WISDOM®
Wisdom Audio

Owner's Manual

Digitally Controlled
Analog Brain
DCAB-1

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WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

CAUTION: TO REDUCE THE RISK OF ELECTRICAL SHOCK, DO NOT REMOVE COVER. NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL.

Danger

The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

Important

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying this equipment.

Important Safety Instructions

Please read all instructions and precautions carefully and completely before operating your Wisdom Audio equipment.

1. ALWAYS disconnect your entire system from the AC mains before connecting or disconnecting any cables, or when cleaning any component.

2. This product must be terminated with a three-conductor AC mains power cord which includes an earth ground connection. To prevent shock hazard, all three connections must ALWAYS be used.

3. AC extension cords are not recommended for use with this product.

4. NEVER use flammable or combustible chemicals for cleaning audio components.

5. NEVER operate this product with any covers removed.

6. NEVER wet the inside of this product with any liquid.

7. NEVER pour or spill liquids directly onto this unit.

8. NEVER bypass any fuse.

9. NEVER replace any fuse with a value or type other than those specified.

10. NEVER attempt to repair this product. If a problem occurs, contact your Wisdom Audio® retailer.

11. NEVER expose this product to extremely high or low temperatures.

12. NEVER operate this product in an explosive atmosphere.

13. ALWAYS keep electrical equipment out of the reach of children.

14. ALWAYS unplug sensitive electronic equipment during lightning storms.

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Unpacking the DCAB-1

Your new Digitally Controlled Analog Brain is a substantial piece of electronics. Please exercise caution when unpacking your DCAB-1 to ensure that you do not strain yourself from its (perhaps unexpected) weight.

Caution!

Do not attempt to lift your DCAB-1 while bending or twisting from the waist. Use your legs for lifting, not your back.
Always stand as straight as possible and keep the DCAB-1 close to your body.

After unpacking your DCAB-1, keep all packing materials for future transport. In the event that you need to ship your DCAB-1, only the original, purpose-designed shipping carton is acceptable. Any other method of shipping this product runs a significant risk of damage to the DCAB-1—damage that would not be covered by the warranty.

Carefully inspect your DCAB-1 for possible damage due to shipping. If you discover any, contact your Wisdom Audio dealer immediately.

Warm up/break-in period

Although your Wisdom Audio DCAB-1 delivers outstanding performance straight out of the box, you should expect to hear it continue to improve as it reaches its normal operating temperatures and its various components "break in." It has been our experience that the greatest changes occur within the first 25-50 hours, but that the DCAB-1 will continue to improve in sound quality for about 300 hours, after which time it remains quite constant.

The only exception to this rule is if power is removed from the unit, allowing it to cool down. In this case you should expect a brief warm-up period before the DCAB-1's sound quality is at its best. (Fortunately, you will never have to repeat the full 300 hour break-in period.)

Placement Considerations

PRECAUTION

For your protection, review “Important Safety Instructions” and “Operating Voltage” before you install your DCAB-1.

Note that adequate clearance for the AC cord and connecting signal cables must be left behind your DCAB-1. We suggest leaving at least six inches (15 cm) of free space behind your DCAB-1 so all cables have sufficient room to bend without crimping or undue strain.

We also suggest leaving at least six inches (15 cm) of space between the DCAB-1 and the nearest power amplifier in your system. Most power amplifiers need adequate ventilation themselves; moreover, some power amplifiers radiate significant magnetic fields that should be kept away from all sensitive electronics in order to achieve the best performance.

The DCAB-1 should also be placed in such a way that the power switch on the rear panel is easily accessible. This switch disconnects power from the unit completely, resulting in effective disconnection of the DCAB-1 from the AC mains. You might think of this as a “vacation switch,” should you wish to turn off your system completely when you will be away from home for a prolonged period of time. Just remember to turn it back on again when you return.

Ventilation

Your Wisdom Audio DCAB-1 does not have significant ventilation requirements, operating as it does solely at line level. It draws less than one ampere of current, and becomes only modestly warm during normal operation.

Mechanical drawings are included in this manual to facilitate special installations where necessary (see “Dimensions” at the end of this manual).

Operating Voltage

For compatibility with existing household outlets, a standard three prong, 15 ampere plug is provided on the removable, IEC-standard AC mains cable.

The Wisdom Audio DCAB-1 may be set for 110-120V or 220V-240V AC mains operation. Outside the United States, and depending on local electrical codes and regulations, the AC mains cord may need to be replaced with one that conforms to local plug/outlet standards.

The operating voltage of the DCAB-1 may be changed by the user. However, it is *critical* that the proper voltage is set before power is applied to the unit.

Caution!

Always make sure the DCAB-1 is set to the correct voltage *before* connecting it to AC mains power! *Failure to do so can permanently damage the unit.*
Under *no circumstances* should you change the position of this switch while the unit is connected to the AC mains!

Special Design Features

Improved Filters

The filters in the DCAB-1 are vastly superior to the previous Analog Brain.

- There are more filters available. This allows for smaller sonic issues to be effectively addressed. (Normally, you tackle the big sonic problems first; if you have filters left after they are fixed, you have the luxury to address smaller ones).

- The DCAB-1 filters can be used for frequencies that the old filters could not reach. All the filters (both cut and boost) can be adjusted to operate at *any* relevant frequency.

- The width of the DCAB-1 filters can be adjusted. These parametric filters can be adjusted for center frequency, amplitude, and the "Q" or width of the affected range. At 100% Q, an extremely narrow notch or peak is introduced, affecting only a tiny range of frequencies; lower Q values broaden the range of the frequencies affected by the cut or boost. This capability gives you the power to fix an extremely specific problem with an equally specific filter, without affecting adjacent frequencies.

In short, the filters in the DCAB-1 are more numerous, more powerful, and more precise.

Repeatable Precision

The DCAB-1 has completely repeatable settings. If you decide to change a single filter parameter to determine whether an improvement is possible, returning to the original setting is as simple as returning the value to its original number. Nothing is lost in the course of experimenting.

The previous Analog Brain used knobs for some of the settings, and returning to *exactly* the same settings was difficult, if not impossible. This applied to left/right balance, bass/treble balance, Q, and damping. With the DCAB-1 you can return *exactly* to any desired setting. This allows for easy A B A testing of system changes.

In addition, the DCAB-1 settings can be saved with a simple cut and paste operation. (*In fact, we recommend printing your initial calibration results and saving the printout with this manual. Doing so will make returning to original performance simple if you ever decide to change anything.*)

Adjust From Listening Position

The DCAB-1 can be adjusted from the listening position, which significantly speeds the adjustment process. (No more running across the room every 30 seconds to make a small change.)

During initial setup and calibration, the adjustments are done using a laptop computer and a simple terminal program that communicates with the DCAB-1. By having a long serial cable, you can easily have the laptop on your lap at the primary listening position. Making on-the-fly adjustments yields immediate, audible, and measurable results.

Once the system has been dialed in, you may want to fine-tune one or two of the simpler settings, based on program material and listening habits. The DCAB-1 has a remote control which is perfect for making these simple changes. It includes two-way communication with the DCAB-1, and a small display in the remote that tells you which parameter you are currently able to adjust.

While doing the entire initial setup with this remote control would be tedious and slow, it is a perfect way (for example) to fine-tune the Q_b to add a little warmth, or to tighten up the bass a bit. Significantly, you can do so from the comfort of your listening chair, which is the only place to judge when you have it just right.

Enhanced Sonic Performance

In addition to all the enhanced adjustment capabilities, the DCAB-1 is a significant step forward in overall transparency and dynamics as compared to the earlier Analog Brain. We are confident that any owner of an Analog Brain will be thrilled with the improvement wrought by the upgrade to the Digital Controlled Analog Brain.

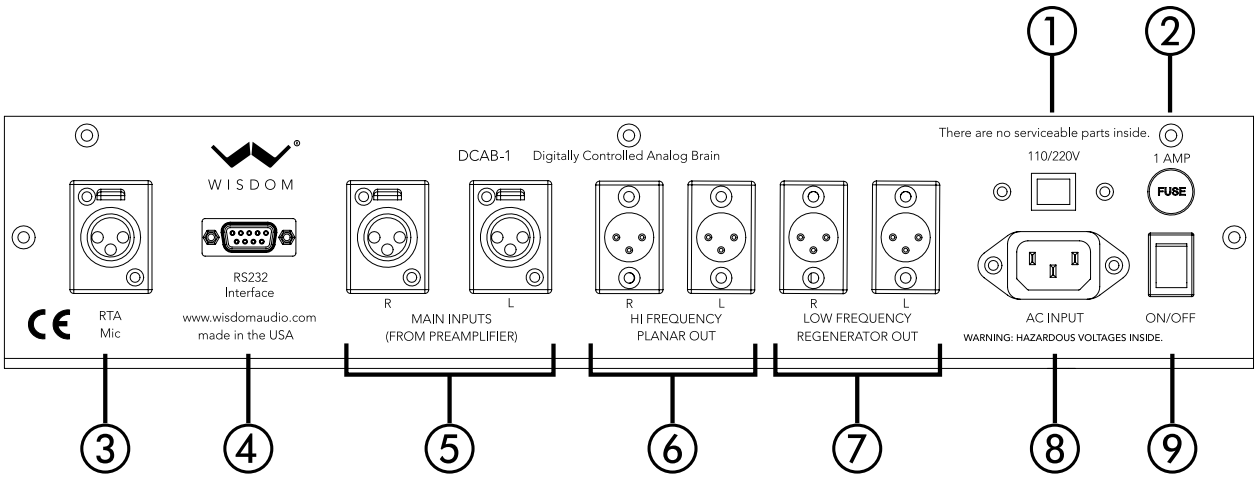
Front Panel

1 Infrared Transceiver LEDs

The DCAB-1 supports two-way communication between its remote control and the unit itself. The lens for this infrared (IR) communication is in one of the DCAB-1's front feet. This lens must have a clean line of sight to the remote control if you want to use it.

