replaced.

WARNING! First unplug the subwoofer from the wall AC socket. Let the woofer sit for 10 minutes before proceeding.

When replacing a fuse mounted on fuse clips, be careful when removing or inserting the fuse. Glass fuses can break and cut your fingers. Do not remove or replace these fuses by hand. Use needlenose pliers or a similar tool.

REPLACING THE EXTERNAL FUSE

1. Unplug the woofer from the wall AC socket. Let the woofer sit for 10 minutes to avoid any shock hazard.
2. Remove the fuse cap by pushing it in while turning it in the direction of the arrow.
3. Look carefully at the fuse. If the wire filament inside the glass is broken, the fuse is blown. Replace it **ONLY** with a fuse of that exact value. Using a larger fuse will void your warranty and may create a fire hazard.
4. Plug the subwoofer back in and try it again. If it does not work, contact your dealer or the factory for service.

If the external fuse is not blown and the red LED remains unlit, one of the internal fuses may have blown. If you do not wish to open up the subwoofer to check those fuses, contact your dealer or the factory for service. If you do wish to check them, here is the procedure:

REPLACING THE INTERNAL FUSES

1. Make sure that the woofer has been unplugged from the wall AC socket for 10 minutes to avoid any shock hazard.
2. Remove the screws from the backplate and gently pry the backplate free. **REMOVE THE PERIMETER SCREWS ONLY!**
3. On the circuit board you will see one or two fuses. If either or both are blown, replace them **ONLY** with fuses of that exact value. Using a larger fuse will void your warranty and may create a fire hazard.
4. Reattach the backplate.
5. Plug the subwoofer in and try it again. If it does not work, contact your dealer or the factory for service.

WARNING! USE OF A FUSE VALUE LARGER THAN SPECIFIED WILL VOID YOUR WARRANTY AND MAY CREATE A FIRE HAZARD.

FUSE VALUES

	100–120 Volt external fuse	B+, B– internal fuse	220–240 Volt external fuse
Model			
MX-2000	6A slow blow	4A slow blow	3A slow blow
MX-100, V-100	4A slow blow	7A slow blow	2A slow blow
V-1B, MX-1000	2A slow blow	4A slow blow	1A slow blow
V-2B	1A slow blow	4A slow blow	3/4A slow blow
V-3B	3/4A slow blow	2½A slow blow	1/2A slow blow
VX-4, VX-7	3/4A slow blow	2½A slow blow	1/2A slow blow

G. CABINET MAINTENANCE

Several different cabinet finishes are offered by M&K. Cabinet maintenance is a matter of proper care for the materials used.

If the cabinet is oak or walnut veneer, treat it as you would any high quality furniture. Rubbing the wood periodically with an oil or polish such as "Olde English" or "Danish Oil Finish" will enhance its appearance and protect its beauty for as long as you own it.

If the cabinet is black lacquer over oak veneer or a black spackle finish, no maintenance is required as the exterior surface is painted. If the surface is damaged, it can be touched up with matching black paint.

If the cabinet is finished in graphite lacquer, no maintenance is required. If you need touch-up paint for repairs, please contact the factory.

Vinyl cabinets can be cleaned with a damp, non-abrasive cloth.

SPECIAL NOTE ON THE MX-1000

The MX-1000 is effectively shielded for use with large-screen direct-view monitor televisions. Other M & K subwoofer models are not shielded.

Shielded loudspeakers are used to avoid magnetizing the shadow mask of a television's picture tube. Any television's tube can be temporarily magnetized by exposure to a variety of magnetic sources. Under normal circumstances, switching the set off and on will operate its internal degaussing circuitry and eliminate any magnetic charge. However, it is possible for a set to be more permanently magnetized, and in the event this occurs, an external degaussing coil must be used to eliminate the problem. Most TV technicians have such a coil.

Because of the problems associated with magnetizing a picture tube, please take special care when installing your set. Like most all "shielded" speakers, a magnetic lobe does exist on each side of the MX-1000 pedestal, directly in front of each speaker cone, and your television should not be exposed to it.

1. Do not mount the television on the MX-1000 from the side. The set should be placed on the subwoofer from either the front or the back.
2. The television must face forward on the MX-1000, perpendicular to the speaker drivers. Do not mount the set so that it faces sideways.
3. Be sure to keep any non-shielded satellite speakers away from the television. MX-1000 does not shield the television from other speakers.