

# *Sanders Sound Systems*

## *Model 10c Electrostatic Speaker System*

### **OWNERS MANUAL**

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# SETTING UP YOUR SPEAKERS

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Setting up your new speakers is a three-part process that includes the following:

- Unpacking/ Assembly/ Positioning
- Electrical connections
- Adjustment of the balance between the woofers and electrostatic loudspeaker (ESL).

## UNPACKING and ASSEMBLY

When you open the boxes, observe carefully how the packaging is arranged so you can repack items correctly in the future. When removing the woofer cabinets from their boxes, it is easier to lift the box off the speaker cabinet than to lift the cabinet out of the box.

To do so, open the box and remove the roll of bubble wrap and the foam pad. Then roll the box over with the speaker in it, and lift the box up and away from the cabinet.

The roll of bubble wrap contains the power cord, feet, cones, nuts, and screws. Be sure to unpack these items before discarding the bubble wrap.

Begin assembly by turning the woofer cabinet on its back on a padded surface like a carpeted floor or a towel on a table. **Never place the cabinet face-down (woofer down) as this will damage the woofer.**

1) Attach either smooth feet or cones into the base of the cabinet. The smooth feet are for use on floors, while the sharp cones are for use on carpet. Speakers are not stable on carpet, so cones should be used to penetrate through the carpet and rest firmly on the floor below.

You may prefer to install the smooth feet first, even on carpet, so you can easily move the speakers around to find the location you prefer. Then install the cones after you have decided on the ideal position.

Both types of feet screw into steel inserts on the bottom of the speaker and can be adjusted by rotating them in or out to get the speaker level and stable.

Lock nuts are provided to insure the feet or cones won't shift position or rattle. Put them on the threaded shaft of the foot or cone before screwing it into the bottom of the speaker. Once you have the feet or spikes adjusted to your satisfaction, **gently** tighten the nut against the bottom of the speaker to lock the foot or spike into position so it will not shift over time.

2) Attach the steel beams to the front edges of the woofer cabinet. Each beam is held in place by four socket-head screws that are in a small bag with an Allen wrench you can use to tighten them.

Note that the side of the beams with the Velcro faces towards you (when you are looking at the front of the cabinet). Install the screws by first mounting them on the end of the Allen wrench. Then insert them through the hole in the Velcro side of the beam. The end of the screw will then stick through the beam where you can screw it into the cabinet. Tighten them gently. When the beams are secure, it is a simple matter to attach the electrostatic panels, grill, and trim to them using the Velcro that is already attached to these parts for your convenience.

3) Position the electrostatic panels approximately even with the top of the steel tubing. The edge of the panels should be flush with the sides of the beams.

The panels' electrical connector hangs down near the left side of the woofer where you will see a mating connector on the woofer cabinet. The panels will only fit one way as if you try to install them backwards, the Velcro won't work.

Because the panel is held with Velcro, you can remove and readjust its position to get it fitted correctly.

4) Plug the panel's electrical connector into its mate on the woofer cabinet. The connectors are keyed so that they will only fit one way so you cannot make a mistake.

Note that the wires on the connector coming from the cabinet can be pulled out of the cabinet by several inches so you can easily position the connector. Adjust the connectors so that the connector will be hidden under the woofer grill and does not touch the woofer. Push any excess wire back inside the woofer cabinet.

Should you ever want to disconnect the panel, you can unplug the connector. Just remember to press the little lever on the connector to disconnect the catch so you can pull the connectors apart. They come apart very easily — but only if you have released the catch.

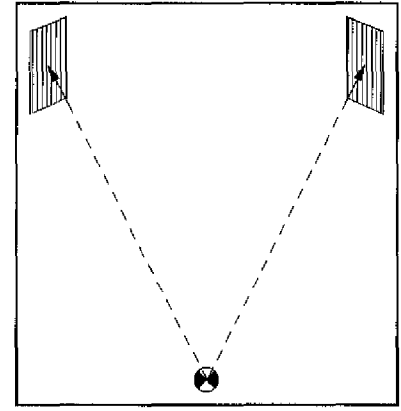
5) Attach the woofer grill. It is held in place with Velcro like the panel. Press it firmly into the bottom of the electrostatic panel so there is no gap between the panel and the grill as you press it into place on the rails.

