

OWNER'S MANUAL

SPECTRA 1100

ELECTROSTATIC

LOUDSPEAKER SYSTEM



Acoustat
A Division of **Rockford** Corporation
613 South Rockford Drive
Tempe Arizona 65281 USA
602 .967 .3565

Table of Contents

Introduction

Break-In Period.....	Page 1
Using This Manual.....	Page 1

Assembly & Installation

Getting Started/assembly.....	Page 2
Disassembly	Page 6
Audio Input	Page 7
Power input	Page 11
High Frequency Contour Switch.....	Page 11
spiked Feet	Page 11

The Listening Environment

Room Size	Page 12
Wall Behind The Speakers	Page 12
The Orientation of The Speaker System Within The Room.....	Page 12
Position In The Room	Page 12
Distance From Rear Wall	Page 13
Distance From Side Walls	Page 13
Toe-In and Distance Between Speakers	Page 13
Area Between The Speakers.....	Page 13

Additional Information

Specifications	Page 14
Impedance Curves	Page 15
Amplifier Recommendations	Page 17
Theory and Practice of Spectra Operation	Page 18
Warranty Statement.....	Page 19
In Case of Difficulty	Page 20
Electrical Schematic.....	Page 21

INTRODUCTION

Break-in Period

Your new Acoustat budspeaker requires a break-in period before full performance may be realized. Even though the speaker will begin to play within a few **moments** of being energized, and will sound quite good, a brand **new** speaker is characterized by a lower **efficiency**, reduced dynamic capability, and a generally "flat" dimensionality.

To "break-in" the speaker, simply play **music** through the system at moderate volume levels. The most dramatic improvement will occur within the first 20 hours of operation, although slight improvements may be noticed even **at** 50 hours of playing time.

The break-in period may be conducted all at once (i.e. leaving the system playing continuously) or may be accomplished over a number of playing sessions. This break-in phenomenon **occurs** only when the speaker is brand **new**. Even if a broken-in speaker has been de-energized for an extended period, it will again reach full performance within a few moments of being re-powered.

Using This Owner's Manual

We all have a tendency to read instruction manuals only if something doesn't work as intended. However, the assembly and installation of the Spectra loudspeaker, though simple, may not be obvious at first glance. Therefore, to maximize your enjoyment of this loudspeaker, please read through the entire manual before beginning.

This manual contains step-by-step information for assembling your Spectra, installation in the listening environment, and hook-up to the amplifier. We have also included additional information in an attempt to answer those most **commonly** asked questions.

ASSEMBLY & INSTALLATION

Getting Started

There are a few warnings we will make now which will save you trouble later:

- 1) Spectra arrays are MIRROR IMAGE, i.e. there are LEFT and RIGHT arrays.

Each is identified by a small label located on the rear edge of the top wood trim, as well as a colored dot on the bottom surface of the array: RED for right, and GREEN for left. The two woofer boxes and two interface chassis are IDENTICAL.

- 2) The cloth arrays are easily soiled, and are very prone to picking up lint from being laid on a carpet. The protective plastic bag should be left on them until the arrays are brought into final installed upright position

- 3) Spectra's sectored operation requires a complex connection-set from interface **to** array. Care is required when making the connections.

We will repeat these warnings when appropriate.

Assembly

Tool Required: Large (#2) Phillips Screwdriver

- 1) Gently pry off the grille frame from the front of the woofer box. It is held on by four plastic fasteners. Set aside the grille frame for later re-attachment.

Refer to Figures 1 and 2 for the following steps.

- 2) Remove the two **large** bolts at the top-front of the enclosure, and set aside. These bolts secure the electrostatic array as well the front edge of the interface chassis.