In normal, day-to-day operation, you should not have to do anything to your DCAB-1 after it has been properly set up. It is truly a "set it and forget it" component that simply optimizes the performance of your speaker system in your room.

However, we have found that some of our customers like to fine-tune one or two parameters a bit to compensate for overly "warm" or overly "dry" recordings. The best parameter for this is the Q_b control, which makes the system sound slightly more "full" or "lean" in the bass. Having the two-way remote control for these sort of on-the-fly minor adjustments is a wonderful convenience.



Rear Panel

Caution!

Turn off your power amplifiers before attempting to connect anything to your Wisdom Audio DCAB-1.

1 Operating Voltage Selector Switch

As described in *Operating Voltage*, the DCAB-1 may be set for 110-120V or 220V-240V AC mains operation. The two-position switch itself shows either "115V" or "230V" — this is indicative of the center of the range that is appropriate in each position.

Caution!

Always make sure the DCAB-1 is set to the correct voltage *before* connecting it to AC mains power! *Failure to do so can permanently damage the unit.*
Never change the position of this switch while the unit is connected to the AC mains!

If you need to change the operating voltage of your DCAB-1:

1. make sure it is completely disconnected from all power
2. using a small screwdriver (or even your fingernail), slide the switch fully to the other position
3. then plug in the unit and turn it on using the AC mains switch located next to the power cord.

2 AC Mains Fuse

A fast-acting 1 ampere fuse is located in a fuse holder on the rear panel. If you suspect that your fuse has blown, turn off the AC mains switch and disconnect the AC mains cord. Only then should you remove the fuse holder by inserting a flat screwdriver in the slot, gently pressing in and rotating it counterclockwise by approximately 45°. It is spring-loaded, and will then safely slide out of the holder.

Either of two things might cause the fuse to blow:

- **a large spike in the line voltage on the AC mains**
- **a failure of some component** within the DCAB-1 itself (unlikely, but certainly possible – particularly if spikes have managed to enter the DCAB-1 and stressed the components inside)

If your AC fuse has blown, disconnect all wires from the unit (both signal and power), replace the fuse with an AGC 1A fuse, and restore power to the unit *without reconnecting signal cables*. This approach prevents a potential problem in the DCAB-1 from affecting the rest of your system. Wait a few moments, then disconnect power again and check the fuse.

If the replacement fuse has blown, contact your Wisdom Audio dealer for assistance.

If the replacement fuse is intact, the first one was probably blown by an AC mains spike. (*Consider investing in good power conditioning. Your Wisdom Audio dealer can provide a recommendation. A high quality power conditioner will both protect your equipment and actually improve performance by supplying clean AC power to all your components*.) Replace the fuse, reconnect signal and power to the DCAB-1, and power the unit up with your power amplifiers turned off. Once everything in the system has had a chance to stabilize (usually just a few seconds), turn on your power amplifiers.

3 Real Time Analyzer Microphone Input

The DCAB-1 includes a calibrated microphone that is matched (via calibration) to a costly reference microphone. During calibration, this microphone should be placed where your head would normally be during listening, using a microphone stand (not included). A mic stand with a boom is often more convenient, though a plain stand is usually adequate.

Connect the DCAB-1 microphone to this input using a high quality, balanced microphone cable. If the cable supplied with the DCAB-1 is not long enough, you can "daisy chain" another quality balanced mic cable in series with the one provided without adverse effects on measurement accuracy.

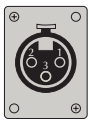
4 RS232 Interface

The RS232 interface is used to connect a computer for calibration and setup. It provides two-way communication between the DCAB-1 and the computer that is used for adjusting all the myriad parameters of the crossover/equalizer. Thanks to this communication, you can adjust the many settings of the DCAB-1 in real time, seeing and hearing the results of your labors immediately.

5 Balanced Audio Input

This balanced audio input accepts a signal from a preamplifier with balanced outputs via a high quality XLR connector.

The pin assignments of this XLR-type female input connector are:



Pin 1: Chassis ground

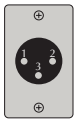
Pin 2: Signal + (non-inverting)
Pin 3: Signal – (inverting)
Connector ground lug: chassis ground

These pin assignments are consistent with the standards adopted by the Audio Engineering Society. Refer to the operating manual of your balanced-output preamplifier to verify that the pin assignments of its output connectors correspond to your Wisdom Audio DCAB-1. If not, wire the cables so that the appropriate output pin connects to the equivalent input pin, in order to preserve the polarity of the musical signal.

6 High Frequency (Planar) Output

These balanced audio outputs carry the "high pass" portion of the audio spectrum, and must be connected to the amplifier that drives the planar magnetic panels.

The pin assignments of this XLR-type male output connector are:



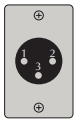
Pin 1: Chassis ground
Pin 2: Signal + (non-inverting)
Pin 3: Signal – (inverting)
Connector ground lug: chassis ground

These pin assignments are consistent with the standards adopted by the Audio Engineering Society. Refer to the operating manual of your power amplifier to verify that the pin assignments of its input connectors correspond to your Wisdom Audio DCAB-1. If not, wire the cables so that the appropriate output pin connects to the equivalent input pin, in order to preserve the polarity of the musical signal.

7 Low Frequency Regenerator Output

These balanced audio outputs carry the "low pass" portion of the audio spectrum, and must be connected to the amplifier that drives the low frequency regenerator (woofer) sections.

The pin assignments of this XLR-type male output connector are:



Pin 1: Chassis ground
Pin 2: Signal + (non-inverting)
Pin 3: Signal – (inverting)
Connector ground lug: chassis ground

These pin assignments are consistent with the standards adopted by the Audio Engineering Society. Refer to the operating manual of your power amplifier to verify that the pin assignments of its input connectors correspond to your Wisdom Audio DCAB-1. If not, wire the cables so that the appropriate output pin connects to the equivalent input pin, in order to preserve the polarity of the musical signal.

8 AC Mains Input

A conventional IEC standard power cord is used with the DCAB-1. A high quality AC mains cord is included with the product, although the use of the standardized IEC receptacle means that you may easily substitute another high quality AC mains cord if you wish.

Warning!

Your new Wisdom Audio DCAB-1 has been safety-tested and is designed for operation with a three-conductor power cord. Do not defeat the “third pin” or earth ground of the AC power cord.

9 AC Mains Switch

An **AC mains switch** is located adjacent to the power cord on the rear panel of the DCAB-1. This switch may be used to disconnect the unit from the AC mains without having to actually unplug the DCAB-1 from the wall outlet.

If you plan to be away for an extended period, or have any other reason to turn the DCAB-1 completely off, you may either unplug the DCAB-1 or you may use the **AC mains switch**.

Danger!

Potentially dangerous voltages and current capabilities exist within your DCAB-1. Do not attempt to open any portion of the DCAB-1’s cabinet. There are no user-serviceable parts inside your DCAB-1. All service of this product must be referred to a qualified Wisdom Audio dealer or distributor.

Remote Control

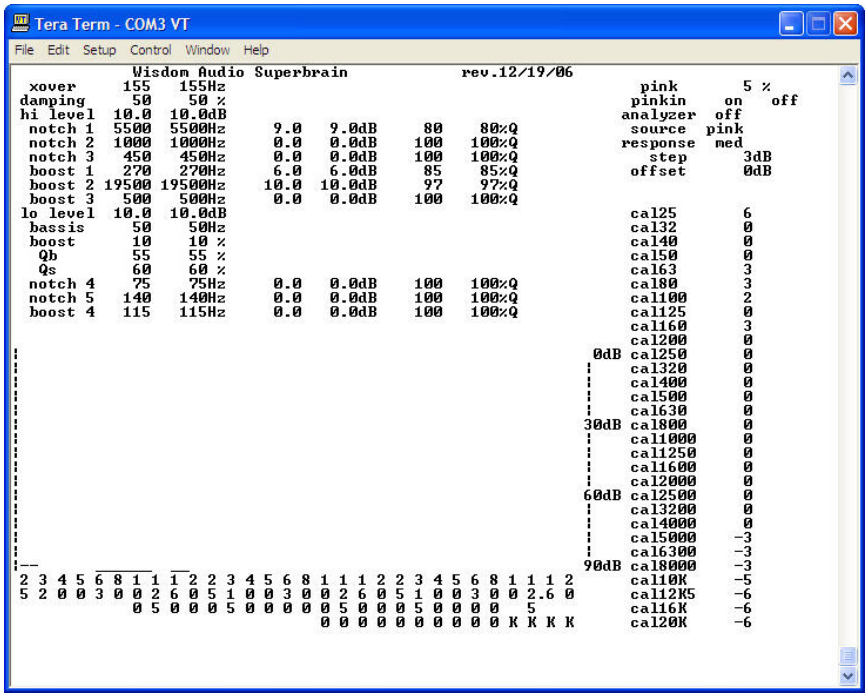
Your Wisdom Audio DCAB-1 comes with a remote control that communicates with the Brain bidirectionally. That is, unlike most remote controls, this one sends instructions to *and receives information back from* the main unit.