6) There are wood trim strips that run the full length of the beams. These fit with their narrow side facing forward and their wide side on the side of the speaker. These are symmetrical so fit either way. They are held in place with Velcro.

## POSITIONING

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- ✓ All speakers sound best when they are equidistant from you. Because the Model 10's imaging is so much more precise than conventional speakers, they will reveal errors in equidistant placement more than conventional speakers. The section of this manual called "Advanced Positioning Techniques" will assist you in obtaining the exact positioning needed.
- ✓ Aim the speakers *directly* at your listening location — do not place them parallel to the wall.
- ✓ The speakers are designed to have a hard, reflective wall behind them — this will disperse the high frequencies throughout the room so they sound good when you are out of the sweet-spot. So do not put damping material on the wall behind the speakers unless you only listen at the sweet-spot and do not care about the sound when you are off-axis.
- ✓ The speakers may be positioned close to a wall — any wall, side or rear walls work equally well. You do not have to place them out in the room.
- ✓ Corner placement exaggerates undesirable bass and room resonances — it is best to avoid corner placement for speakers.
- ✓ The bass frequencies in all speakers are adversely affected by room acoustics. Depending on your room dimensions and the positions of the speakers, bass resonances will occur that cause ragged bass frequency response.



Equidistant to speakers

This problem cannot be avoided — but it can be minimized by trying to produce an infinite number of infinitely small resonances instead of just a few large ones. Therefore, the worst bass will be produced with both speakers are positioned symmetrically in the room. This will have them at the same distances from walls and corners, which will cause them to produce the same two or three resonances and double their magnitude.

It is much better to place the speakers randomly in the room so that they are each at different distances from walls and corners. This will produce more resonances at many frequencies and will reduce the magnitude of those resonances so the bass response will be smoother than symmetrical placement. You don't *have* to use random placement, you can place the speakers symmetrically (most listeners do), but symmetrical placement will compromise the smoothness of the bass.

Random placement of the speakers refers only to their relationship to the walls and corners of the room. It does not apply to the relationship of the speakers to your listening location, which must always be set up so that the speakers are equidistant from you and pointed directly at you.

## **ELECTRICAL CONNECTIONS and QUICK CROSSOVER INSTRUCTIONS**

To eliminate the need of you having to read the complex owner's manual for the crossover, follow these instructions to get operational immediately — you can then read the manufacturer's complete instructions later if you are so inclined. They are in the Addendum at the end of this manual.

1) Although the crossover has XLR connectors only, you can operate either balanced or unbalanced. XLR to RCA adaptors are included with the speakers if you wish to use unbalanced connectors. Connect your interconnects as follows:

- a) Connect your left preamp output to Input A on the crossover.
- b) Connect your right preamp output to Input B on the crossover.
- c) Connect Output 1 on the crossover to the left channel of your bass amp.
- d) Connect Output 2 on the crossover to the left channel of your ESL amp.
- e) Connect Output 3 on the crossover to the right channel of your bass amp.
- f) Connect Output 4 on the crossover to the right channel of your ESL amp.

2) Remove the protective film from the crossover's display (if present).

3) Plug in the crossover and turn on the power switch (on the front panel).

4) Start playing music that contains lots of bass. You will see green lights on both the input and outputs showing dynamic music levels. This is normal and you may ignore them unless you see red lights, which indicates a problem.

5) You will need to adjust the bass level to get it matched to the ESL. To do so, follow these steps:

- a) Press the button under Output 1 on the front panel. You will see the page of the menu that allows you to adjust the bass gain.
- b) Press the right "PARAM" buttons to highlight "Gain."
- c) Turn the knob like you would any volume control to either increase or decrease the loudness of the bass so that it properly matches the output from the ESL.
- d) Press the Output 1 button again to return to the main screen.

Note: You only need to adjust Output 1. I have linked the two channels so that whatever you do to one channel will automatically be applied to the other channel. Therefore you do not need to adjust each channel individually.

