Kappa Subwoofer

Powered Subwoofer
(230V)

Owner's Manual

Kappa

Infinity®

About this product...

Introduction

The Infinity Kappa Series Powered Subwoofer has been designed to enhance the bass frequencies of any audio system. This subwoofer may be used with speakers of any size. Obviously, the greatest bass enhancement will be achieved when the subwoofer is connected with speakers that do not have the capability to create deep bass. This subwoofer may be used individually, or combined with another Kappa Series subwoofer for even more impressive reproduction of bass frequencies (i.e., one subwoofer near the satellite speakers and a second subwoofer behind the primary listening area, or both subwoofers up front).

The Kappa Series subwoofer is a self-powered system utilizing a solid-state, low-frequency amplifier driving a specially designed woofer mounted within a structurally rigid, tuned-port enclosure.

Unpacking the Subwoofer

Important!

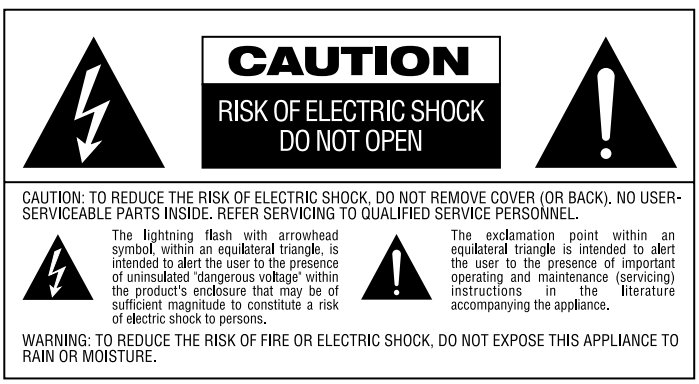
Check your subwoofer carefully. If it has been damaged in transit, report the damage immediately by calling your dealer and/or the trucking firm that delivered it.

To prevent fire or shock hazard, DO NOT EXPOSE THIS SUBWOOFER SYSTEM TO RAIN OR EXCESSIVE MOISTURE. To avoid electric shock, DO NOT OPEN THE SUBWOOFER! There are no user serviceable parts inside. Observe all warnings and cautions.

Important Safety Precautions

Read First!

1. Read Instructions. All the safety and operating instructions should be read before the product is operated.
2. Retain Instructions. The safety and operating instructions should be retained for future reference.
3. Heed Warnings. All warnings on the product and in the operating instructions should be adhered to.
4. Follow Instructions. All operating and use instructions should be followed.
5. Cleaning. Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
6. Water and Moisture. To reduce the risk of fire or electric shock, do not use this product outdoors or near water – for example, near a bathtub, wash bowl, kitchen sink or laundry tub; in a wet basement; near a swimming pool; or the like. Do not expose the amplifier to dripping or splashing. Do not place objects filled with liquids, such as vases, on or near the amplifier.
7. Accessories. Do not place this product on an unstable cart, stand, tripod, bracket or table. The product may fall, causing serious injury to a child or adult, and serious damage to the product. Use only with a cart, stand, tripod, bracket or table recommended by the manufacturer, or sold with the product. Any mounting of the product should follow the manufacturer's instructions, and should use a mounting accessory recommended by the manufacturer.
8. Power Sources. This product should be operated only from the 230 AC power source indicated on the marking label. If you are not sure of the type of power supply to your home, consult your product dealer or local power company.
9. Power-Cord Protection. Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the product.
10. Nonuse Periods. The power cord of the product should be unplugged from the outlet when left unused for long periods of time.
11. Overloading. Do not overload wall outlets or extension cords, this can result in a risk of fire or electric shock.
12. Object and Liquid Entry. Never push objects of any kind into this product through openings, as they may touch dangerous voltage points or short-out parts that could result in a fire or electric shock. Never spill liquid of any kind on the product.
13. Servicing. Do not attempt to service this product yourself, as opening or removing covers may expose you to dangerous voltage or other hazards.
Unplug this product from the wall outlet and refer servicing to qualified service personnel.
14. Wall or Ceiling Mounting. The product should be mounted to a wall or ceiling only as recommended by the manufacturer.
15. Heat. The product should be situated away from heat sources such as radiators, heat registers, stoves or other products (including amplifiers) that produce heat.



Volume control...

A Few Suggestions

We recommend that you do not operate your speakers or subwoofer with the bass, treble and loudness controls set to full boost. This will place undue strain on your electronics and speakers and could damage them.

The volume control setting on your preamplifier or stereo receiver is not a specific indication of the overall loudness level of the speakers. The only important consideration is the loudness level at which the system can be played regardless of where the volume control is set.

Always turn down the volume control setting on your preamplifier or stereo when changing a cassette or CD, or switching inputs to AM or FM operation. Excessively loud transients (clicks or popping sounds) can damage the satellite speakers and possibly the subwoofer.

Important!

Whenever changing cables, pulling plugs, etc., ALWAYS TURN OFF ALL EQUIPMENT, including the subwoofer. This prevents transients from entering the speakers and prevents electrical energy from reaching you. Keep all connections out of the reach of children.

Position within a room will strongly influence performance...

Positioning

Since the installation of a subwoofer is somewhat more complicated than installing full-range speakers, it is essential you read this section very carefully prior to connecting the subwoofer to your system. Should you have questions relating to your installation, it is advisable to call your Infinity dealer for advice.

The performance of the subwoofer is directly related to its placement in the listening room and how you align the subwoofer with its satellite speakers. Setting the volume of the subwoofer in relationship to the left and right speakers is also of critical importance because it is essential that the subwoofer integrates smoothly with the entire system. Setting the subwoofer's volume level too high will result in overpowering, boomy bass. Setting the volume level too low will negate the effect of the subwoofer.

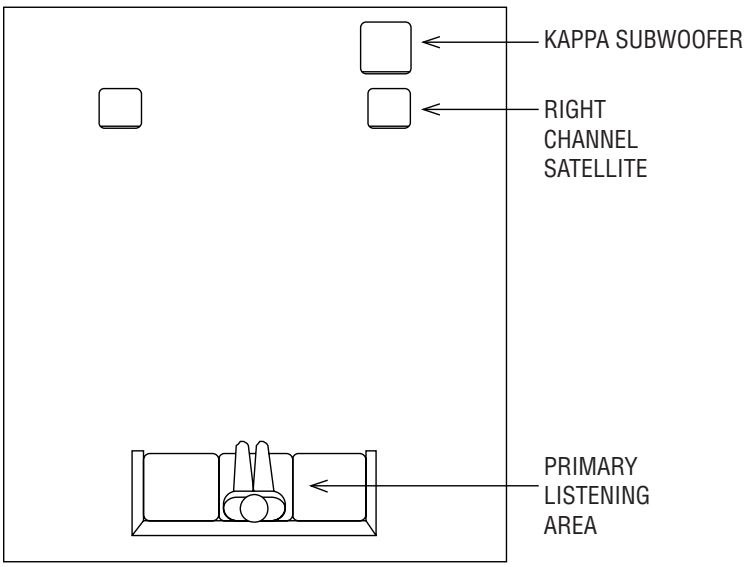
The metal plate acts as the heat sink for the subwoofer's internal amplifier. Do not place pillows or other objects against it.

We recommend placing the subwoofer at least 2 to 3 feet away from a television or a computer's disc-drive system to prevent smearing the colors of the TV picture or erasing of the magnetic drive.

Here are several additional facts on installation that may prove useful. It is generally believed by most audio authorities that low frequencies (below 125 Hz) are non-directional and, therefore, placement of a subwoofer within any listening room is not critical. While in theory it is true that the larger wavelengths of extremely low frequencies are basically non-directional, the fact is that when installing a subwoofer within the limited confines of a room, reflections, standing waves and absorption generated within the room will strongly influence the performance of any subwoofer system. As a result, specific location of the subwoofer becomes important, and we strongly recommend that you experiment with placement before choosing a final location.

Placement will depend upon your room and the amount and quality of bass required (for example, whether or not your room permits placement of the subwoofer near either satellite). Never place the port too close to a wall or piece of furniture as this will prevent the port from operating properly. Since the port is an integral part of the subwoofer's design, it should always be permitted free access to the listening room without obstruction to the sound emerging from it. Careful experimentation will enable you to determine the best position for the subwoofer (see useful hints, next page).

Figure 1. This view shows the subwoofer positioned behind the right-channel satellite speaker to re-create the actual location of bass instruments in an orchestra.