This deceptively simply remote control actually provides access to everything that the DCAB-1 can do. Every adjustment that can be made with the computer connected to the RS232 port can also be made with the remote control.

The major limitation of the remote control lies in the size of its LCD display. It can show you only one parameter at a time, for a single speaker. Pressing the MENU ▲ button moves "up" in the same way that pressing the arrow-up button on your computer moves you "up" in the list of parameters. Similarly, pressing the MENU ▼ button moves you "down" in the list.

The display on the remote will show you which parameter is active at each step along the way. But unless your memory of the layout of the on-screen display from your laptop is extraordinary, you are probably best off making only minor changes with the remote control.

As a quick reference, you can use the screen shot below as a map, to refresh your memory of how the cursor scrolls through the many parameters available in the DCAB-1. (Ignore the specific values contained in this screen shot. They are meaningless initial values.)



Introduction to Room Acoustics

Wisdom Audio believes in equalization. Assume for a moment that you had a "perfect" loudspeaker: as soon as you place it in your room, its perfection is gone. In fact, even *good* rooms often introduce deviations of 20 dB to the response of the system.

It seems strange to us to worry about tenths of a decibel differences between one component and another when there are 10-20 dB problems right there in the room with you.

At the same time, room equalization is not a panacea. It does not solve all problems. In fact, and somewhat paradoxically, EQ works best when it has the least to do. It is best used as the "finishing touch" on an otherwise good system. Unfortunately, most people do not understand that the most important component in their system is their room.

This manual does not have the space for a full description of everything that goes into creating excellent room acoustics; doing so would require a textbook of several hundred pages. Instead, we will give you some ideas, and some references to pursue should you want to learn more.

Start With the Room

There are many myths floating around pertaining to what a "good room" should be like. One of the most common is that it should have non-parallel walls. Without going into the details, we recommend sticking with rectangular rooms whose dimensions do ***not*** share common divisors.

Thus a room with dimensions of 8' by 16' by 20' would be quite poor (since the dimensions are all divisible by a length of 4', and 16 is also multiple of 8). By contrast, a room whose dimensions are 9' by 16' by 29' would be much better, since none of the dimensions are mathematically related to one another.

There are infinite variations on this idea. If you have the flexibility to choose (or modify) your room to avoid such problems, do so. Either way, our equalization will be a big help.

Rigid Walls

Another myth that should be dispelled is the notion that the walls (and ceiling and floor) of the room should be extremely rigid in order to reproduce good bass. Rigid, inflexible walls reflect energy extremely well; thus you will keep more of the bass energy in the room. This much is true. However, those rigid walls will only increase the size of the standing waves that your room naturally supports. In simple terms, you will have *more* bass, but it will also be *more irregular*, with larger peaks and valleys in the response.

Walls that flex a bit (but do not rattle) are much better. Coincidentally, traditional American residential construction standards (sheet rock on wooden studs) are not a bad place to start. You can do better still with professional help, but studs and sheet rock are better than poured concrete. (If your listening room is in the basement, a false wall can easily be built in front of the concrete. You probably need something like this for insulation and aesthetics anyway.)

The ultimate in dedicated listening room construction involves the design and construction of floating walls, ceiling and floor. This approach yields the added

benefit (when done properly) of providing outstanding acoustic isolation from adjacent spaces as well as superb bass reproduction. This approach goes well beyond the scope of an owner's manual; if you are interested, you should contact a professional acoustician who has specialized in this sort of domestic room design.

Speaker Placement

Within the room itself, placement of the speakers and the listener will have a profound effect on the performance of the system, particularly below 300-400 Hz. There is no "perfect" position that will solve all problems, but finding the best compromise will make it easier to solve the remaining problems with the DCAB-1.

Your Wisdom Audio dealer can help you with speaker placement, which is never quite as simple as it seems it should be. The characteristics you need to listen for are several:

- **Stable, 3-dimensional imaging**
  This usually requires reasonable symmetry within the room, and a bit of space between the speakers and adjacent walls (to minimize the adverse effects of the first reflections). Mono (correlated) pink noise can help here, though it does not replace listening to music. With pink noise playing in both speakers, you should hear a tightly-defined little "ball" of pink noise floating in space exactly halfway between the speakers. Minor adjustments to the position of the speakers in order to center and tighten the focus of this test signal will yield superior clarity of image placement, size and position later, when listening to music.
- **Smooth, consistent bass**
  Oft-cited rules of thumb for smoother bass reproduction include both "placing the speakers at different distances from the side walls vs. the wall behind them," and "placing them at 'odd fractions' of the room's dimensions" (e.g., fractions in which the denominator is an odd number, like $^1/_3$, $^2/_5$, $^2/_7$, etc.). But nothing replaces your experience in your room, combined with your dealer's experience in a variety of rooms. Playing pink noise through the woofer sections of your Wisdom Audio speakers (with the microphone at the listening position, and prior to doing any equalization) will let you *see* the results of your labors.

Look for relatively smooth response, even if it trails off in the deep bass. The underhung design of your Wisdom Audio Low Frequency Regenerators is specifically designed to handle the extra power brought on by equalization. But some problems are easier to correct than others. Starting out with relatively smooth bass response, even if somewhat limited in bass extension, makes for an easy fix (using the Bassis control in the DCAB-1).

Room Treatment

Rectangular rooms have six reflecting surfaces (four walls, ceiling and floor) that reflect sound to the listener, after a delay introduced by the indirect route the sound took. These first reflections are particularly damaging to the sound quality at the listening position. Since this happens for both Left and Right speakers, you have a minimum of *twelve* first reflection points in your room that deserve some attention.

Fortunately, the line source behavior of your Wisdom Audio loudspeakers minimizes the most destructive of these reflections, those from the ceiling and

the floor. Wisdom Audio line sources simply do not radiate much energy up or down; it is largely contained within the height of the planar magnetic element.

This leaves you with eight "first reflections" that you should consider minimizing somehow. These points are easily found by having a friend move a small mirror along the four walls of the room, while you sit at the listening position. Any place on the wall where you can see a reflection of *either* speaker is a first reflection point.

If you can, arrange to apply either absorption or diffusion at these eight points (don't forget the wall behind you). Absorption can be as simple as heavy, insulated drapes; diffusion can be provided by a well-stocked bookcase with books of different sizes. Alternatively, you can buy purpose-designed room treatments (some sources listed under References, below).

The important things to remember are these: a good room should have a balance of absorption and diffusion; and if you are going to treat only a few areas of the room, the first reflection points are the most important ones to treat.

Professional Acoustic Design

Does this all sound too complicated? For good reason. It *is* complicated.

The difference between the average listening room and one that is professionally designed and implemented is huge. A great listening room will disappear to an astonishing degree, letting the experiences captured in your recordings speak to you directly. A well-designed room is also quieter and more comfortable. It can easily become a favorite retreat for peace and rejuvenation.

If you decide to investigate the possibility of improving your room with the help of a professional, it is important to find someone who focuses on domestic/residential spaces. Most acousticians are trained to deal with large spaces — airports, auditoriums, lobbies in commercial buildings, etc. The problems seen in "small" rooms (residential spaces) are quite different, and outside the experience of most acousticians. Find someone who specializes in and has a lot of experience designing home studios, home theaters, and the like. Your Wisdom Audio dealer may be such a person; failing that, they can help you find such a professional.

References

Books on Acoustics:

The Master Handbook of Acoustics, F. Alton Everest, TAB Books
Create your very own screening room; Secrets of high performance home theater design, Anthony Grimani, Performance Media Industries, Ltd.

Suppliers of Acoustic Treatments:

Acoustic Innovations, http://www.acousticinnovations.com/
Acoustic Sciences Corporation, http://www.acousticsciences.com/
CinePanel, http://www.pmiltd.com/cinepanel.html
Echo Busters, http://www.echobusters.com
RPG Diffusor Systems, http://www.rpginc.com/

Getting Ready to Calibrate

System Connections

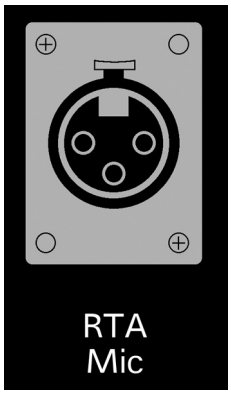
Before you start to calibrate your DCAB-1, double check the connections:

- Left and Right balanced outputs of your preamplifier to the corresponding Main Inputs of the DCAB-1.
- Left and Right balanced Hi Frequency Planar Outputs of the DCAB-1 to the amplifier that is connected to the planar sections of your Wisdom Audio loudspeakers.
- Left and Right balanced Low Frequency Regenerator Outputs of the DCAB-1 to the amplifier that is connected to the LFR (woofer) sections of your Wisdom Audio loudspeakers.