6) You may adjust the midrange quality by adjusting the equalization gain. To do so, follow these steps:

- a) Press the button under Output 2 on the front panel.
- b) Press the "PAGE" buttons until you get to the equalization page.
- c) Press the "PARAM" buttons to highlight "Gain."
- d) Turn the knob to increase the gain to make the midrange sound fuller and richer. Decrease the gain to make the midrange more clear and analytical. Note that if you increase the midrange significantly, you probably will want to increase the bass (see #5 above) to keep the balance between the midrange and bass ideal.
- e) Press the Output 2 button again to return to the main screen.

That is all you need to do to use the crossover. However, in the event you decide to experiment with other settings, I have saved the current settings in memory so you can recall them later if you make major changes and want to quickly re-install the original ones. To recall the original settings do the following:

- a) Press the "RECALL" button.
- b) Press the right "PARAM" button to highlight the file called "Default."
- c) Press the "OK" button.

## COMMENTS ON CABLES

Surprisingly, some expensive interconnects are poorly designed in that they lack shielding. Avoid these as they often cause buzzing sounds or even allow radio stations to be produced through your speakers. Properly shielded interconnects will have an outer covering made of fine braided wire that forms a metal shield around the wire(s) inside the shield. This is known as *coaxial* wire. Always use shielded interconnects.

Some speaker cable has very high capacitance and can cause high-quality, wide-bandwidth amplifiers to oscillate at very high frequencies. You cannot hear this oscillation as it is supersonic, but it will cause the amplifier to operate at full-power and can overheat and damage both the amplifier and the speakers. If you notice that one or both channels of any amplifier is running much hotter than normal, suspect a supersonic oscillation.

One brand of cable is notorious for causing this problem and that is Goertz (Alpha core) cable. It is built as two thin ribbons sandwiched together, one on top of the other. Do not use this brand or type of cable on wide-bandwidth solid state amplifiers (these are amplifiers that are capable of linear high frequency response to 100 KHz or beyond). You may use it on tube amplifiers because they have much more limited bandwidth and cannot reproduce the high frequencies where the oscillation occurs. But because electrostatic speakers are capacitors, it is best to avoid all high capacitance cables as this just taxes your amplifier more.

Speaker cables exert most of their influence on the sound of speakers by interacting with passive, high-level crossovers present in most speaker systems to change the frequency response of the speaker. Because Sanders Sound Systems speakers do not have passive crossovers, cables will have little if any effect. The only basic requirement for the woofer cables is that they be large — at least 14 gauge, so that the amplifiers will not be isolated from their drivers by excessive impedance.

Electrostatic speakers will operate best with cables that have extremely low inductance, low capacitance, and moderately high impedance. Sanders Sound Systems manufactures cables that are ideal for this purpose, but most other cables will be satisfactory as long as their inductance is very low (excessive inductance will adversely affect the high frequency response of the speakers). You can find a detailed discussion of this on the "Cable White Paper" found on the website [www.sanderssoundsystems.com](http://www.sanderssoundsystems.com).

Each speaker has an internal **POWER SUPPLY** to energize the electrostatic panels. This is why each speaker must be plugged into the mains. You may use the supplied 10-foot power cord, or the any special power cord you prefer. Note that since the power supply is not involved in any audio circuits, there is no reason to believe that using a special cord or power conditioner would have any affect on the sound. Power conditioners should be avoided on the Magtech bass amp as most cannot deliver sufficient current to power the amplifier properly.

## VOLTAGE SELECTION and FUSE REPLACEMENT

The speaker's power supply can be adjusted to operate on any mains voltage anywhere in the world. There is a voltage selector on the back of the speaker where the power cord attaches. You will see that it is a little drawer that has a number on it (either 120 or 240).

This drawer can be removed by pressing the clips along the sides of the drawer inwards. These clips are designed so they cannot accidentally be released. You will need to insert a small tool like

a ball point pen, a paper clip, or a small screwdriver into the recess next to each clip so you can press it inward toward the drawer. When both clips are moved inward, the drawer will release and pop out where you can grasp it with your fingers and remove it.