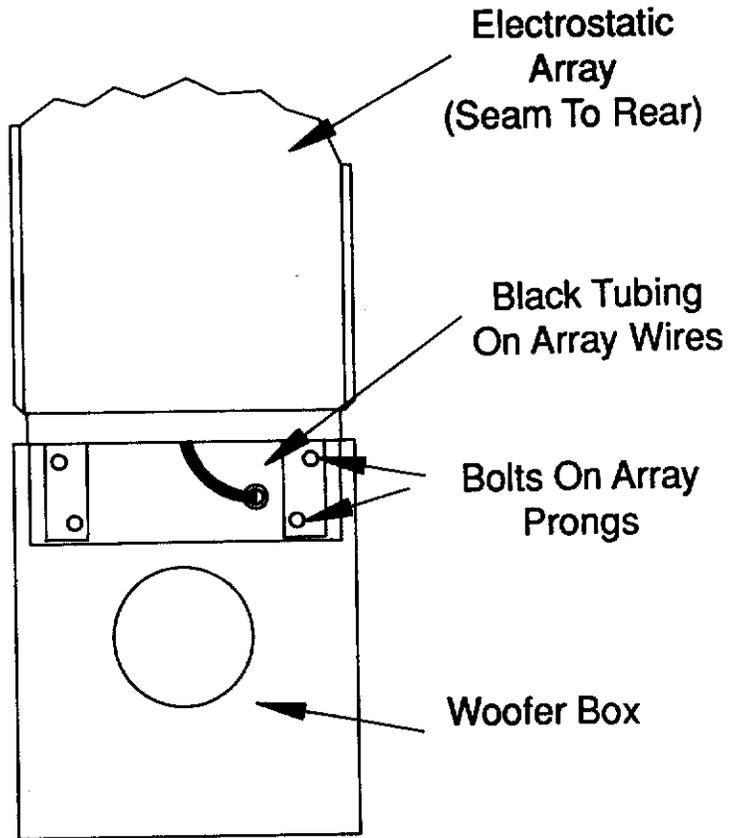


Fig. 1

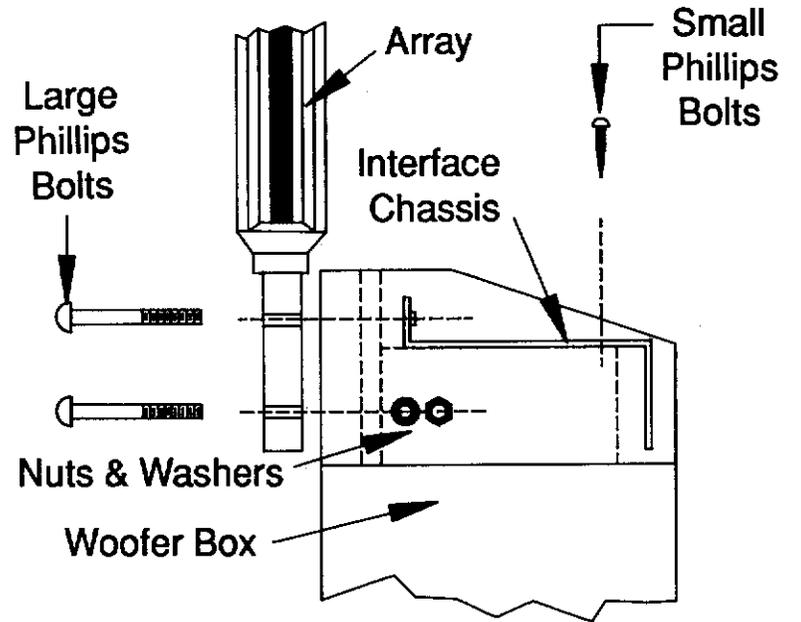


Fig. 2

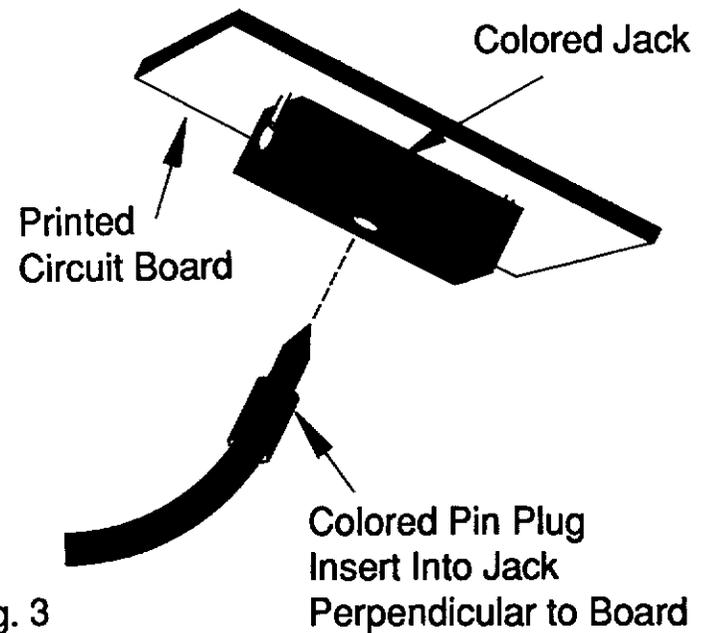


Fig. 3

- 3) Remove and set aside the ~~two~~ small Phillips-head screws on top of the interface chassis, ~~at~~ the outer rear edges.
- 4) Slide the chassis rearward about 2", and lift-up the front edge. Remove the plastic parts bag located under the chassis. Plug in the white connector to the mating receptacle on top of the woofer box. Note that this connector is keyed so that it inserts only one way. Insert fully until it snaps.
- 5) The parts bag should contain the following:
 - (1) Wall Transformer
 - (2) 1/4" - 20 x 2" Bolts
 - (2) 1/4" - 20 Nuts
 - (2) 1/4" Washers
 - (4) Spiked Leveling Feet
- 6) Place the electrostatic array in position on the front of the woofer box, with the wires hanging down in front of the woofer, and the seam in the grille cloth toward the rear. It is recommended that an assistant support the array in position until step #7 is completed.

Note: If the speaker is being assembled near its final location, you may want to choose the appropriate Left or Right array.
- 7) Insert a large bolt in each of the LOWER holes located on the prongs extending from the array, and adjust the position of the array so that the screws insert fully through the front of the woofer box. Place a washer and nut on the bolts from the rear **and** tighten. The array will now be self-potting.
- 8) Feed the array wires through the hole in the front of the woofer box, with the black tubing covering the wires between the array and hole.

- 9) Again lift-up the front edge of the interface chassis, and locate the 5 colored jacks (RED, BLUE, BLACK, YELLOW, WHITE) on the printed circuit board. Plug the array wires into these jacks, PERPENDICULAR TO THE BOARD, following the color code. Refer to Figure 3.
- 10) Slide the interlace chassis forward, making sure that the array wires are not pinched or strained.
- 11) Insert the remaining large bolts in the upper prong holes, thread into the interface chassis, and tighten.
- 12) insert and tighten (but do not overtighten) the Philips head screws on top of the chassis.
- 13) Re-install the woofer grille, aligning it to the front of the woofer box by first lining up the top edge of the grille against the plastic trim plate at the bottom of the array. Then seat the fasteners by pressing each of the four corners.