If you have not done so already, now would be a good time to also make sure that all loudspeaker cable connections are snug and cleanly made.

As in any system, we recommend that the power amplifiers be the last components turned on, and the first components to be turned off. That way, if any "upstream" components in the system emit a turn-on transient of some sort, the speakers cannot be damaged.

Setting Up the Microphone



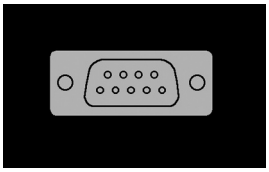
Connect the supplied microphone to its input on the rear of the DCAB-1 using high quality microphone cable. If you need a longer cable, you can "daisy chain" multiple mic cables together without sacrificing performance. (*This is precisely what balanced cables were originally designed for, after all.*)

Using a microphone stand (*not included*), place the microphone at the primary listening position, where your head would normally be.

You may find that this is more easily done if you have a microphone stand that includes a "boom," which is a counterbalanced arm that extends out laterally from the stand. The boom allows the stand to be placed on the floor beside your chair, and then extends over it to place the microphone at the correct location.

Aim the microphone at a center point between your two speakers. The included microphone is quite omnidirectional, so aiming it is not especially critical. (Having the microphone's tip in the correct *location* is fairly critical however, even though aiming it is not. Try to get it where your head will be when listening.)

Connecting the Computer



Using the supplied null modem cable (which looks like a normal serial cable, with female DB-9 connectors at both ends), connect the serial port of your computer to the RS232 interface found on the DCAB-1's rear panel.

If you need to extend this cable, you can use a normal male-female serial cable. Do not use another null modem cable in series with the one provided, since two null modem cables together result in a normal serial cable. (*Technically, pins 2 and 3 are "crossed" deliberately in null modem cables; if you do this twice, you are back where you started.*)

Using an RTA (optional)

If you have access to a Real Time Analyzer (RTA), you may want to set it up as well. This is not strictly necessary, since there is an RTA function built into the DCAB-1, which displays on your computer via the terminal program. However, the relatively slow speed of the RS232 interface to your computer makes re-drawing the screen to see your changes slower than an outboard RTA.

When we at Wisdom Audio do these calibrations, we usually use an external RTA to do most of the work. It's simply much faster. But we always double check the results using the DCAB-1 and the microphone it comes with, since this microphone is calibrated against a known reference. Good RTAs are usually pretty close (since they, too, have calibrated microphones). But we *know* what the calibration standard is for our systems, and have no control over the standards of others.

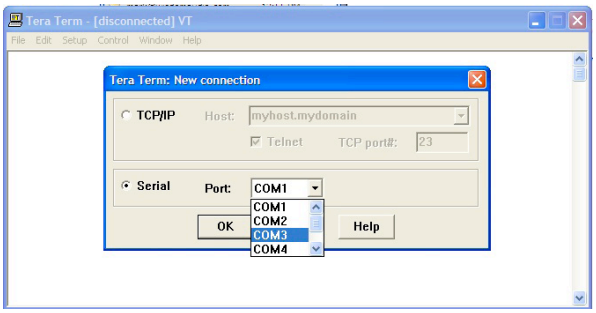
Launching Tera Term Pro

The Terminal Emulation program we use for accessing the many controls of the DCAB-1 is Tera Term for Windows. It can be downloaded at

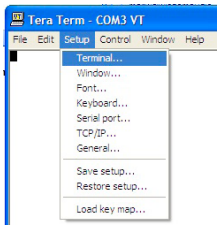
http://hp.vector.co.jp/authors/VA002416/teraterm.html

This is a free program and runs under any Windows operating system from Windows 95 through Windows XP SP2. It has not been tested with Vista.

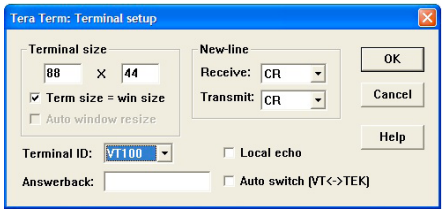
Once it is installed, connect the DCAB-1 to a serial (RS232) port and launch Tera Term. In the New Connection dialog box, select Serial and the appropriate COM port (COM3 in our case).



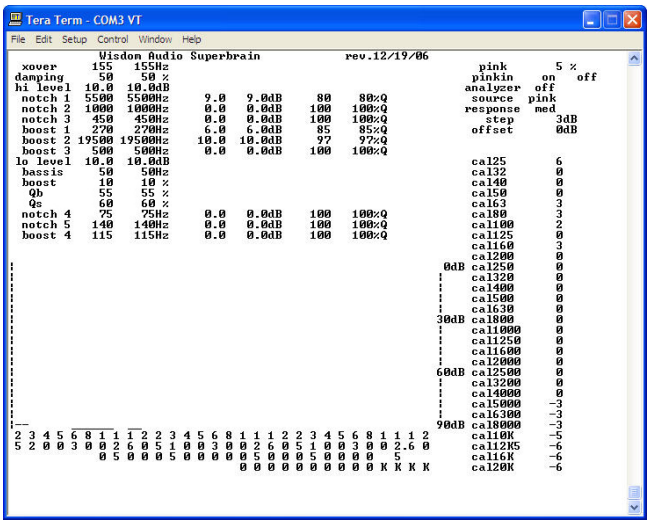
The next step is to make sure the terminal window is big enough to let you see the entire interface at once. Choose Setup -> Terminal...



Fill out the Terminal Setup dialog box as shown below, with a size of at least 88 by 44 characters, Terminal size = window size and VT 100 emulation.



If the DCAB-1 is not powered up, do so now. If it is already powered up, press Shift-? to force a download of information from DCAB-1 to the screen, which should look something like what you see below.



Congratulations! You now have access to an incredibly powerful tool for optimizing your system.

Moving Around in the Window

When in this terminal window, pressing the Left and Right arrows on your keyboard will move the cursor from one parameter to the next; the Up and Down arrows will change the value of whatever parameter you are on at the moment. You can get a little practice doing this by entering the calibration data for your particular microphone, below.

Entering Microphone Calibration Data

The microphone included with your DCAB-1 has been carefully calibrated against a known reference microphone to ensure the accuracy of the results you will achieve. These offsets are entered in the column on the right side of the terminal window, where "cal25" refers to the "**cal**ibration at **25** Hz." This is done for you at the factory; you should not have to change these values unless you need a replacement microphone for some reason.

Were you to need to enter new calibration data, you would press the right arrow until the cursor moves over to the "cal25" position; use the up or down arrows to enter the cal25 value; move on to "cal32" and do likewise; and so on through the frequencies. You would not have to save anything; every change is made in real time as you change the value, and saved automatically in the DCAB-1.

Learning Your Way Around

The terminal window may seem intimidating at first. Once you learn your way around in it, you will find that it displays a tremendous amount of information in an extremely compact, accessible format. Please take a few moments to familiarize yourself with the window and its information before your begin calibration.

There are four logical areas within this window: Filter Controls, Calibration Data, RTA Controls, and RTA Display.

Filter Controls

At the top-left of the window you find the parameters available to you to correct room problems.

In general, the columns come in pairs; the Left column for the Left speaker, and the Right column for the Right speaker. For the notch and boost filters, the pairs of columns are for the center frequency of the filter, the amplitude of the adjustment, and the Q (or width) of the filter.

	left	right	left	right	left	right
xover	155	155Hz				
damping	50	50 %				
hi level	10.0	10.0dB				
notch 1	5500	5500Hz	9.0	9.0dB	80	80%Q
notch 2	1000	1000Hz	0.0	0.0dB	100	100%Q
notch 3	450	450Hz	0.0	0.0dB	100	100%Q
boost 1	270	270Hz	6.0	6.0dB	85	85%Q
boost 2	19500	19500Hz	10.0	10.0dB	97	97%Q
boost 3	500	500Hz	0.0	0.0dB	100	100%Q
lo level	10.0	10.0dB				
bassis	50	50Hz				
boost	10	10 %				
Qb	55	55 %				
Qs	60	60 %				
notch 4	75	75Hz	0.0	0.0dB	100	100%Q
notch 5	140	140Hz	0.0	0.0dB	100	100%Q
boost 4	115	115Hz	0.0	0.0dB	100	100%Q

xover

These controls set the crossover frequency for the Left and the Right speaker. These will usually be the same for both speakers, but are set separately (as are all parameters), to preserve flexibility.

damping

"Damping" refers to the shape of the curve where the crossover transitions from flat to its 24 dB/octave slope. A value of 50% will cause the two halves of the crossover to sum to a flat curve. A value higher than 50% will introduce a small bump in the summed curve at the crossover region, while a lower value will result is a small dip in the summed curve at the crossover region.