The fuse drawer can be rotated so that you can select either 120 or 240 volts. The 120 volt position is used for any mains voltage between 100 to 120. The 240 volt position is used for any mains voltage between 220 and 240. After making your voltage selection, simply insert the fuse drawer fully into its recess until you hear a "click." The last little bit of motion will be against a spring, so you will have to push firmly to seat it.

The drawer also has the fuse for the speaker's power supply in it. If this fuse fails, it means that there is a problem in the power supply that needs to be fixed. Do not simply insert a new fuse and plug the speaker back in without identifying the problem and repairing it.

The correct fuse is any value between 250 and 500 mA (milliamps). This is a standard metric 5 x 20 mm fuse and should be a fast blow type.

## COMMENTS ON AMPLIFIERS

What good does it do to have a wonderfully designed amplifier if it is usually overloaded and full of distortion? Power is the most important amplifier specification.

While most of the power is required in the bass (which is why the included Magtech bass amplifier is very powerful), the electrostatic panel requires a surprisingly large power amplifier because high voltages are required and these are only available from powerful amplifiers. Therefore it is best to drive the panel with a *minimum* of a 60 watt/channel tube amplifier or a 250 watt/channel solid state amplifier, and more is better.

Low-power amplifiers will work, but they will cause distortion if you play them loudly on dynamic material. They may not sound obviously distorted, but they may sound "strained", "harsh", lack detail and dynamics, or have other audible flaws. What is the point of having wonderful speakers if the amplifier cannot drive them adequately and ruins their sound? So please use powerful amplifiers.

CLASS D (SWITCHING) AMPLIFIERS should not be used. They cannot drive ESLs with linear frequency response. They may fail due to the difficult load presented by an ESL. Their rapid switching behavior at high power voltages may damage the transformer in ESLs. In summary, they are not suitable for driving ESLs and should not be used.

If you have a Class D amplifier, you may safely use it on the bass of the Model 10 speaker. You can then use the Magtech amplifier on the panels instead of on the woofers. The Magtech uses the same advanced technology used in the Sanders' ESL amp, so it will drive the panels beautifully.

## **ESL/WOOFER PHASING**

The ESL and woofer leave the factory in-phase with each other *when the ESL is driven by a non-inverting amplifier*. Most amplifiers are non-inverting (a positive input signal produces a positive output signal, not a negative one). As long as you connect the positive (red) terminal of the ESL to the positive (also probably red) terminal on your amplifier, and the red terminals on the bass amplifier to the red terminals on the woofer, the ESL and woofer will be in-phase.

If you have an inverting amplifier, the drivers will be out-of-phase when connected as described above. Out-of-phase drivers have a very subtle, adverse effect on the sound.

Because you probably do not know if your amplifier(s) are inverting or not, it is best to test the system for phasing. First, listen to the speakers as they are currently wired. Then reverse the leads to either the ESLs or woofers (but not both), and listen carefully. Probably you will have to reverse the leads several times to hear any difference. If you do hear a difference, choose the phase that sounds the best to you.

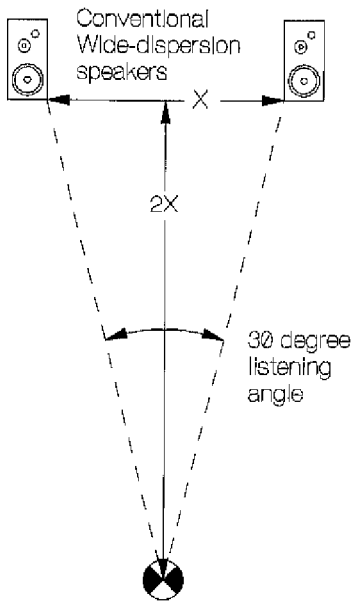


## ADVANCED POSITIONING TECHNIQUES

This section is to help you position Sanders Sound Systems speakers so they produce incredibly precise images — far more precise than any other type of speaker. To do this, the speakers must be placed exactly equidistant from you so that the sound from each speaker arrives at your ears at *exactly* the same time. Also, each speaker needs to be aimed at your preferred listening location. This “sweet spot” or “focus” is where the sound will be best, although it will be satisfactory anywhere in the room.