Here are some useful hints:

1. Experimentation with the port direction may be useful. At times directing the port away from the listening area (to the side) may be advantageous because this may create a better blend of bass within the listening room.
2. If bass response seems inadequate, move the subwoofer closer to a wall or corner. If bass becomes too heavy, try turning the subwoofer with the port facing away from the wall. This will tend to diminish bass output.

It will take time and patience to find the most pleasing acoustic location for your subwoofer. Listening for sonic balance and blending should always be done from your normal listening position, using a wide range of source material. As a starting point, initially place the subwoofer behind your right channel satellite speaker, about 3 or 4 inches (8-10 cm) from the wall. We suggest trying this location first because in an orchestra, the bass instruments are usually located in the back and to the right (see Figure 1).

Connections

The Infinity Kappa Subwoofer offers unprecedented flexibility for connecting the system to any type of audio or home-theater system.

Consult the table below to determine which system description most closely matches your own, then follow the hook-up method corresponding to that system. Never connect both speaker and line input Simultaneously. If none of these system configurations seem to match yours, consult your dealer or Infinity customer service for direction on how best to hook up your system.

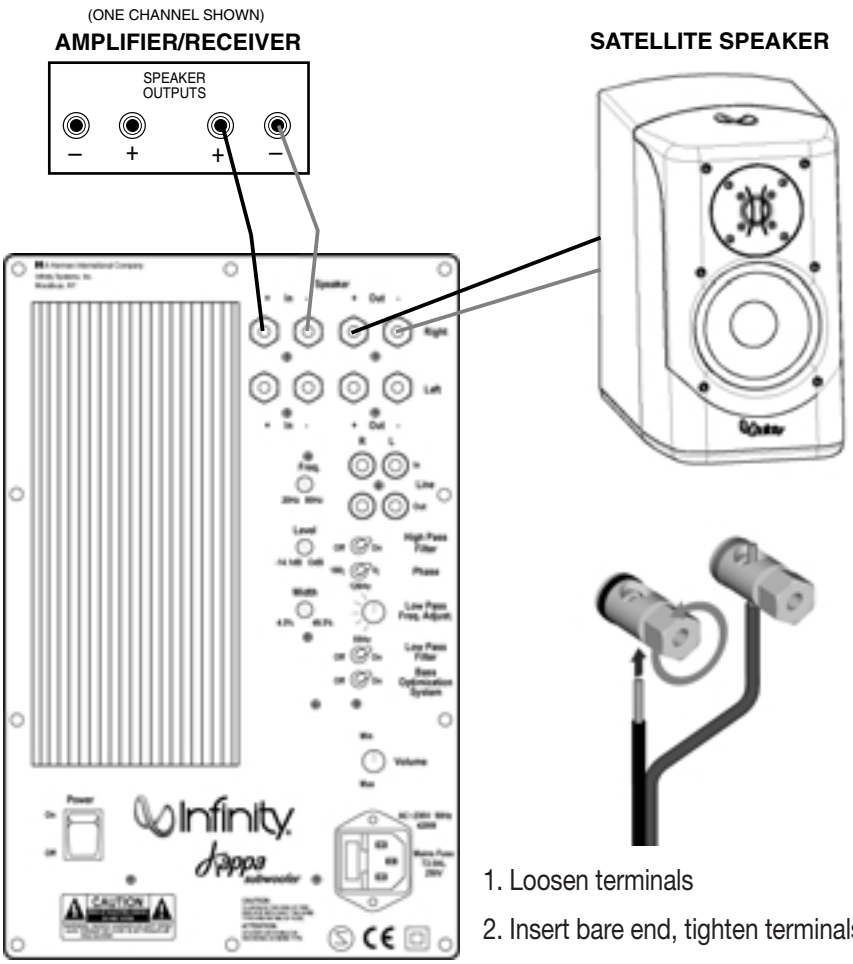
It is essential, to enable the RABOS system to work optimally, to direct all bass in the system to the Kappa subwoofer by setting all main speakers to SMALL, even if you are using main speakers that reproduce frequencies below 100Hz.

Connection method 1 should ONLY be used when other options do not exist.

System Type	Connection Methods
2-Channel receiver or integrated amplifier that has no subwoofer output or Pre-out/Main-In connectors	**1**
2-Channel receiver or integrated amplifier with preamp output and input connectors	**2**
2-Channel system with separate preamplifier and power amplifier	**2**
Dolby Pro Logic with THX, Dolby Digital, or DTS® receiver/ processor with a filtered subwoofer (or LFE) output connector	**3**
2 channel receiver or integrated amp with a sub output and with no input connector	**3**

Method 1

Figure 2.



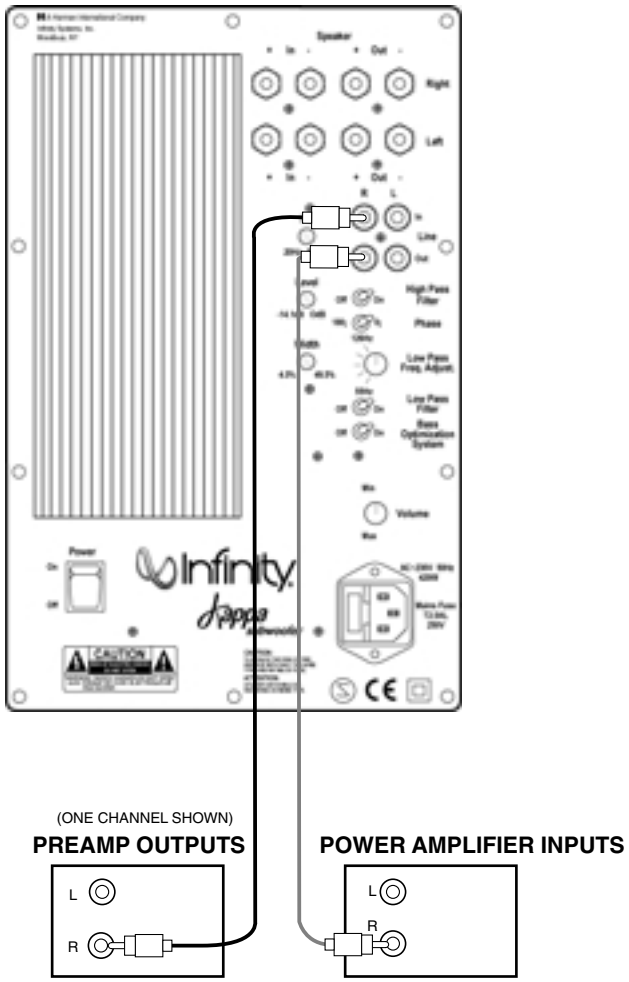
1. Loosen terminals
2. Insert bare end, tighten terminals

Method 2

Disconnect the jumper or cable that links your preamplifier ouput and power amplifier input

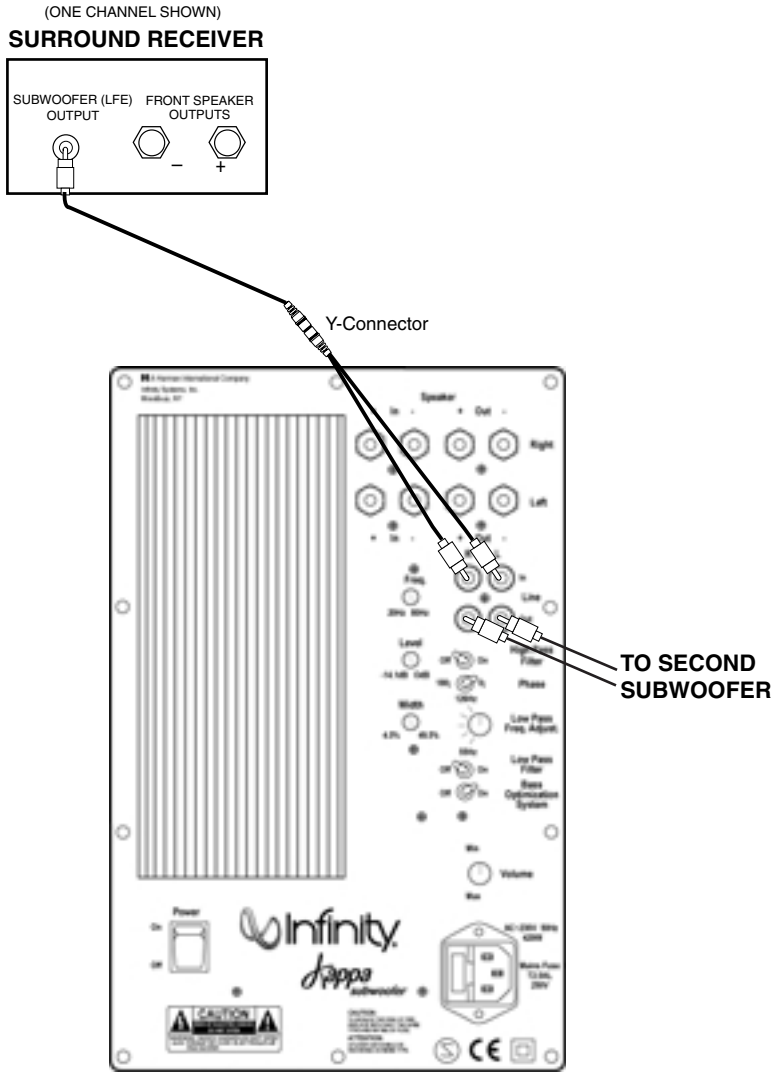
- Connect the preamp output to the kappa subwoofer line input
- Connect the kappa suwoofer line output to the power amplifier input (MAIN IN)

Figure 3.