The subjective effect of the damping control allows you to make a seamless blend between the low and high frequency portions of the system. Start with a value of 50% and vary it only at the very end of the tuning process, if necessary.

hi level

This is the level (volume) control for the high pass (planar) section of the system. It sets the overall level of the speaker above the crossover frequency.

notch 1, 2, 3

The high pass portion of the crossover has three independent, parametric ***notch*** filters. The first two columns give you control over the ***center frequency*** (in Hz) of the filter, for the Left and Right speakers, respectively. The next two columns give you Left/Right control over the ***amplitude*** (or depth*)* of the notch. The last two columns give you control over the ***Q*** (or width) of the notch. Taken together, these controls allow you to tame the three largest or most troublesome peaks in the system's response, as measured in your own listening room.

	Frequency		Amplitude		Q	
	left	right	left	right	left	right
notch 1	5500	5500Hz	9.0	9.0dB	80	80%Q
notch 2	1000	1000Hz	0.0	0.0dB	100	100%Q
notch 3	450	450Hz	0.0	0.0dB	100	100%Q
boost 1	270	270Hz	6.0	6.0dB	85	85%Q
boost 2	19500	19500Hz	10.0	10.0dB	97	97%Q
boost 3	500	500Hz	0.0	0.0dB	100	100%Q

The Amplitude and Q parameters interact with each other to a significant degree. Specifically, when the Q is at 100% (an extremely narrow spike or notch), the effect on the frequency response is minimal. As you open up the Q, not only does the result affect more frequencies (which you would expect), but the absolute *size* of the correction increases. Thus the amplitude values in decibels are suggestive rather than authoritative. Some experimentation will be necessary until you develop a "feel" for the nature of the controls.

Important

Make sure your adjustments in the high pass (planar) section of the DCAB-1 are all acting *above* the crossover frequency. Similarly, limit your low pass (woofer) corrections to frequency *below* your selected crossover frequency.

boost 1, 2, 3

The high pass portion of the crossover has three independent, parametric ***boost*** filters. The first two columns give you control over the ***center frequency*** (in Hz) of the filter, for the Left and Right speakers, respectively. The next two columns give you Left/Right control over the ***amplitude*** (or height*)* of the boost. The last two columns give you control over the ***Q*** (or width) of the boost. Taken together, these controls allow you to tame the three largest or most troublesome dips in the system's response, as measured in your own listening room.

	Frequency		Amplitude		Q	
	left	right	left	right	left	right
notch 1	5500	5500Hz	9.0	9.0dB	80	80%Q
notch 2	1000	1000Hz	0.0	0.0dB	100	100%Q
notch 3	450	450Hz	0.0	0.0dB	100	100%Q
boost 1	270	270Hz	6.0	6.0dB	85	85%Q
boost 2	19500	19500Hz	10.0	10.0dB	97	97%Q
boost 3	500	500Hz	0.0	0.0dB	100	100%Q

The Amplitude and Q parameters interact with each other to a significant degree. Specifically, when the Q is at 100% (an extremely narrow spike or notch), the effect on the frequency response is minimal. As you open up the Q, not only does the result affect more frequencies (which you would expect), but the absolute *size* of the correction increases. Thus the amplitude values are suggestive rather than authoritative. Some experimentation will be necessary until you develop a "feel" for the nature of the controls.

Important

Make sure your adjustments in the high pass (planar) section of the DCAB-1 are all acting *above* the crossover frequency. Similarly, limit your low pass (woofer) corrections to frequency *below* your selected crossover frequency.

low level

This is the level (volume) control for the low pass (bass) section of the system. It sets the overall level of the speaker below the crossover frequency.

bassis

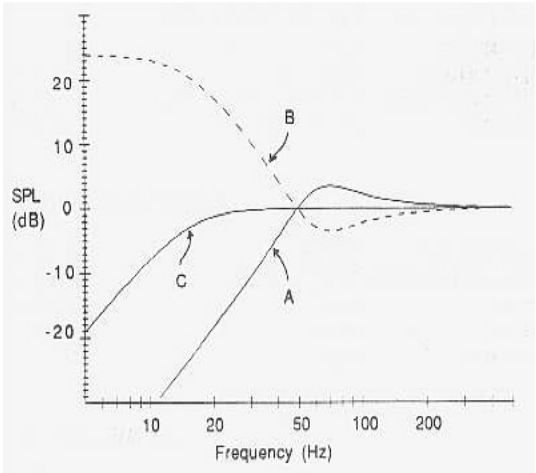
The Bassis control is actually a complex filter that uses four parameters to address a nearly universal problem in deep bass reproduction. This powerful filter both tightens and extends the useful bass response of the system (and would be a welcome addition to nearly any loudspeaker).

bassis	**50**	**50Hz**
boost	**10**	**10 %**
Qb	**55**	**55 %**
Qs	**60**	**60 %**

Almost all systems end up with a bit of a "bump" in their low frequency response just before the point at which they roll off in the deep bass. (See Curve A, below.) Sealed, acoustic suspension woofer systems like those Wisdom Audio uses also have the ability to go deeper in the bass than they naturally do without equalization. In short, they have low bass and power-handling capabilities in excess of what they exhibit when left to themselves.

The Bassis filter allows you to offset the "bump" in the bass response with a corresponding dip, below which the response can be boosted to take advantage of the extra capability of your Wisdom Audio Low Frequency Regenerator. This curve is shown in Curve B, below.

The result of applying Curve B to the speaker's native Curve A is an acoustic response that looks like Curve C in the drawing below. The Bassis filter, when set up properly, can extend the deep bass response of your system by as much as an octave or more, while providing tighter bass by cleaning up that midbass bump.



the effects of the Bassis filter

The first of the bassis controls determines the frequency of the midbass peak you are trying to eliminate. In the conceptual drawing above, this would be about 75 Hz. On Wisdom Audio systems (which have unusually good bass response), this figure is more likely to be in the 40-50 Hz range.

boost

The ***bassis boost*** control determines how much the deep bass is boosted (the left hand portion of Curve B, above). The effect of this control is not linear, since most of the change comes early in its range. By the time you reach a 20% boost, you have taken advantage of most of the available range. You will probably find that differences of even 1-2% in the first part of this adjustment are audible.

When Bassis boost is set to 0%, no deep bass extension is added.

Qb

The ***Qb*** control determines the "Q" or damping quality factor of the overall Bassis curve. This has the subjective effect of either creating a lean/tight deep bass when the value it below 55%, or a warmer/fuller deep bass when it is above 55%.

During adjustment, we suggest leaving the Qb control at 55%, which you can think of as "neutral." After everything is adjusted, you may choose to make small adjustments in Qb to fine-tune the bass performance of your system to suit the needs of different recordings (e.g., a particularly dry orchestral recording often benefits from a slightly higher Qb setting).

Qs

The ***Qs*** control informs the Bassis circuit as to the native "Q" (or damping quality factor) of the speaker in the room. In short, it characterizes the shape of the response curve in and just above the final roll off in the bass. There will be a bit of a bump just before the native roll off of the speaker, because the Low Frequency Regenerators are in relatively small enclosures.

In adjustment, you set the ***bassis Hz*** value to the lowest-frequency peak of the speaker (leaving ***Qb*** at 55%) and will usually go back and forth between ***Qs*** and ***bassis boost*** until the bump is removed. In the process, you will see and hear that the deep bass is extended quite usefully, while the bass actually becomes tighter (better defined).

notch 4, 5

The low pass portion of the crossover has two independent, parametric ***notch*** filters that work in the same way as those on the high pass side. The first two columns give you control over the ***center frequency*** (in Hz) of the filter, for the Left and Right speakers, respectively. The next two columns give you Left/Right control over the ***amplitude*** (or depth) of the notch. The last two columns give you control over the ***Q*** (or width) of the notch. Taken together, these controls allow you to tame the two largest or most troublesome peaks in the system's upper bass response, as measured in your own listening room. (Remember that you will use the Bassis control for the lowest-frequency peak.)

	Frequency		Amplitude		Q	
	left	right	left	right	left	right
notch 4	75	75Hz	0.0	0.0dB	100	100%Q
notch 5	140	140Hz	0.0	0.0dB	100	100%Q
boost 4	115	115Hz	0.0	0.0dB	100	100%Q

The Amplitude and Q parameters interact with each other to a significant degree. Specifically, when the Q is at 100% (an extremely narrow spike or notch), the effect on the frequency response is minimal. As you open up the Q, not only does the result affect more frequencies (which you would expect), but the absolute *size* of the correction increases. Thus the amplitude values are suggestive rather than authoritative. Some experimentation will be necessary until you develop a "feel" for the nature of the controls.

boost 4

The low pass portion of the crossover has a single parametric ***boost*** filter that works in the same way as those on the high pass side. The first two columns give you control over the ***center frequency*** (in Hz) of the filter, for the Left and Right speakers, respectively. The next two columns give you Left/Right control over the ***amplitude*** (or height) of the boost. The last two columns give you control over the ***Q*** (or width) of the boost. Taken together, these controls allow you to tame the largest or most troublesome dip in the system's bass response, as measured in your own listening room.