- 14) Repeat steps 1-13 for the other speaker.

We recommend that you keep all the boxes if possible. If storage space is limited, keep all of them for a while until you are satisfied that both speakers are performing properly.

Experience has shown that if service or a factory modification is ever needed, it is most likely to involve sending ONLY the interfaces to Acoustat. Our packaging materials are top-of-the-line and much more protective than most home-made arrangements. (See In Case of Difficulty.)

Disassembly of Speaker

Should your Spectra ever require disassembly for the purpose of moving or repair, simply follow the assembly instructions in reverse order, **with** one very important exception. After unbolting the interface chassis, but BEFORE disconnecting any internal wires, the speaker must be discharged.

(cont.)

WARNING: Always unplug the AC (POWER) input and audio feeds before accessing the inside of the Interface.

- 1) Even after the power is removed, a high voltage charge remains on the array for at least many hours.
- 2) To discharge the array, remove the RED coded array wire and touch its tip (while holding the wire's insulation, NOT the metal plug) to any other array wire connection. Unless the speaker has been de-energized for some time, expect to see a spark and hear a snap from the speaker.
- 3) The speaker will *now* be safely discharged, and disassembly *may* proceed.

Audio Input

The red/black input terminals are standard, 3/4" spacing, banana jacks. They may accept single or dual banana plugs, spade lugs, pin plugs, or bare wires.

There are four possible ways to connect the loudspeaker to the system amplifier(s). For all connections, be sure to observe polarity markings for both channels: Red (+) to Red (+), and Black (-) to Black (-). All Acoustat Loudspeakers are designed to preserve absolute phase integrity: i.e. when the red input terminal is positive with respect to the black terminal, the electrostat's diaphragm will move forward.

Standard Connection: See Figure Four. This configuration allows a single stereo amplifier to power both the electrostatic array and the woofer. To implement, connect the amplifier's output to the "ESUSYSTEM INPUT" terminals, and set the switch to "SINGLE AMP". No connection is made to the "WOOFER INPUT" terminals.