The following suggestions can help you achieve precise positioning. Although not essential, an assistant will be very helpful during this process.

Place the speakers about where you want them and connect the speaker cables. The exact speaker position and geometry are critical and can be disturbed by connecting the cables. So connect the cables now — before you finalize speaker position.



Begin by adjusting the listening angle. How wide should the listening angle (“sound stage”) be? Conventional speakers can only fill a listening-angle about 30° wide — their distance from each other can only be about half their distance from you. If wider, they will produce the well-known fault where there is a “hole-in-the-middle” of the sound image.

Because Sanders Sound Systems speakers are phase-coherent and have a dipole dispersion pattern, they can be placed much further apart than most speakers and still completely fill the sound-stage. We encourage you to take advantage of this fact and place them very widely so you can enjoy a huge sound stage.

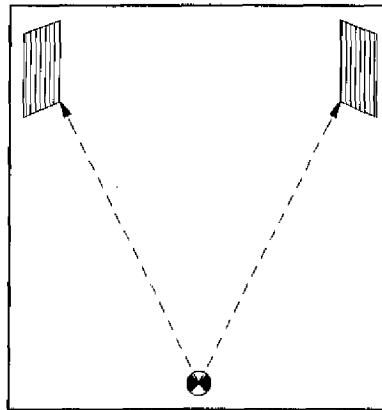
Sanders' speakers are deliberately made to be directional so that the sound quality is the most realistic possible. It is three-dimensional and has a "holographic" quality.

Wide-dispersion speakers send most of their sound away from you into the room where it reflects off room surfaces before reaching you. You are actually listening to the room more than the speakers. Because these reflections travel varying distances before they reach you, they are delayed by varying amounts. When the speaker produces a transient sound (and music is mostly transient in nature), you hear the sound from many directions and at slightly different times. This "smears" the transient and produces "muddy" sound and a poor image.

Sanders' speakers direct the sound directly to you instead of throughout the room. You hear the speaker instead of the room. This is why Sanders' speakers sound more clear than even very good conventional speakers.

Sound clarity and image quality is a function of timing and distance. So to get the best performance, you will need to get your speakers precisely positioned. This requires that you have both speakers an equal distance from you and that they are pointed directly at you. To avoid reflections from the wall behind you, it is best that your listening chair be well-away from the wall or that the wall has an absorbent surface in the area directly behind your head.

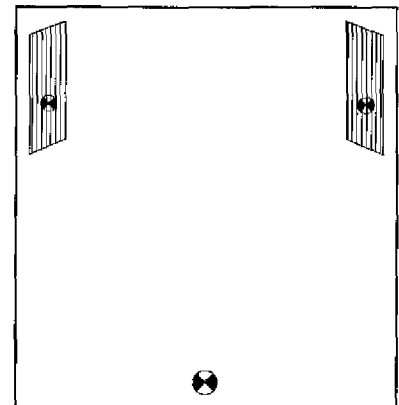
This may seem like extra effort that is unique to Sanders' speakers, but this is not true. All speakers perform best when they are accurately positioned. Because wide-dispersion speakers confuse the sound from the speakers with the sound from the room, they are incapable of producing high-quality images. Therefore errors in positioning are not as obvious as with Sanders' speakers.



Equidistant inner corners

Position the base of each speaker equidistant from your ideal listening location. You can use a tape-measure, string, or thread to gauge the distance from your chair to each speaker. Use the center of the back or seat of your chair as one reference point and the inner edge of each speaker as the other. You can have an assistant at your chair hold one end of the tape or string while you check the distance to each speaker. If you don't have an assistant, you can use a pin to hold the end of the string by sticking the pin in the center or back of your chair and tying the string or thread to it. *The anchor point must be solid and stable to get accurate measurements!*

Next, adjust each speaker so it is pointed directly at your chair. Although you can do this by obtaining identical measurements to both lower corners of each speaker, an easier and more precise way to do this is to observe the reflection of a flashlight in the ESL diaphragms. Hold the flashlight just above your head while you search for its reflection.