Method 3

- Connect the subwoofer output of your AV receiver to the Kappa subwoofer line input using a Y-connector*.
- On our AV receiver, go to the SPEAKER CONFIGURATION section in the receiver's set-up menu and set the front Left/right main speakers to SMALL and the subwoofer to ON.



*Note: Some receivers/amplifiers have a single (mono) subwoofer output. In this case, it is recommended that you use a "Y"-connector (not included) to link the mono output from the amplifier/receiver to both subwoofer input channels.

Operation

Initial setting of the controls… Power on...

1. Initially set the Bass Optimisation System switch to OFF.
2. Initially set the subwoofer's Volume control to the minimum position.
3. Initially turn the subwoofer's Crossover Frequency control fully clockwise.
4. Turn on your audio system and play any music source.
5. Turn the subwoofer's Volume control to its mid-position. If no sound emanates from the subwoofer, check the AC line cord and input cables. Are the connectors on the cables making proper contact? Is the AC plug connected to a "live" receptacle?

Adjust volume...

6. Set the overall volume control of your amplifier/receiver to a comfortable level. Adjust the subwoofer's Volume control until you obtain a pleasing blend of bass. Bass response should not overpower the room. There should be a harmonious blend across the entire musical range. Many users have a tendency to set the subwoofer volume too loud, following the belief that a subwoofer is there to produce lots of bass. This is not entirely true. A subwoofer is there to enhance bass, extending the response of the entire system so the bass can be felt as well as heard. However, overall balance must be maintained; otherwise, the music will not sound natural. An experienced listener will set the volume of the subwoofer so its impact on bass response is always there but is never obtrusive.

Crossover frequency control...

7. The Crossover Frequency Control sets the upper frequency limit of the subwoofer. It is adjustable through five click-set positions corresponding to 50Hz, 70Hz, 80Hz, 100Hz and 125Hz. The 50Hz setting is selected when the control is turned fully counterclockwise and the 125Hz setting is selected when the control is turned fully clockwise. Where you set the control depends on the low-frequency capabilities of your satellite speakers, system placement, and other factors affecting the mid-bass region.

   Turn the volumecontrol UP (clockwise) until you feel there is too much mid-bass information (around 100Hz) then back the control down a little until that area sounds more natural.

   To hear more low bass, turn the Crossover Frequency control DOWN a little (counterclockwise) and the Volume control UP by about the same amount. This will increase low bass while leaving the mid-bass sounding the same as it did before the adjustment. To reduce low bass without changing mid-bass, turn the Crossover Frequency control UP and the Volume control DOWN.

   In case of the configuration depicted on figure 3 or if you are using the Kappa 200 as your satellite speaker, it is recommended that you set the Crossover Frequency Control on the subwoofer to 80Hz. This corresponds to the third click-stop of the control from fully counterclockwise.

Room placement...

8. Room placement of the subwoofer is one of the most critical aspect of its installation. It will be necessary for you to try various locations in your listening room before you choose the final location. Some possible starting points include: behind the right channel satellite speaker, along the back wall between the satellites, along a side wall (but not too close to a corner), or behind a couch or a chair.

   In general, the closer the subwoofer is to walls and corners, the greater the effect of low frequency enhancement. Experiment with the Crossover Frequency and Volume controls in different locations until you are pleased with the result you obtain from your particular application.

Phase Control

The Phase control can be set to 0 degrees or 180 degrees. There is no correct or incorrect setting. The setting you choose will depend on factors such as room size, subwoofer placement and listener position. Listen to familiar material with strong bass content. Switch the phase control back and forth, while listening carefully. Leave it in the position which provides maximum bass output.

A word of advice

The Low-Frequency Roll-off and Volume controls may be set anywhere within their rotation. However, it will be a most unusual circumstance if you have to set the Volume control completely clockwise. This may indicate an unbalanced condition in your system (too much bass) or an especially large room or that your room placement may not be correct. Try several other locations before concluding that the Volume control must be set at maximum.

A word about tone controls

The tone controls on your electronic components (preamplifier, receiver, etc.) should be used with the utmost discretion. Excessive boost can create severe power demands on your power amplifier. Maximum bass boost can create a demand for literally hundreds of watts in the bass region, whereas, in the “flat” position, or with the tone controls switched out of the system, your average listening level may be impressively and realistically loud at less than 10 watts. The remaining power capacity is available for power peaks on sharp transients and powerful crescendos.

Power

The main Power switch should be left in the On position for normal use. For your convenience, the Kappa Subwoofer includes an auto-sensing circuit that activates the subwoofer when a signal is detected. When a signal is present, the Power LED will glow green. After several minutes with no signal present, the subwoofer will automatically go into Standby. When the subwoofer is in Standby, the Power LED will glow red.

Replacing the fuse

The Kappa Subwoofer uses a built-in fuse to protect the amplifier. To replace a blown fuse with a new one, first turn the subwoofer's main power switch Off and disconnect the AC power cord. Remove the old fuse and replace it with a new one of the exact same value and rating: 2.5A, slow blow, 250V.

Room Adaptive Bass Optimization System

Infinity R.A.B.O.S. is a simple-to-use, yet sophisticated, low- frequency calibration system. It is designed to work in conjunction with Infinity Kappa self-amplified subwoofers. Each Kappa Subwoofer contains a parametric equalizer that you will adjust as indicated by the R.A.B.O.S. test results. Following these instructions, you will optimize the Kappa Subwoofers' response characteristics to complement their environment. This will dramatically improve the sound of your system. The optimization process takes less than 30 minutes.

The R.A.B.O.S. Kit Includes the Following Components:

- Specialized Sound-Level Meter
- Test CD
- Instructions
- Measurement Templates
- Width Selector
- Adjustment "Key"

What R.A.B.O.S. Does

The Test CD provides specially designed signals you will use while performing measurements. The sound-level meter provided is used to "acquire" the information needed for adjustments. You will create a response plot on the Measurement Template. Using the Width Selector, you will then determine the appropriate equalizer settings. The "Key" is used to adjust the parametric equalizer built into each Kappa Subwoofer. After adjustment, the test sequence is repeated to confirm your settings.

The R.A.B.O.S. Goal

It is a fact of audio that what we hear at low frequencies is determined as much or more by the listening room than by the loudspeaker itself. Placement of the loudspeakers and listeners and the acoustical characteristics of the room surfaces are all important determinants of bass quantity and quality. In most practical situations, there is little that can be done about this, except for patient trial-and-error repositioning of the loudspeakers and listeners. Usually, the practical constraints of a living space and the impracticality of massive acoustical treatment mean that equalization is the only practical solution.

Professional sound engineers routinely employ sophisticated measurement systems and equalizers to optimize speakers to the installation. This has never been practical for the home audiophile. This is why R.A.B.O.S. was created. R.A.B.O.S. enables you to identify the dominant low-frequency response characteristic of your room. Once you know the problem, R.A.B.O.S. provides the tools needed to optimize the low-frequency characteristics of the speakers to the room they are in, exactly as the professional sound engineers do it.

Performing R.A.B.O.S. Tests

These instructions assume you have already installed your Kappa speakers according to the information provided in the Owner's Guide. It is also assumed that all equipment in your entertainment system is interconnected properly and is in good operating condition.