Bi-Wire Connection: See Figure Five. This configuration allows a single stereo amplifier to power both the electrostatic array and the woofer, but allows use of two separate cables to feed each section. To implement, connect the amplifier's

output to the "ESUSYSTEM INPUT" terminals using one cable, and using another cable, connect the same amplifier channel's output to the "WOOFER INPUT" terminals. Set the switch to the "BI-AMP/BI-WIRE" position.

Bi-Amp Connection: See Figure Six. This configuration allows one stereo amplifier to power the electrostatic array, and a second stereo amplifier to power the woofer. To implement, connect one amplifier's output to the "ESUSYSTEM INPUT" terminals, and connect the second amplifier's output to the "WOOFER input" terminals. Set the switch to the "BI-AMP/BI-WIRE" position. The two amplifiers need not be identical, but should have similar power ratings, and must have identical gain (sensitivity).

Alternate Bi-Amp Connection See Figure Seven. This configuration allows one stereo amplifier to power the left speaker, and a second stereo amplifier to power the right speaker. The advantage of this set up is that it allows each power amplifier to be placed close to the corresponding speaker, avoiding long speaker cable runs. To implement, connect one channel of the "left" amplifier to the left speaker's "ESUSYSTEM INPUT" terminals, and connect the other channel to the left speaker's "WOOFER INPUT". Repeat the process for the right channel. Set the switch to "BI-AMP/BI-WIRE" position. The two amplifiers **MUST** be identical for this configuration.

Note that the BI-AMP/BI-WIRE switch disconnects both (+) and (-) woofer terminals from the ESU System terminals, avoiding possible problems between amplifiers due to common connections.

For connections using two amplifiers, a means must be provided for splitting the signal from the preamplifier to each amplifier. Some preamps provide multiple outlets; others require the use of a "Y" adapter. Consult your dealer for available options.

STANDARD CONNECTION
SWITCH TO "SINGLE AMP"

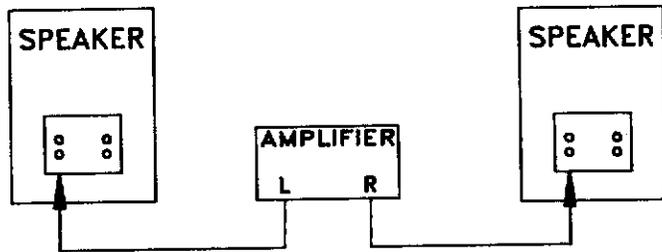


Fig. 4

BI-AMP CONNECTION
SWITCH TO "BI-AMP / BI-WIRE"

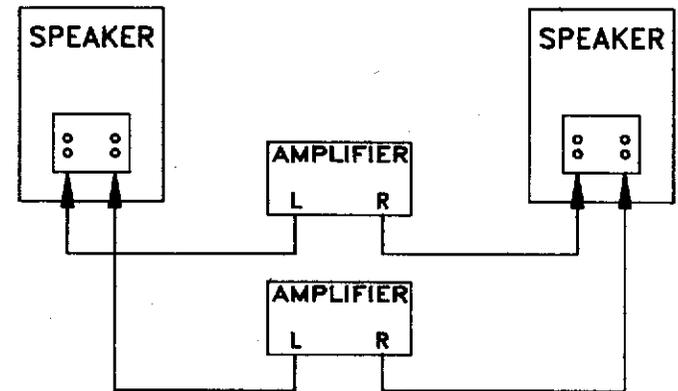


Fig. 6

BI-WIRE CONNECTION
SWITCH TO "BI-AMP / BI-WIRE"

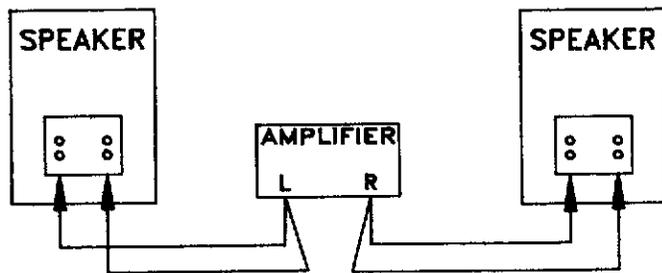


Fig. 5

ALTERNATE BI-AMP CONNECTION
SWITCH TO "BI-AMP / BI-WIRE"