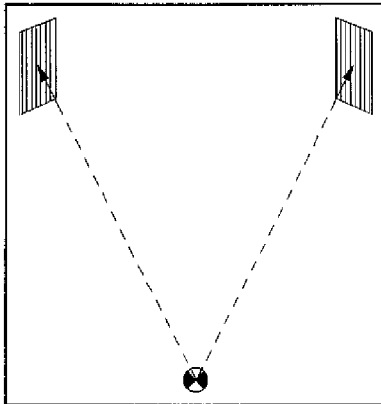


Center your reflection

Get your reflection in both speakers centered from side-to-side while sitting in your listening chair. To avoid altering the previous measurement, pivot the speakers on their inner corners — the one you used as the reference point.

When your reflection is centered side-to-side in both speakers, check to see that it is at the same height in both speakers. It doesn't have to be centered from top to bottom, but the reflection of your ears should be at least a foot from the bottom edge of the ESL. If not, the rear foot of the speaker can be screwed in or out to adjust the vertical angle of the speaker.

The speakers should now be correctly positioned, but it is a good idea to double-check by measuring from your chair to your reflection in each speaker's electrostatic cell.



Equidistant to reflections

How precise should you be? The wavelength of a 10 KHz tone is about one inch. An error of  $\frac{1}{2}$ " will place this frequency a full  $180^\circ$  out-of-phase — just like you had reversed the wires to one speaker. So ideally, the speakers should be within a quarter wave — for 10 KHz, this would be a quarter inch of being equidistant from you.

**NOTE:** If your speakers do not sound balanced (left to right), the most likely reason is that they are not equidistant from you. An error of one just inch will ruin left/right balance.

Balance also will be ruined if the speakers are not pointed directly at you.

## **CLEANING / MAINTENANCE**

The speakers do not require any maintenance. You may dust them as you would any fine furniture. You may use furniture wax on the cabinets as you would any fine furniture.

*Never spray any substance into the electrostatic cells*, as the electrostatic diaphragms could be damaged. If the electrostatic panels are dusty, you may gently wipe them with a damp sponge.

## **TROUBLESHOOTING**

The speakers are rugged and reliable, and problems are extremely rare. This section is included to just make it easy to correct problems if they arise.

**ELECTROSTATIC AMPLIFIER FUSE-BLOWING** — may be of two types. The first is where the amplifier blows fuses on loud music. The other is when it blows fuses the moment you turn it on. This will not occur in amplifiers that have a turn-on delay circuit, and is rare in modern amplifiers.

Blowing fuses at turn-on is due to the fact that most amplifiers require a couple of seconds to stabilize their power supplied when turned on. When connected to an ESL, they may blow fuses only during this unstable period. To be sure, you first must check to be sure that it is just a simple turn-on instability problem and not a short-circuit or other amplifier problem.

To test, disconnect one of the speaker wires from each channel. Then turn on the amplifier — it should not blow fuses with the speakers disconnected. If it does, the amplifier is defective.

If it works properly, *leave the amplifier on* while you reconnect the speaker wires (being careful not to short the amplifier terminals with the loose wires). It should NOT blow fuses, and it should play music properly. If so, probably you can solve the problem by increasing the size of the fuses up to the manufacturer's maximum allowed value.

If despite larger fuses the problem persists, then you will have to connect the amplifier to the speakers through a delay relay (a delay of between 2 and 5 seconds is adequate). External, electronic delay relays are available from electronic parts houses, and your dealer probably can help install it. The amplifier manufacturer may be helpful as well.

When playing music loudly through an ESL, even high quality amplifiers may blow fuses. If this occurs, consult the owner's manual, your dealer, or the manufacturer to find the largest fuse that is safe to use with your amplifier. Replacing the stock one with a larger one (within the safe range specified by the manufacturer) will often solve this problem. If it doesn't, you will need a more powerful amplifier.