	Frequency		Amplitude		Q	
	left	right	left	right	left	right
notch 4	75	75Hz	0.0	0.0dB	100	100%Q
notch 5	140	140Hz	0.0	0.0dB	100	100%Q
boost 4	115	115Hz	0.0	0.0dB	100	100%Q

The Amplitude and Q parameters interact with each other to a significant degree. Specifically, when the Q is at 100% (an extremely narrow spike or notch), the effect on the frequency response is minimal. As you open up the Q, not only does the result affect more frequencies (which you would expect), but the absolute *size* of the correction increases. Thus the amplitude values are suggestive rather than authoritative. Some experimentation will be necessary until you develop a "feel" for the nature of the controls.

Caution!

As described earlier, trying to correct a room null (cancellation) by adding more power to the problem will not fix anything. It will, however, place a great deal of strain on your power amplifier, and on the low frequency regenerators.

If the system seems not to respond to the ***boost*** control, you are probably trying to fix a null. Back off the boost adjustment and address the room null by other means (speaker placement, listener placement, bass traps, etc.). Your system will sound better without the added stress of unsuccessfully trying to solve a problem with added power.

Boost & Bassis?

Be careful using the ***boost*** control below the ***bassis*** frequency in Hz. ***Bassis*** is capable of adding a great deal of power demand to its operating range of frequencies, and adding even more on top of ***bassis*** can be unwise, and potentially dangerous for your amplifier. If there is a dip in response below the ***bassis*** frequency, limit your ***boost*** settings to a Q above 90% to ensure they affect only a narrow range of frequencies.

Calibration Data

The Calibration Data section of the terminal window (see example below right) holds specific offsets required to match to microphone supplied with the DCAB-1 with a known reference microphone at the Wisdom Audio factory. *(Data shown is only an example; your calibration data will vary.)*

Each calibration frequency is labeled, for example: "cal25" refers to "calibration at 25 Hz" and "cal1000" refers to "calibration at 1000 Hz." The last four calibration frequencies are 10k (10,000 Hz), 12k5 (12,500 Hz), 16k (16,000 Hz, and 20k (20,000 Hz).

```
cal25       0
cal32       0
cal40       2
cal50      -1
cal63       0
cal80      -1
cal100      0
cal125      1
cal160      0
cal200      0
cal250      0
cal320      1
cal400      0
cal500      0
cal630      0
cal800      0
cal1000     0
cal1250     0
cal1600     0
cal2000     0
cal2500     0
cal3200     1
cal4000     0
cal5000     1
cal6300     3
cal8000     3
cal10K      3
cal12K5     5
cal16K      6
cal20K      7
```

If your microphone was ever damaged or lost, you could purchase a replacement from Wisdom Audio. If this were to happen, you would enter the calibration data that came with your replacement microphone here, before you start working with the DCAB-1 and its new microphone. (Do not use the data at right.) The DCAB-1 will take this information into account, displaying a corrected RTA curve in the bottom of the terminal screen.

To do so, press the right arrow until the cursor moves over to the "cal25" position; use the up or down arrows to enter the cal25 value; move on to "cal32" and do likewise. Enter all remaining values. You do not have to save anything; every change is made in real time, as you change the value, and saved automatically in the DCAB-1.

RTA Controls

The DCAB-1 also includes a 1/3-octave Real Time Analyzer (RTA) that displays the system's frequency response based on the signal received by the (calibrated) microphone. This section of the terminal window provides control over these functions.

```
  pink       0 %
 pinkin    off    off
analyzer   off
 source    gnd
response   med
   step       3dB
 offset       0dB
```

The various controls work as follows:

pink

The ***pink*** parameter acts as a volume control for the pink noise generator within the DCAB-1. On most system, a setting of 5-6% is a good starting point.

pinkin

The ***pinkin*** control allows you to turn the signal on or off to either the Left or Right speaker. (Think of it as the "pink noise input" to the system.) The left control sets the Left speaker, and the right control sets the Right speaker. Either may be on or off. The only time you would have both on at the same time is to check for a tightly-defined phantom center image. Do all your measurements one channel at a time.

analyzer

The ***analyzer*** control toggles the analyzer's display on and off. Note that because RS232 is relatively slow, it takes a a few seconds to redraw this display. If you own a dedicated RTA, you may want to use it in parallel with the one built

into the DCAB-1. You can do most of the work on your own RTA, fairly quickly (since you don't have to wait for screen redraws), and then do the final dialing in of the system using the DCAB-1. (The main advantage to doing so is that the DCAB-1 comes with a precisely calibrated microphone of known quality.)

response

The ***response*** time parameter determines the degree of averaging used with the pink noise. Slower response is generally more accurate, but of course it takes longer for the response to settle after a change.

The Medium setting is appropriate for most of what you will be doing, especially since the pink noise generator in the DCAB-1 is of unusually high quality. ("High quality noise" refers to the spectral content and uniformity of the signal as well as its freedom from unusual spikes.)

step

The RTA Display section of the terminal window can be set up with a vertical scale of 2 or 3 dB per division. Each time you increment or decrement the ***step*** value, the DCAB-1 redraws the RTA Display section of the terminal window to reflect the change.

You should start with a 3 dB per division scale, at least until you have gotten the system significantly "dialed in" and smooth in your room. This gives you the most useful perspective on the often large swings in response introduced by most rooms. Once you have the system closer to the target curve, you can expand the scale to fine-tune your filter settings a bit.

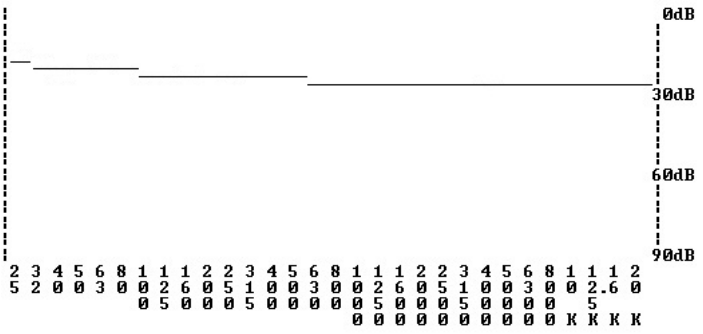
offset

The offset simply moves the response curve up or down in the RTA Display in 1 dB increments. This can be useful when looking more closely at the behavior of the system at or near a display threshold (e.g., 3 dB per division).

Of course, you can also change the ***step*** (vertical scale) to examine such transitions more closely, but many people find that constantly changing the vertical scale (step) is a bit disorienting. Try it both ways and decide for yourself.

RTA Display

The RTA display in the lower left area of the terminal window shows a frequency response curve, based on input from the microphone.



Note that the screenshot above is an approximation of what you are striving to achieve. Few rooms are good enough to allow this degree of precision; but you will get a lot closer with your Wisdom Audio system and a DCAB-1 than with any alternatives.

Because RS232 is relatively slow, the display on your computer takes several seconds to redraw. But thanks to the calibrated microphone included with the DCAB-1, this RTA Display is extremely accurate.

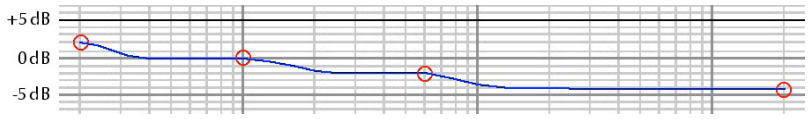
The Calibration Process

What follows is a methodical process for correcting the anomalies found in your specific acoustic environment. It assumes that everything is properly connected and that your computer is communicating with the DCAB-1 via TeraTerm Pro (or a similar terminal program).

One important note on using pink noise to calibrate systems: your ears hear things differently than an omnidirectional microphone. Therefore, it is essential that we adjust the speakers to fit a curve that takes these differences into account.

Specifically, our ear/brain mechanisms differentiate between early arrival sounds and subsequent reverberation; what we perceive is a complex combination of the two. By contrast, the microphone lumps all of this information together. Since the later reflections have lost much of their high frequency information through absorption, trying to make the *overall* mix measure "flat" will make the direct sound far too bright.

Our founder, Tom Bohlender, has personally calibrated many Wisdom Audio systems, in a huge variety of rooms. In his considerable experience, the target curve you should be shooting for when using pink noise calibration looks something like the following:



In short:

- ±3 dB from about 30-100 Hz
- smoothly shelf down by about 3 dB, then ±3 dB to about 600 Hz
- smoothly shelf down another 3 dB, then ±3 dB to 20 kHz
- a little extra energy below 30 Hz (as measured by pink noise) is fine

Note that this target curve is specific to planar magnetic line sources such as the Wisdom Audio Adrenaline series of loudspeakers. Also, if you want a little more movement of your pant legs, you can increase the 20-30 Hz range a couple dB more without unduly upsetting the tonal balance of the system.

Important

The microphone will capture any and all noise in the environment. We live with many low frequency sounds that we tend not to notice, including vibrations from passing traffic, air conditioning compressors, furnaces, and refrigerators. All such low frequency rumbles will be picked up by the microphone and displayed on the RTA. To get accurate results, do everything you can to quiet the environment: close the windows, turn off heavy equipment in the home, and in extreme cases, do the calibration in the early morning on a weekend, when traffic noise is at a minimum.

A Quick Overview

In principle, the calibration process is fairly straightforward.

For the Left Speaker

1. Establish the preliminary crossover frequency between Low Frequency Regenerators (LFRs) and Planars and set the rough levels.