Preparations

Before beginning R.A.B.O.S. tests, please check the following:

- Make sure that all three R.A.B.O.S. controls on the Kappa Subwoofer are turned fully clockwise or switch the R.A.B.O.S. selector to the Off position.
- Set the tone controls (Bass and Treble) to their center or flat positions.
- Bypass all surround and effects features of your receiver/ processor/preamp or set to Stereo Bypass.
- If you are using a multichannel surround processor or receiver, make sure all bass-management features are properly set. The Audio channels should all be set to "Small" or "High-Pass" and the subwoofer set to "On."

You must have a CD player in the system. A CD player remote control is quite convenient but not essential.

For best results, it is recommended that all major furnishings are in place and that all doors and windows in the listening area are in their normal positions. That is, if you normally listen to music with all doors closed, then this is how they should be during this procedure.

Try to minimize ambient noise while running tests. Turn off all major appliances and any air conditioning or furnace fans. These can create significant subsonic noise that may be barely perceptible but which can wreak havoc on low-frequency measurements.

Critical information is highlighted with this mark: ⓘ

Helpful hints are marked with this symbol: 

Contents of the R.A.B.O.S. Test CD

Track	Title	Track	Title
1	Welcome	32	Quick Retest 80Hz
2	Set System Test Level	33	Quick Retest 77Hz
3	Set Subwoofer Test Level	34	Quick Retest 72Hz
4	100Hz Test	35	Quick Retest 66Hz
5	95Hz Test	36	Quick Retest 63Hz
6	90Hz Test	37	Quick Retest 56Hz
7	85Hz Test	38	Quick Retest 52Hz
8	80Hz Test	39	Quick Retest 49Hz
9	77Hz Test	40	Quick Retest 46Hz
10	72Hz Test	41	Quick Retest 43Hz
11	66Hz Test	42	Quick Retest 40Hz
12	63Hz Test	43	Quick Retest 38Hz
13	56Hz Test	44	Quick Retest 35Hz
14	52Hz Test	45	Quick Retest 30Hz
15	49Hz Test	46	Quick Retest 26Hz
16	46Hz Test	47	Quick Retest 24Hz
17	43Hz Test	48	Quick Retest 22Hz
18	40Hz Test	49	Quick Retest 21Hz
19	38Hz Test	50	Quick Retest 20Hz
20	35Hz Test	51	Final System Level Adjustment
21	30Hz Test	52	Final Subwoofer Level Adjustment
22	26Hz Test	53	Wide Band Pink Noise, Left
23	24Hz Test	54	Wide Band Pink Noise,L+R
24	22Hz Test	55	Wide Band Pink Noise, Right
25	21Hz Test	56	Wide Band Pink Noise, L-R
26	20Hz Test	57	Wide Band Pink Noise, Uncorrelated
27	Intro to Quick Retest	58	1 to 4kHz Pink Noise, Left
28	Quick Retest 100Hz	59	1 to 4kHz Pink Noise, L+R
29	Quick Retest 95Hz	60	1 to 4kHz Pink Noise, Right
30	Quick Retest 90Hz	61	1 to 4kHz Pink Noise, Left-R
31	Quick Retest 85Hz	62	1 to 4kHz Pink Noise, Uncorrelated

Tracks 53–62 of the R.A.B.O.S. Test CD are test tones that can be used for general diagnostics of your system. They are not used for R.A.B.O.S. settings.

The R.A.B.O.S. Sound-Level Meter (RSLM)

The RSLM is a battery-operated, handheld, acoustic measurement device specifically designed for Infinity R.A.B.O.S. On the face of the instrument is a light-emitting diode (LED) bar graph that indicates relative sound level. There are also indicators for power-on, out-of-range signals and a low battery.

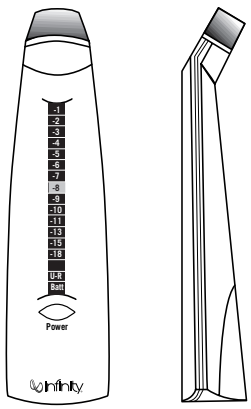


Figure 4
R.A.B.O.S. Sound-Level Meter

Power is switched on or off by pressing the button directly below the bar-graph window. When the unit is on, one or more LEDs will always be illuminated. The function of the LEDs is described in the following section.

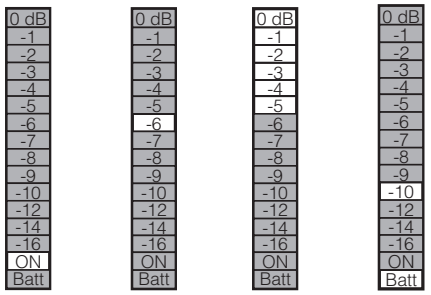


Figure 5
RSLM bar-graph indications

- Power-On/Low Signal: This is indicated by the illumination of any LED on the bar graph. If the sound level in the room is below the measurement range of the instrument, a green LED near the bottom of the bar graph will be illuminated.
- Normal Measurements: When the sound level is within the range of the RSLM, the green LED will be off and one of the red LEDs in the bar graph will be illuminated, indicating the relative sound level, in decibels (dB).
- Over-Range: If the sound level exceeds the range of the meter, 0 dB through -5 will all light simultaneously.
- Low Battery: When the battery voltage is too low for accurate measurements, an LED at the bottom of the bar graph will be illuminated. Replace the battery.

ⓘ Do not attempt measurements when this light is on.

RSLM Placement

Determine where in the room you are most likely to sit when listening to music or watching a movie. This is where you will want to hold the RSLM during measurements. The RSLM should be oriented so it can be easily read and held at your seated ear level during tests.

ⓘ You must use this same position for all tests.

⚷ The RSLM can be mounted on a standard camera tripod. This will ensure the best results.

Initial System-Level Setting

The following steps will set the playback level of the system to the correct level for all tests that follow.

ⓘ Turn the system volume to minimum.

Cue the R.A.B.O.S. Test CD to Track 2 and press Pause II. This track will produce band-limited pink noise in both the left and right channels.

Press Play ▶ With the RSLM positioned as described above, increase the system volume until the RSLM display indicates -10 dB. See Figure 6.

Figure 6
RSLM indicating the correct system level to begin tests (-10 dB)

When you have completed this adjustment, press Pause II.

Setting the Subwoofer Test Level

Each of the following test tracks is about one minute long. This is normally much longer than required. Press Pause II or advance to the next test as soon as you are ready.

This step will set the subwoofer levels for measurement purposes. The objective is to scale the subwoofers' output to make full use of the RSLM indicator range. Scaling is optimum when a 0 dB reading is observed on the highest peak without triggering the over-range indication. Later, you will rebalance the subwoofers to the main speakers.

The Kappa Subwoofers should be shipped with the three R.A.B.O.S. controls, set to fully clockwise positions, and all measurements should be conducted with their level controls in this position. Confirm this setting before you begin this test. The level control should be set to the mid position (5).

Cue Track 3 and Pause II. Track 3 continuously steps through all subwoofer test tones for approximately 1 minute. Each tone will play just long enough for the RSLM to give a stable reading.

To get accurate measurements, it is necessary to play the woofers quite loud. The 0 dB indication is about 94 dB. At this level, frequencies below 100 Hz can cause doors, windows, furnishings and other objects in the room to vibrate. This frequently results in clearly audible buzzes and/or rattles that come and go as each test tone plays. Strong buzzes not only sound bad, they can cause measurement errors.

If you hear a buzz or rattle during this test, it is highly recommended that you locate the source and eliminate its effects. This is actually a valuable room-diagnostic tool.

Press Play ▶. As Track 3 plays, watch the RSLM carefully. Watch for peak readings. The peak reading may be no more than a brief flash. Readjust the subwoofers' level control until the peak level observed is 0 dB without triggering the over-range indication. See Figure 7.

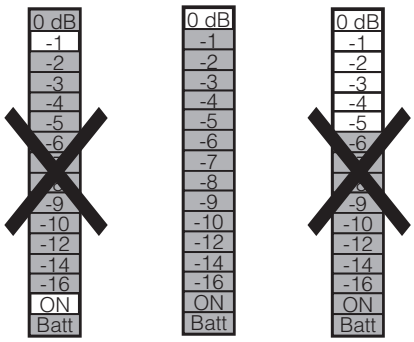


Figure 7
Adjusting the subwoofer levels for a 0 dB peak

When finished, press Pause II.

Performing Low-Frequency Measurements

Read the following instructions fully before beginning tests.

For the following steps, you will need a Measurement Template and a pencil.