**AMPLIFIER OVER-HEATING** — should never occur. ESLs are "wattless" speakers. This means they don't dissipate your amplifier's power as heat like magnetic speakers do. Therefore, the amplifier should run cool — only a bit warmer than if it were just idling. If either channel of the amplifier runs hot, something is wrong. That "something" usually is supersonic oscillation caused by high-capacitance speaker cables or a defective component elsewhere in your system. DC offset in the output stages of the amplifier can also be a problem. This is *not* a speaker problem — it means there is a problem with the cables or in the electronics. Try changing cables. If that doesn't work, you will need to service the amplifier or other offending component.

**TUBE AMPLIFIER OUTPUT IMPEDANCE** — should be set as low as possible. As a minimum requirement, you must use the amplifier's 4Ω connection. If a lower one is available, use it. If your amplifier doesn't have a 4Ω (or lower) connection, it probably will not be suitable for driving electrostatic loads as it will tend to roll-off the high frequencies.

**AMPLIFIER INSTABILITY** — can be a problem if the amplifier was designed to only drive resistive loads, not capacitive loads like electrostatic speakers. Oscillation may be noticed as a harsh quality in the high frequencies and/or amplifier overheating. If this happens, try a different amplifier. Be sure you are not using high capacitance speaker cables. If a different amplifier solves the problem, then your amplifier may need service. If different speaker cables solve the problem, then retire the problem-causing ones.

**MOMENTARY AMPLIFIER SHUT-DOWN** — is caused by inappropriate activation of an amplifier's protection circuitry. You may experience this problem when playing music loudly and the amplifier completely shuts down for several seconds, then returns to normal operation — only to trip off again a few moments later. It will repeat the cycle as long as you try to play music loudly.

The problem here is that the amplifier is not designed to drive low impedance, electrostatic loads. Although the amplifier may not seem to be harmed when it shuts down in this way, repeated activation may eventually lead to failure of the output transistors. You should switch to a different amplifier.

**BUZZING NOISES** — are caused either by "ground loops" or unshielded interconnects. Ground loops grounding problems with your equipment — most commonly your preamp. It is not a failing of any part of your system, it is simply an interaction. The problem usually is caused by having one or more components grounded to the mains circuit. Lifting the ground (by using a 3 pin to 2 pin adaptor on the power cable) often will stop the buzz. Also, it is good practice to have all components plugged into the same outlet strip.

Surprisingly, some expensive interconnecting cables have no shielding. If lifting the mains ground doesn't stop the buzz, change interconnects. Be sure the test interconnect has a metal shield around a central conductor ("coaxial cable"). For testing at least, use an inexpensive cable because you can be sure they are properly designed and shielded.

## ***SPECIFICATIONS***

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Speaker dimensions	15.5" x 18" x 69" (40 x 46 x 176 cm)
Speaker net weight	72 pounds (32.6 KG)
System shipping weight	225 pounds (114 KG)
ESL size	15x 42.3" (38 x 107 cm)
ESL power handling	No practical limit
ESL impedance	112 $\Omega$ @ 500 Hz falling to 2 $\Omega$ @ 20 KHz
Bass power handling	2000 watts, momentary
Bass driver	10"
Woofer impedance	8 $\Omega$
Bass design	Transmission line
Sensitivity	94 dB
Frequency response	20 Hz to 32 KHz $\pm$ 2 dB

## **WARRANTY**

Sanders electronics and speakers are warranted to be free from defects in material and workmanship for life. The warranty applies to the original owner.

During this period, Sanders will, at its option and without charges, either repair any part or assembly of parts that is found to be defective in material or workmanship, or replace the product with one of comparable quality, subject to the following limitations and exclusions:

This warranty shall not apply to any product which has been subject to misuse, abuse, negligence, or accident.

To obtain warranty service, contact the factory using the contact information listed below. The purchaser must prepay shipping costs to the factory.

Sanders Sound Systems  
12054 Deer Trail Road  
Conifer, CO 80433  
Phone: (303) 838-8130  
FAX: (303) 838-8130  
E-mail: [Roger@sanderssoundsystems.com](mailto:Roger@sanderssoundsystems.com)  
[www.sanderssoundsystems.com](http://www.sanderssoundsystems.com)