2. EQ the planar section first: boost the bottom of their range, cut the typical peak around 6-7 kHz, and then tackle the largest remaining problems from the bottom of the range, working your way up.

3. EQ the LFR sections: work on the biggest problems from about 50 Hz on up to the crossover; then use the Bassis controls to pull down the last bump in the bass (usually between 40-50 Hz) and extend the response deeper.

For the Right speaker

Repeat the process described for the Left speaker, above.

Compare the Two Speakers

Then compare the results of the two, and fine-tune things to make the two curves lay over one another. The best-focused and three-dimensional imaging is achieved when the two speakers are extremely close matches to each other, despite whatever differences your room might be superimposing on them.

Detailed instructions follow below.

Set the Crossover

The crossover frequency is determined by the size of the planar magnetic section of your loudspeaker.

- 50-inch planar = 190 Hz (the Adrenaline M50)
- 75-inch planar = 155 Hz (the Adrenaline M75 or Rush)

These crossover frequencies are starting points, and usually end up being the correct settings. You may fine-tune them by as much as 10 Hz or so toward the end of this process, based on the performance you are achieving in your room.

Set the Levels

Start with both the ***hi level*** and the ***lo level*** controls at 10.0 dB. Set ***pink*** to 3% and set the left channel ***pinkin*** to on. Bring the volume up (using ***pink***) to a moderate volume, one that is loud enough to get well up above background noise, but not so loud as to drive you from the room. With most amplifiers, a setting of 5-6% is fine.

Looking at the average volume of from 50–150 Hz and from 300Hz–10kHz (ignoring the extremes for the moment), adjust either the ***hi level*** or the ***lo level*** control for the left speaker to bring them even with each other. It is difficult to get this perfect before you flatten the response. Don't worry about perfect, but try to get it close. *(You may see an obvious step from one to the other if you have amplifiers with different gains on the low and the high sections of the speakers. This is fine — just fix it before moving on.)*

If your amplifiers have the same gain and behave well into lower impedances, your initial settings will probably be approximately as follows:

- M50 hi level = 9.0 dB lo level = 15.0 dB
- M75 or Rush hi level = 10.0 dB lo level = 10.0 dB

Boost the Bottom of the Planar

Ideally, we would like the planar magnetic portion of the speaker to reproduce as much of the music as it can. Fortunately, these incredibly robust drivers can handle a bit of equalization to help them reach a bit lower than they would in the absence of EQ.

In most rooms, you will see that the response of the planar section is rolling off a bit before it reaches the crossover frequency. Use your first ***boost*** filter to bring the response of this region up to match the average levels you established in the last step (50–150 Hz and 300 Hz–10 kHz). (The default settings from the factory should get you close; feel free to modify them to suit the needs of the system in your particular room.)

	Frequency		Amplitude		Q	
	left	right	left	right	left	right
notch 1	5500	5500Hz	9.0	9.0dB	80	80%Q
notch 2	1000	1000Hz	0.0	0.0dB	100	100%Q
notch 3	450	450Hz	0.0	0.0dB	100	100%Q
boost 1	270	270Hz	6.0	6.0dB	85	85%Q
boost 2	19500	19500Hz	10.0	10.0dB	97	97%Q
boost 3	500	500Hz	0.0	0.0dB	100	100%Q

Start by choosing a center frequency that is roughly halfway between the crossover frequency you selected and the point at which the planar section begins to roll off. Then add perhaps 5-6 dB of amplitude. You will then have to reduce the Q of ***boost 1*** to affect a wider range of frequencies. (A Q of 100% is an extremely narrow spike that is hard to see on a 1/3-octave analyzer, and too narrow to serve your purpose here.) As you lower the Q from 100%, you will see the effect of the boost spread out in frequency and increase in amplitude.

Fine-tune the three parameters until the lower end of the planar section's response is fairly smooth and contiguous from the crossover frequency up to approximately 300 Hz. Remember: ***Frequency*** moves the boost left or right in the RTA Display; ***Amplitude*** increases or decreases the size of the boost; and ***Q*** changes the width of the area affected (as well as modifying the amplitude a bit).

Don't worry about making this perfect yet. Just make it better. You will refine all settings later, once things are smoother and small errors are easier to see.

Cut the 5-7 kHz peak

The nature of all double-ended planar magnetic drivers is such that there is inevitably a peak in the response at approximately 5-7kHz. This is a result of the sound being forced between the front magnets on its way to your ears. Correcting this characteristic is the next step in calibration.

Use your first ***notch*** filter much as you did your first boost filter, except that you will be removing a peak instead of filling a dip.

	Frequency		Amplitude		Q	
	left	right	left	right	left	right
notch 1	5500	5500Hz	9.0	9.0dB	80	80%Q
notch 2	1000	1000Hz	0.0	0.0dB	100	100%Q
notch 3	450	450Hz	0.0	0.0dB	100	100%Q
boost 1	270	270Hz	6.0	6.0dB	85	85%Q
boost 2	19500	19500Hz	10.0	10.0dB	97	97%Q
boost 3	500	500Hz	0.0	0.0dB	100	100%Q

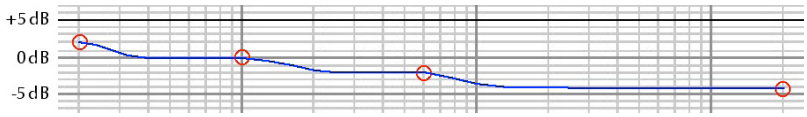
Choose a frequency that is centered on the peak in your system, add 5-6 dB of amplitude to begin with, and start opening up the width of the filter by reducing the Q. Then, as you begin to see the results, fine-tune the settings to flatten the peak, adjusting frequency, amplitude and Q as needed.

Once again, you do not have to get this perfect just yet. You will be refining your settings later.

Work from the Bottom Up

Having corrected the two most predictable problems in the planar magnetic section of the response (above the crossover frequency), you can now use the remaining two boost and two notch filters to address the largest remaining aberrations in your room's response. Work from the crossover frequency up, solving one problem at a time in a methodical way

By the time you are done with the planar section of this one channel, the area above the crossover should begin to look like the target curve described above and shown below:



It should be relatively flat from the crossover up to about 600 Hz, and then shelf down to another relatively flat plateau from there to about 20 kHz. If it isn't quite as smooth as you'd like it, don't worry: the final adjustments are done after the woofer section is also calibrated.

Switch to the Bass Section

Once again, you are going to work from the bottom of the range up.

Rough In Bassis

The first step to is make sure the Bassis section is "roughed in" (set to approximate values). The low frequency regenerator in your Adrenaline speaker is capable of delivering far more output than its relatively small enclosure would normally allow; this initial setting of the Bassis filter gets it close enough that you can see what is really happening with the acoustics of your room. The factory default settings for Bassis are as follows:

bassis	50	50Hz
boost	10	10 %
Qb	55	55 %
Qs	60	60 %

Smooth the 40-80 Hz Octave

Once you have confirmed that the Bassis filter is "roughed in," work on the 40-80 Hz range. In almost all residential spaces, there will be some significant problems that need to be addressed in this range. (The bass problems in smaller rooms may extend up to 120 Hz or more).

Use the ***boost*** filter to fill the most significant dip in response between 40 Hz and the crossover frequency for your system. The ***Q*** for this boost is usually in the 85-90 range.

Take care when boosting low frequency dips in response — if the microphone is sitting in a null (an area of cancellation) in your room, adding more power to the region won't help. In this situation, there is a reflection that is cancelling out

the bass at that frequency, and the reflection gets bigger along with the primary sound. Either way, a positive and a negative add up to zero. This is less of a problem at higher frequencies, where the waves are smaller and more easily diffused in the room; but below perhaps 200 Hz, it can be a significant problem.

Thus if you start adding boost to a dip in your room and very little seems to be happening, experiment by moving the microphone a couple feet (or half a meter). If the response jumps back up, you have discovered a null. The solution is to move either the speakers or the listening position, or to add effective low frequency room treatment. (We told you that equalization would not solve all your problems, as essential as it is.)

Remember that adding more power to a room null (a zone of cancellation) will not help matters, and may in fact make the sound worse. If you find yourself adding a lot of ***boost*** and not seeing or hearing much change, move the microphone a couple feet to see if your position is in a null.

Next, use the ***notch*** filters in the low pass section of the DCAB-1 to address the biggest peaks between 40 Hz and the crossover frequency. It is not unusual for rooms to introduce errors of as much as 20 decibels in low frequency response. (This fact is why we included the section on Room Acoustics in this manual.)

notch 4	75	75Hz	0.0	0.0dB	100	100%Q
notch 5	140	140Hz	0.0	0.0dB	100	100%Q
boost 4	115	115Hz	0.0	0.0dB	100	100%Q

Fine-Tune Bassis

By now, things should be looking pretty good. In most rooms, there will be still a bit of a bump between 40-50 Hz (approximately), and then a some roll off below that bump. Bassis can fix both problems.

bassis	50	50Hz
boost	10	10 %
Qb	55	55 %
Qs	60	60 %

Bassis Hz Adjustment

The first step is to fine-tune the ***bassis*** frequency adjustment to correspond with the frequency of the peak that occurs just above the roll off. You can always fine-tune this at any time, but do the best you can now. It will usually be between 40-50 Hz on Adrenaline systems, in most domestic rooms.