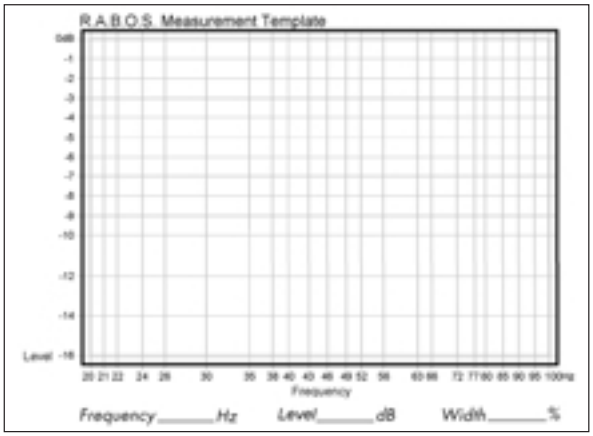


Figure 8
R.A.B.O.S. Measurement Template

Each of the following tracks produces a low-frequency test tone. The range of these tests is from 100Hz down to 20Hz. The frequency of each test is announced before it begins. The first test is the highest frequency (100Hz); therefore, you will be marking the template from right to left. Each frequency point is listed across the bottom of the Measurement Template (this is called the X-axis). See Figure 8. The vertical scale on the left side of the template indicates relative level, in dBs (the Y-axis). The template's vertical scale matches that of the RSLM bar graph.

Cue Track 4 and Pause II.

From now on, you will want to keep your CD player's remote control handy.

Press Play ▶. As Track 4 plays, observe the level indicated on the RSLM.

EXAMPLE: The test frequency is 100 Hz and the level indicated is -2 dB. Find the intersection of 100 Hz (X-axis) and -2 dB (Y-axis). Place a dot at that point. See Figure 9.

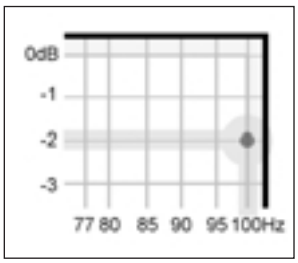


Figure 9
Locating a test point

It takes a few seconds for the RSLM reading to stabilize, especially at very low frequencies. Don't rush. Give each test adequate time for the meter to stabilize.

At the bottom of the bar graph is a green "ON" LED. This LED is illuminated whenever the sound level is below the measuring range of the RSLM. If this occurs during a test, place a dot at the intersection of the test frequency and the bottom frame of the template. See Figure 10.

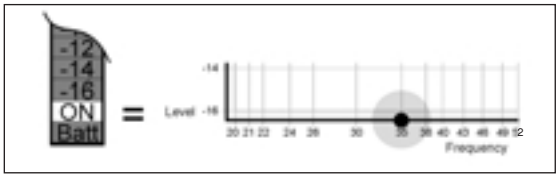
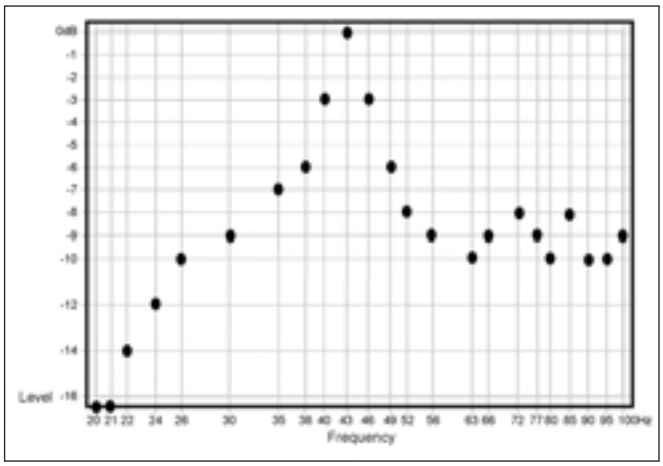


Figure 10
Indicating an under-range test

When finished, press Skip ▶▶I to advance to the next test. Repeat the process described above for Tracks 5 through 26.

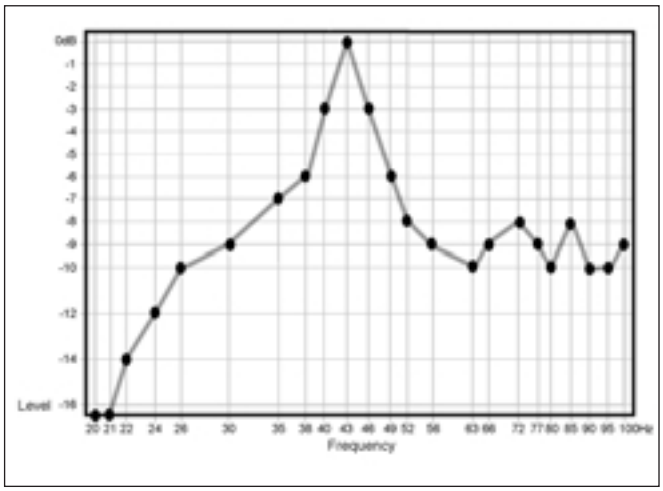
When you have completed the 23 measurements, you are ready to analyze the data and make corrective adjustments. The completed Measurement template will look something like the example in Figure 11.

Figure 11
Completed R.A.B.O.S. template



Now connect the dots as shown in Figure 12. This will make interpretation of the data much easier.

Figure 12
Test example with dots connected



What Does a Parametric Equalizer Do?

The R.A.B.O.S. system uses one band of parametric equalization for response correction. Parametric equalizers are the most versatile class of filters. The effect an equalizer will have on the signal is dependent on three parameters.

Frequency: The equalizer will have maximum effect at one frequency, usually described as the center frequency.

Level: This refers to the amount of cut (in dBs) the equalizer is set for.

Bandwidth: Defines the range of frequencies over which the equalizer will have an effect. On the Kappa, this adjustment is abbreviated as "Width."

Only parametric equalizers allow independent adjustment of all three parameters.

These will be explained more fully in the sections that follow.

Completing the Measurement Template

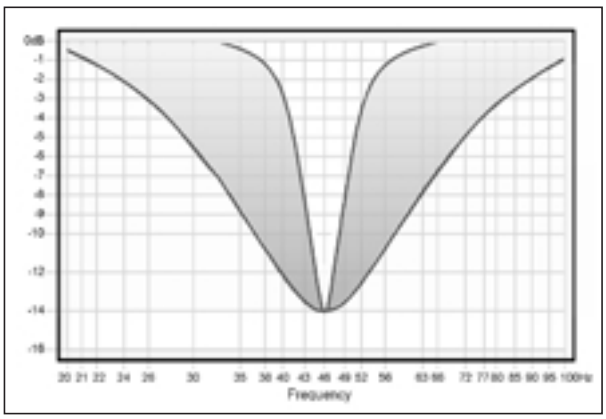
Along the bottom of the Measurement Template are three fields where you will enter the equalizer settings needed to complete system optimization.

These instructions are based on the example in Figure 12. Use this tutorial to become familiar with the process. Strategies for several other test results will be presented later. After you have completed these three entry fields, you will be ready to perform the adjustments, completing R.A.B.O.S. optimization.

Frequency

The frequency of the R.A.B.O.S. equalizer may be adjusted to any one of nineteen frequencies from 20Hz to 80Hz. This defines where you are going to apply equalization.

Figure 13
Effect of adjustable width



Width

The frequency range of the R.A.B.O.S. equalizer may be set from 5% to 50% of an octave in 21 steps. This setting defines how much of the subwoofers' output will be equalized.

Width is expressed as a percentage of an octave. For example, a width setting of 25% means the equalizer will affect a frequency band of 1/4 of an octave; 1/8 of an octave above and 1/8 of an octave below the center frequency.

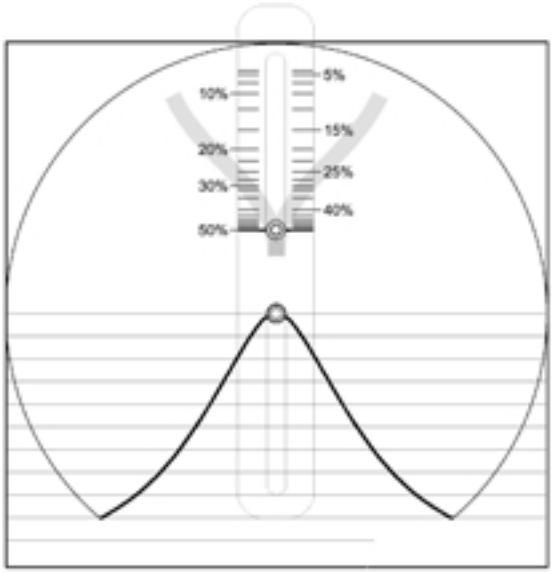
The octave is a logarithmic expression. From any point in the spectrum, one octave above or below that point is always double or half the frequency. Therefore, one octave above 100 Hz would be 200 Hz. One octave below 100Hz is 50Hz.