Bassis Boost

The ***bassis boost*** adjustment is expressed on a scale on 0-100, though (as discussed previously) this scale is not as linear as the percentage seems to suggest. Most of its effect occurs between 0-20, with diminishing returns thereafter.

Take the ***bassis boost*** control up from 10 to 15%, so you can begin to see the effect in the deep bass.

Qb to 55%

Make sure the ***Qb*** control is set to 55%.

Once all calibration is complete, you will use the ***Qb*** control to make the system either a bit leaner (lower value) or a bit more full (higher value) in the bass. For the purposes of calibration, the best balance is 55%.

Qs to Counter the Peak

Finally, vary the ***Qs*** control down to bring the peak around the ***bassis Hz*** adjustment down. The ***Qs*** controls the width of the response dip that is designed to counteract the speaker's peak in the 40-50 Hz region. (Remember, Qs addresses

the "native" Q factor for the speaker itself; it describes the shape of the bass peak and roll off you are trying to correct.)

When ***Qb*** (the Q factor of the corrected system, *after* the ***Bassis*** circuit has been accounted for) is set to 55% as described above, a ***Qs*** setting of 50% is approximately flat. Lowering the Qs will bring *down* the region centered on the ***bassis Hz*** setting.

Adjust to Suit Your Room

Once you begin to see the effect that the four Bassis controls have on the response, you will want to fine-tune the settings to flatten the bass peak and extend the deep bass.

Just remember to leave ***Qb*** at 55% during these adjustments; it is best used in day-to-day listening to make the bass either tighter or more full, based on recordings and personal preference.

Fine-Tune the Transition

Now that both sides of the crossover are relatively smooth and flat, you may want to make small adjustments to the crossover region itself to a more seamless transition. This step may not be necessary, but it can help solve room problems in the crossover area.

There are four possible adjustments you can make:

- raise or lower the hi level control
- raise or lower the lo level control
- change the crossover frequency slightly (10 Hz)
- adjust the damping to affect the response in the region of the crossover

The first two adjustments are mirrors of each other. Whichever one you adjust, you are looking for a smooth continuation of the response from the bass into the midrange. This is much easier to see (and hear) now that the overall response is much more consistent than when you began.

In rare cases, you may find that moving the crossover frequency up or down by 10 Hz may allow you to smooth the response in the crossover region. This is because rooms respond differently to the planar sections than they do to the low frequency regenerator sections. Do not move the crossover frequency more than 10 Hz away from the recommendations (190 Hz for 50-inch models, 155 Hz for the 75-inch models).

Lastly, changing the ***damping*** control (which has been set to 50% throughout the process so far) can add or subtract a little energy at the crossover region. Higher damping values make the crossover region sound "lean" and reduce the energy somewhat; lower damping values make the region sound "warmer" and increase the energy at the crossover. This is best set using music you know well that has significant acoustic energy in the crossover region (which is in the octave below middle C on a piano).

Repeat for the Right Speaker

By now, the Left speaker should be looking and sounding excellent. Now you get to repeat the process for the Right speaker.

The good news is that you now have a fair amount of experience working with the DCAB-1, and the next speaker setup will probably go more quickly.

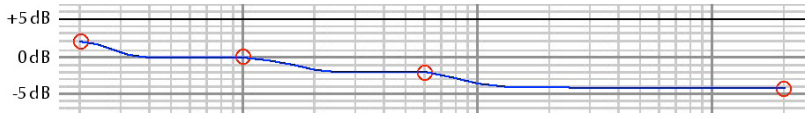
Do not assume that the settings will be the same, however. We have never seen a room that is so perfectly symmetrical that everything is the same for both channels. Usually, most of the settings are at least *somewhat* different, and at least one or two are *quite* different.

Remember, the goal is to have both channels perform optimally *despite* what the room is doing to them. A different location in the room yields different colorations, which require different corrections.

Still, if your room is relatively symmetrical, you may be able to save some time by copying the settings from the Left speaker to the Right speaker, and then fine-tuning them as needed to achieve the desired result. If doing so doesn't get you pretty close, you may be better off starting at the beginning of the process and working your way through it step by step.

Refine all your settings

The last round of adjustments involves going back and forth between the Left and the Right speaker, comparing the two and fine-tuning them to be as similar to each other as possible. Remember, you are striving for a curve that measures roughly as follows:



Once you are satisfied with the overall shape of the pink noise curve and with the match between your two speakers, settled back with your favorite refreshment and some great music, and enjoy your work. The effort invested in calibration today will provide enjoyment for years to come.

Save Your Work!

The DCAB-1 saves your changes at every step along the way. There is no "Save" command that you need to remember to use occasionally.

However, we strongly suggest printing the terminal window of the adjusted DCAB-1 in your system, after calibration. Save that piece of paper with this manual. That way, you can experiment with slightly different settings at a later time, knowing you will always be able to set everything back the way it was.

(attach printout of terminal window here)

Care & Maintenance

To remove dust from the cabinet of your DCAB-1, use a feather duster or a lint-free soft cloth. To remove dirt and fingerprints, we recommend isopropyl alcohol and a soft cloth. Dampen the cloth with alcohol first and then lightly clean the surface of the DCAB-1 with the cloth. Do not use excessive amounts of alcohol that might drip off the cloth and into the DCAB-1.

Caution!

At no time should liquid cleaners be applied directly to the DCAB-1, as direct application of liquids may result in damage to electronic components within the unit.

U.S. and Canadian Warranty

Five Year Warranty

This Wisdom Audio® product is warranted to be free from defects in material and workmanship under normal use for a period of five years from the date of purchase.

During the warranty period, any Wisdom Audio component exhibiting defects in materials and/or workmanship will be repaired or replaced, at our option, without charge for either parts or labor, at our factory. The warranty will not apply to any Wisdom Audio component that has been misused, abused or altered.

Any Wisdom Audio component not performing satisfactorily may be returned to the factory for evaluation. Return authorization must first be obtained by either calling or writing the factory prior to shipping the component. The factory will pay for return shipping charges only in the event that the component is found to be defective as above mentioned. There are other stipulations that may apply to shipping charges.

There is no other express warranty on this component. Neither this warranty nor any other warranty, express or implied, including any implied warranties of merchantability or fitness, shall extend beyond the warranty period. No responsibility is assumed for any incidental or consequential damages. Some states do not allow limitations on how long an implied warranty lasts and other states do not allow the exclusion or limitation of incidental or consequential damages, so that the above limitation or exclusion may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. This warranty is applicable in the United States and Canada only. Outside of the U.S. and Canada, please contact your local, authorized Wisdom Audio distributor for warranty and service information.

To register your warranty, please send a copy of the original receipt of purchase to the address below. Doing so will ensure that there will be no delays should you ever require warranty service.

Wisdom Audio
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Fax: 775.887.8820

Obtaining Service

We take great pride in our dealers. Experience, dedication, and integrity make these professionals ideally suited to assist with our customers' service needs.

If your Wisdom Audio component must be serviced, please contact your dealer. Your dealer will then decide whether the problem can be remedied locally, or whether to contact Wisdom Audio for further service information or parts, or to obtain a Return Authorization. The Wisdom Audio Service Department works closely with your dealer to solve your service needs expediently.

Important!

Return authorization must be obtained from Wisdom Audio's Service Department BEFORE a unit is shipped for service.

It is extremely important that information about a problem be explicit and complete. A specific, comprehensive description of the problem helps your dealer and the Wisdom Audio Service Department locate and repair the difficulty as quickly as possible.

A copy of the original bill of sale will serve to verify warranty status. Please include it with the unit when it is brought in for warranty service.

Warning!

All returned units must be packaged in their original packaging, and the proper return authorization numbers must be marked on the outer carton for identification. Shipping the unit in improper packaging may void the warranty, as Wisdom Audio cannot be responsible for the resulting shipping damage.

Your dealer can order a new set of shipping materials for you if you need to ship your component and no longer have the original materials. There will be a charge for this service. We strongly recommend saving all packing materials in case you need to ship your unit some day.

If the packaging to protect the unit is, in our opinion or that of our dealer, inadequate to protect the unit, we reserve the right to repackage it for return shipment at the owner's expense. Neither Wisdom Audio nor your dealer can be responsible for shipping damage due to improper (that is, non-original) packaging.

Specifications

All specifications are subject to change at any time, in order to improve the product.

- **Signal to Noise ratio (main outputs)**: –90 dB (ref 1V rms, A-wtd.)
- **Input impedance**: 25 kΩ (balanced)
- **Output impedance**: 50 Ω
- **Voltage gain range, without EQ**: -15 to +5 dB dB
- **Maximum input level, at maximum level & boost**: 1V rms
- **Power consumption:** 33W
- **Thermal load:** 112 BTU
- **Mains voltage**: 115V or 230V
- **Overall dimensions**: 4″ H x 17″ W x 14⅞″ D
  10.2cm H x 43.2cm W x 37.8cm D
- **Shipping weight**: 34 lbs. (15.4 kg)

For more information, see your Wisdom Audio dealer, or contact:

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Notes

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