In the section that follows, we will discuss the use of the Width Selector.

Using the Width Selector

ⓘ Read the following instructions carefully. The example presented may not look like the graph you just created. Focus on the concepts and techniques presented. Specific cases will be discussed later.

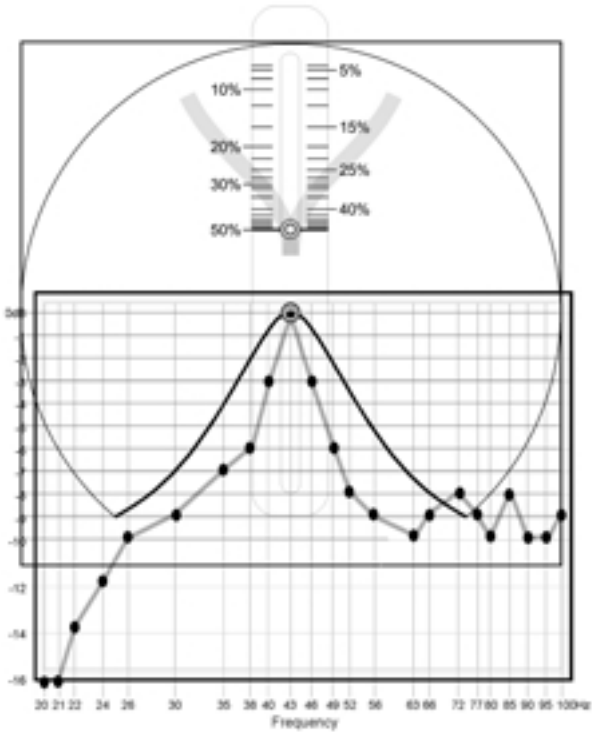
Figure 14
Width Selector



You will use the Measurement Template just completed and the Width Selector to determine the correct width setting. The Width Selector graphically depicts a single resonant peak. The peak looks similar to a slice of a pie. See Figure 14. At the top of the Selector is a pull tab. When you slide the tab up and down, the width of the pie slice becomes narrower and wider, respectively. The pointers on the sides of the button point to the bandwidth that corresponds to the width of the slice.

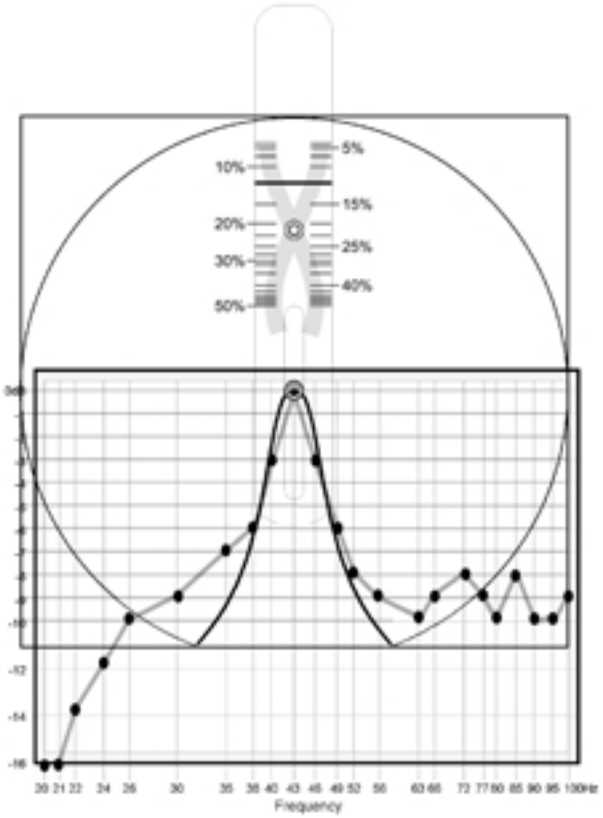
Place the Width Selector over the Measurement Template, positioning the center rivet of the Selector over the response peak, as shown in Figure 15. Be sure to align the horizontal lines of the Width Selector with those of the Measurement Template.

Figure 15
Placement of the Bandwidth Selector



Apply pressure to the upper and lower left corners of the Selector using the thumb and forefinger of your left hand. Now gently slide the tab up or down until the adjustable slice most closely fits the response data. See Figure 16.

Figure 16
Selector adjusted for the "best fit"



The pointer on the slider will indicate the correct width setting. Enter this number in the Width field of the Measurement Template.

In our example, the width is 12.5%.

It is not realistic to expect a perfect fit. Acoustic measurements encompass the behavior of not only the speakers but of the room and its contents as well. Reflected energy, standing waves and ambient noise all add their part. Determining the best width setting nearly always requires compromise.

Level

This setting will define the amount (level) you want to reduce the peak, in decibels.

The R.A.B.O.S. level adjustment is limited to attenuation only, and is adjustable from 0 dB to -14 dB. After optimization, the R.A.B.O.S. equalizer will eliminate the largest low-frequency peak; therefore, the broadband bass level can be increased without overpowering the midrange frequencies. R.A.B.O.S. applies this compensation automatically.

You will use the Width Selector as an aid in determining the correct level setting. Place the Width Selector as described above and adjust it to the correct width. Observe the first frequency point on the high-frequency side of the peak that no longer follows the slope of the Width Selector. In this example this is 56Hz. Calculate the average level of the readings from 56Hz up to 100Hz; that is, 10 data points in this example.

56Hz	63Hz	66Hz	72Hz	77Hz	80Hz	85Hz	90Hz	95Hz	100Hz
-9	-10	-8	-9	-10	-9	-8	-10	-10	-9

- 92 ÷ 10 = **-9.2**

Whenever your answer has a remainder, always round down (disregarding the negative [-]) to the next whole number.

In our example, you would enter 9 in the attenuation field.

This may not be the best method in all cases. The next section contains several other examples.

What You Measure, What To Do

As stated earlier, it is not possible to anticipate the effect of every possible listening environment. However, most residential sound rooms share many characteristics, and their dimensions fall into a range that make some response irregularities far more likely than others. On the following pages are examples of what you may encounter. Following each example is a strategy for correction. Compare your measurement results with the following examples. Find the one that best fits your graph and follow the instructions presented for that scenario.

Remember, when looking for a match, look at the descriptive characteristics, not any specific frequency or level. Each of these examples can occur at any frequency, bandwidth and level. It is unlikely that your test results will be exactly as depicted in these examples.

Example 1. Single Dominant Peak:

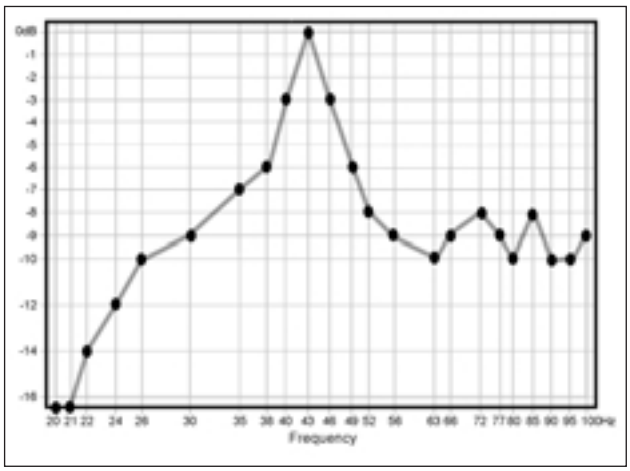


Figure 17
Single dominant peak

This is the most common result of speaker/room interaction.

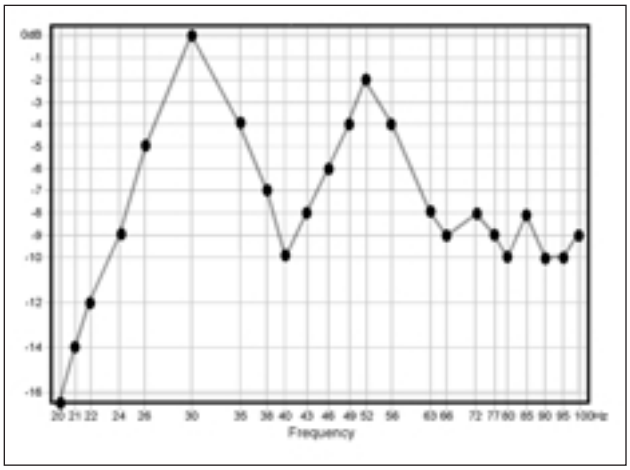
Apply the Width Selector as described in Figure 15. Align the center-line of the Selector over the center of the peak, as shown in Figure 16. Now adjust the Selector until you have achieved the “best fit”. The slider now points to the correct bandwidth setting. In this example, the frequency is 43Hz and the best-fit width is 12.5%. Fill in the Width and Frequency fields provided on the template.

Determine the appropriate level using the technique described earlier. In this example, -9 dB would be best. Enter the level in the field provided.

Skip to the “Adjusting the R.A.B.O.S. Equalizer” section on page 28.

Example 2. Two Response Peaks:

Figure 18
Two response peaks



Characterized by two response peaks, approximately equal in amplitude and width. This requires that you make a choice between the two peaks. In situations like this, the higher frequency peak will always be more audible and objectionable. Response peaks below 45Hz, unless extreme, can actually be beneficial toward achieving visceral impact. Perform corrections on the upper frequency peak.

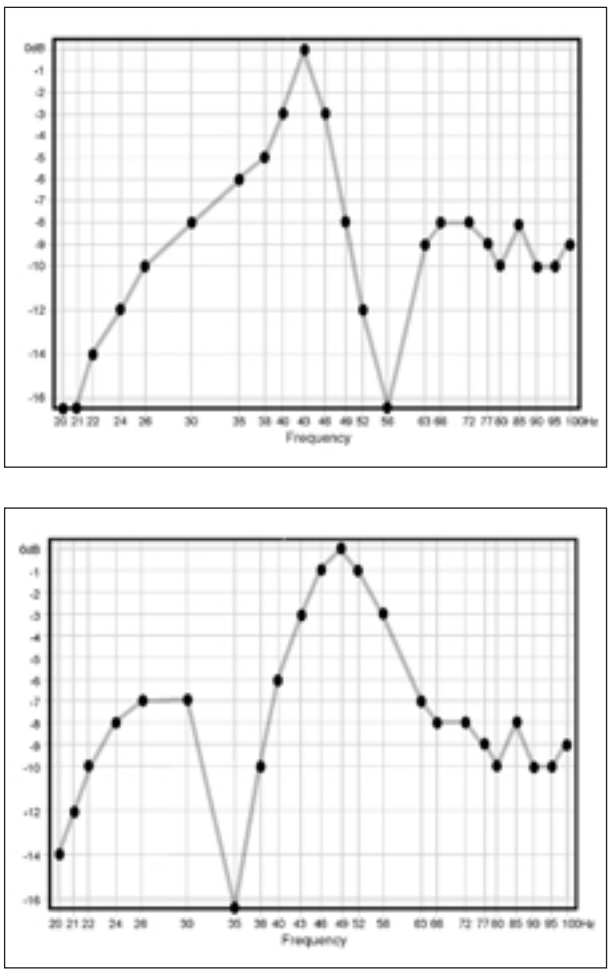
Apply the Width Selector as described above. Align the center-line of the Selector over the center of the higher frequency peak. Now adjust the Selector until you have achieved the "best fit." The slider now points to the correct width setting. In this example, this is at 52Hz. The best-fit width is 28%. Fill in the Width and Frequency fields provided on the template.

Determine the appropriate level using the technique described earlier. This calculation will indicate a -8 dB setting. However, this peak does not reach the 0 dB level as the lower peak does. Therefore, a -8 dB setting would be excessive. The 52Hz peak stops at -2dB. Subtracting 2 from 8 yields the correct setting, -6 dB. Enter -6 in the Level field.

Skip to the "Adjusting the R.A.B.O.S. Equalizer" section on page 28.

Figure 19
Dip above or below peak

Example 3. Peak Adjacent to a Dip:



Response dips can occur at any frequency, sometimes immediately adjacent to the peak you want to correct. Two examples are shown, one immediately above and one immediately below the peak. Deep response dips such as these are caused by destructive wave interference. Destructive interference dips occur only in one spot within the room. It is not uncommon to completely eliminate the effect by moving the RSLM to a different location. Note that this does not eliminate the dips. We have simply moved away from them. Sometimes only a few inches are required. Do not attempt to correct this condition with equalization. If you encounter dips like this, take the following steps:

1. Select a new test position: Cue the test track corresponding to the center frequency of the dip. In the first example in Figure 19, you would play Track 13 (56Hz). Press Play ▶. You will see a reading very close to what you had before. Now, slowly move the RSLM around the area, if possible remaining within about a foot of the original test point. As you move the RSLM, watch the bar graph. You will observe large level fluctuations. Find a position that restores the level to approximately that of the adjacent test points. You may find it helpful to move the RSLM vertically. Dips can be oriented in any axis. The position that restores the level to about that of the adjacent test points is your new test position.

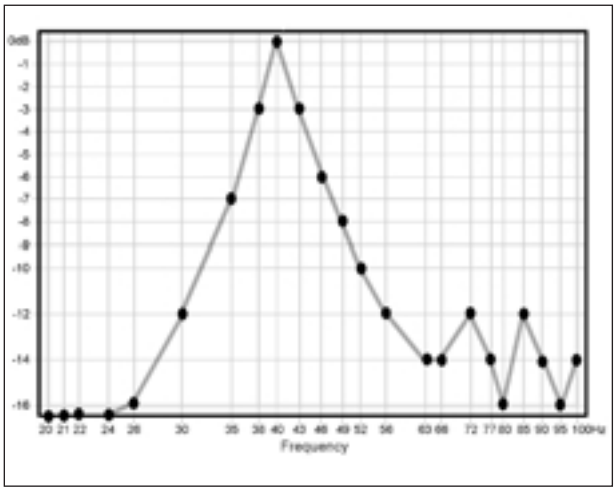
2. Reset the test level: Return to the section “Setting the Subwoofer Test Level” on page 16. Perform the procedure as described.

3. Repeat the measurements: Now that you are familiar with the measurement process, you can go much faster by using Tracks 27–50. These tracks contain all the test tones necessary for measurement. However, each test is only about three seconds, and there is no frequency announcement. The first test is 100Hz. Just place each test mark in order until finished. Connect the dots.

Your second measurement will no longer exhibit the deep response dip. However, the peak will still be evident. Without the influence of the response dip, the amplitude and center of the peak may have changed. Compare your new data to the examples given in this section of the manual. Follow the instructions for the example that most closely matches your new measurement.

Example 4. Narrow Response:

Figure 20
Narrow Response



Although it looks as though this speaker is quite bass-deficient, this is actually indicative of a single, very narrow peak in excess of 10 dB high.

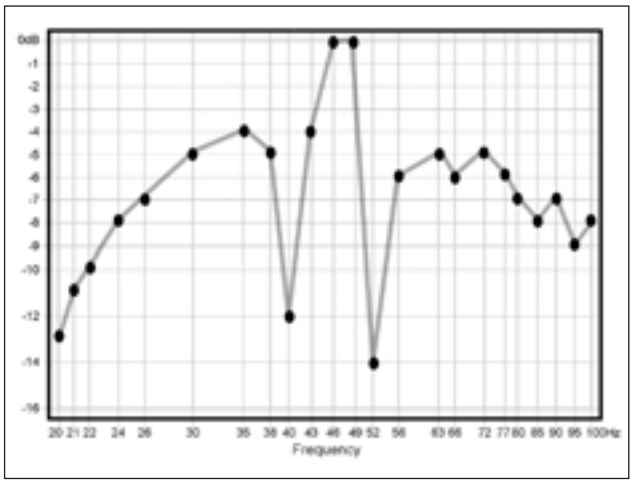
Apply the Width Selector as described above. Align the center-line of the Selector over the center of the peak, as shown in Figure 15. Now adjust the Selector until you have achieved the “best fit”. The slider now points to the correct width setting. In this example, the frequency is 40 Hz and the best-fit width is 10%. Fill in the Width and Frequency fields provided on the template.

Determine the appropriate level using the technique described earlier. In this example, -13 dB is indicated. Enter 13 in the field provided.

Skip to the “Adjusting the R.A.B.O.S. Equalizer” section on page 28.

Example 5. One or More Narrow Dips:

Figure 21
Example of two narrow dips



Response dips can occur at any frequency, sometimes immediately adjacent to the peak you want to correct. In this example, there are two such dips on either side of the peak. Deep response dips such as these are caused by destructive wave interference. Destructive interference dips occur only in one spot within the room. It is not uncommon to completely eliminate their effect by moving the RSLM to a different location. Note that this does not eliminate the dips. We have simply moved away from them. Sometimes only a few inches are required. Do not attempt to correct this condition with equalization. If you encounter dips like this, take the following steps:

1. Select a new test position: Cue the test track corresponding to the center frequency of the dip. In the example in Figure 21 you would play Tracks 14 (52Hz) and 18 (40Hz). Press Play ▶. You will see a reading very close to what you had before. Now, slowly move the RSLM around the area, if possible remaining within about a foot of the original test point. As you move the RSLM, watch the bar graph. You will observe large level fluctuations. Find a location for the subwoofer or a test location that raises the response at these frequencies. You may find it helpful to move the RSLM vertically. Dips can be oriented in any axis. The position that restores the level to about that of the adjacent test points is your new test position.

2. Reset the test level: Return to the section "Setting the Subwoofer Test Level" on page 16. Perform the procedure as described.

3. Repeat the measurements: Now that you are familiar with the measurement process, you can go much faster by using Tracks 27–50. These tracks contain all the test tones necessary for measurement. However, each test is only about three seconds, and there is no frequency announcement. The first test is 100Hz. Just place each test mark in order until finished. Connect the dots.

Your second measurement will no longer exhibit the deep response dips. However, the peak will still be evident. Without the influence of the response dips, the amplitude and center of the peak may have changed.

4. Interpret the new data: Compare your new data to the examples given in this section of the manual. Follow the instructions for the example that most closely matches your new measurement.

Example 6. Ideal Response:

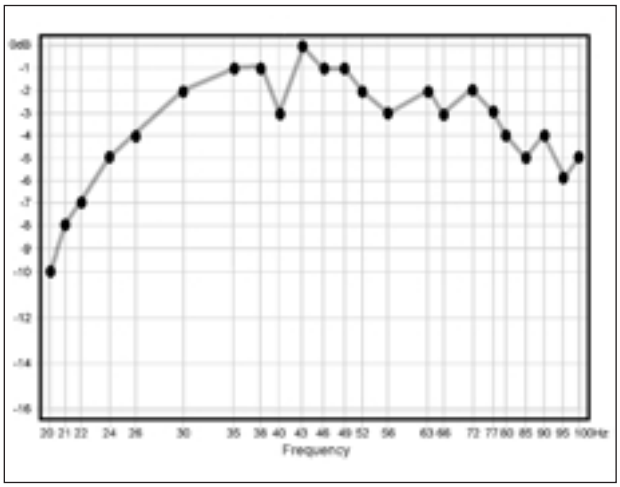


Figure 22
Ideal response, no EQ needed

Adjusting the R.A.B.O.S. Equalizer

If your test data looks similar to the example in Figure 22, you have a very favorable setup. Skip to the "Final System Balance" section, page 29.

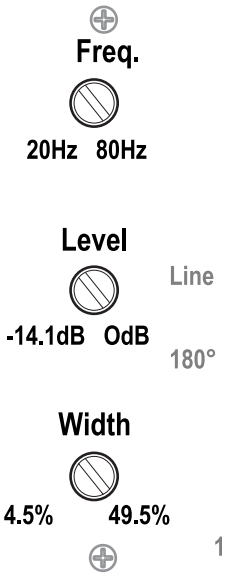
Now that you have performed the measurements and interpreted the data, you have the information needed to adjust the subwoofer equalizers.

First, make sure that the R.A.B.O.S. selector is in the On position. There are three equalizer adjustments on the Kappa Subwoofer. Top to bottom, they are marked "Freq" (frequency), "Level" (level) and "Width" (width). Each control has 21 positions. These are numbered from left to right. Therefore, Position 1 is the full counterclockwise position. The following table illustrates all switch positions.

Position	Freq. (Hz)	Level (dB)	Width %
1 CCW	20	-14.1	4.5%
2	20	-13.9	5%
3	20	-13.5	7.5%
4	21	-13.1	10%
5	22	-12.7	12.5%
6	24	-11.7	16.5%
7	26	-11.0	20.5%
8	30	-10.2	23%
9	35	-9.5	26%
10	38	-8.9	28%
11	40	-8.3	29.5%
12	43	-7.9	31%
13	46	-6.4	34%
14	52	-4.4	39%
15	56	-2.9	41.5%
16	63	-1.9	43.5%
17	66	-1.1	45%
18	72	-0.5	46.5%
19	77	0.0	48%
20	80	0.0	49%
21 CW	80	0.0	49.5%

R.A.B.O.S. Controls

You must use the R.A.B.O.S. key to adjust these controls. Always adjust both subwoofers together. Using the adjustment key, adjust the controls as indicated by the Measurement Template. Each value shown in the table is represented by detents in the R.A.B.O.S. controls. Simply count the number of detents necessary, indicated by the results of your R.A.B.O.S. Test.



After performing these adjustments, you may skip forward to the "Final System Balance" section. It is recommended that you perform a second measurement to confirm that the settings are correct.

ⓘ If you are going to retest the system after EQ adjustments, repeat the "Setting the Subwoofer Test Level" section on p. 16.

🔑 Retesting the system will go much faster if you use Tracks 27–50. These tracks contain all the same test tones you just used. However, each tone plays for only a few seconds and there is no frequency announcement. If you are uncomfortable operating at this pace, you may, of course, perform measure-ments with the original test tracks.

Your first interpretation of the data and choice of settings may not be optimum. You can repeat the test-adjust-test cycle as often as needed to get the desired results. To do this, return to page 16, "Setting the Subwoofer Test Level." You may prefer to retest using the same template. Doing so makes it easy to evaluate the improvement.

When you are satisfied with the results, go to "Final System Balance."

Final System Balance

Cue Track 51 of the R.A.B.O.S. Test CD. Press Play ▶. Increase the system volume until the RSLM indicates -10 dB. Now play Track 52. Adjust both subwoofer gain controls until -10 dB is indicated on the RSLM. Of course, you may fine-tune the subwoofer gain control to your listening preference.

This concludes the R.A.B.O.S. process. It is recommended that you remove the battery from the RSLM. Store the Test CD, Width Selector, Adjustment Key and the RSLM together.

Care of your Subwoofer

Your Infinity subwoofer cabinet is finished with a heavy-duty, high-quality veneer which requires very little maintenance. Keep the cabinet clean by dusting it occasionally with a damp cloth or use a good quality furniture polish to maintain its original luster. (When using aerosol products, always spray the cloth, not the speaker, to prevent any of the product from drifting onto the electronics of the unit.)

Feedback

If the bass seems boomy, or you notice a rumbling sound when listening to record albums, the cause may be acoustic feedback. This means that low-frequency vibrations from your speakers are reaching the turntable. To help isolate the turntable from these vibrations, place the turntable on a heavy, solid support, as far away as possible from the subwoofer. If you continue to experience difficulties after experimenting with placement, consult your Infinity dealer.

Important!

CD players are also susceptible to vibrations and should be placed on solid supports to isolate them acoustically. Another method to isolate the CD player is to place it on four isolation feet, available at your local dealer.

In case of trouble with your Subwoofer

If the subwoofer sound is distorted, stops playing or otherwise seems to be malfunctioning, first determine if the problem is in the subwoofer or the wiring and/or other audio components. If the problem also affects the satellite speakers, the cause is most likely in your electronics. If it is only noticed in the subwoofer, make sure that all connecting cables are correct and in proper working condition. Make sure the subwoofer is plugged in and turned on.

Important!

If everything seems to be in good working order and the subwoofer still malfunctions, **DO NOT ATTEMPT ANY REPAIRS!** Contact your Infinity dealer and get the name of the authorized Infinity service center near you.

Specifications – Kappa Series Subwoofer

		Kappa Subwoofer
Performance data	Frequency Response (±3 dB):	25Hz ~ 150Hz
	Output (RMS):	220W
Drive units	Driver:	250 mm long throw woofer
	Crossover	50Hz ~ 150Hz
Dimensions	Height*:	42.5 cm
	Width:	45.0 cm
	Depth:	44.5 cm
	*Add 2.0cm for feet.	
Weight		31.5 kg

Declaration of Conformity

CE

We, Harman Consumer International
2, route de Tours
72500 Château-du-Loir
France

declare in our own responsibility that the product described in this owner's manual is in compliance with technical standards:

EN 55013/A12:1994

EN 55020:1994

EN 55022:1994 class B

EN 61000-3-2:1995

EN 61000-3-3:1995

R. Marshall
Harman Consumer International
FRANCE 12/01

2, route de Tours
72500 Château-du-Loir
France