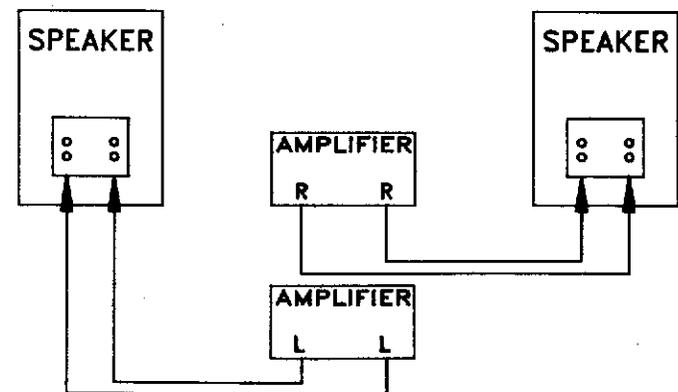


Fig. 7

Power Input

The miniature (3.5 mm) phone jack connects to the ultrasonic bias power supply, which creates the +5000 volts necessary for electrostatic operation. The supplied wall transformer is to be connected to this input jack and plugged into an ALWAYS ON line outlet. Make sure that there are no wall switches or light dimmers associated with the outlet. All Acoustat loudspeakers are intended to be left on at all times to maintain full charge: power consumption is minimal (about as much as a small night light).

NOTE: Before plugging in the wall transformer, make sure that it is rated for your local line (mains) voltage. The export transformer, labelled for 220 volts, is suitable for use with 220 to 240 volts, 50 to 60 Hz.

High Frequency Contour Switch

A three position switch has been provided on the rear of the interface chassis to adjust the top-octave response. Most situations will call for the "medium" setting. However, there is no "correct" setting: adjust this switch to suit your own preferences. Each step of the switch causes a change of about 2 dB at 20kHz.

Spiked feet

Four spiked feet have been included for installation on each speaker. The feet serve to firmly couple the speaker to the floor, yielding more solid bass response. The feet can also be used to level the speaker, as well as to "bite" through deep pile carpeting to better stabilize the speaker.

The speakers **should** be set-up in their final listening positions before installing the spiked feet, as moving the speaker with the spikes installed can be more difficult. Never drag the speaker across the *floor with* the spikes installed. To install, simply screw each foot into the receptacle located on the bottom of the

woofer cabinet. Insert the threads fully unless the feet are being used to level the speaker, in which case one or more feet can be **backed-out** to even the speaker on the floor.

The use of spiked feet on non-carpeted floors is generally not recommended due to the high chance of scratching or denting the floor. It is possible to level the speaker on non-carpeted floors by substituting a hex-head 1/4"-20x 1" bolt for the spiked foot. available from hardware stores.

THE LISTENING ENVIRONMENT

Room Size

The Spectra 1100 is best suited to small to medium rooms: those with minimum dimensions of 12 to 18 feet (3.5 to 5.5 meters). Quite acceptable performance will be obtained in larger rooms, but with a slight loss of total volume capability.

Some of the principal considerations which will determine the performance potential of the speaker system as installed are listed below. Remember, these are general guidelines only. Room shape, furniture type, and personal taste are all important variables. Every listening environment is different, and experimentation is the key to satisfaction.

The Wall Behind The Speakers: The walls should be neither excessively absorptive nor reflective. A highly reflective wall, such as large glass windows or smooth hard plaster, will tend to accentuate high frequencies. A highly absorptive wall such as heavy drapes or excessive application of specific sound absorbing materials, will tend to muffle high frequencies, as well as constrict the apparent depth of the sound stage. The High Frequency Contour switch can help to compensate for some of these variables.

The Orientation Of The Speaker System Within The Room: For deepest low bass performance, the speakers should project sound along the longer axis of the room. This is true of all loudspeakers, and is in no way unique to Spectra. If this is not possible in your room, the performance will not be significantly compromised other than a slight **loss** of deep bass.

Distance From The Rear Wall: Since the Spectra is a dipole loudspeaker (producing sound from both sides) placing the speaker too close to the rear wall will yield reduced bass output, due to rear-wave cancellations. A minimum speaker-to-rear wall distance of 3 feet (1 meter) is recommended, as measured from the rear center of the array perpendicular to the wall. Note also that the distance to the rear wall can be used in some situations to adjust the low frequency balance in the room.

Distance From The Side Walls: Some space is desirable from the side walls, but the asymmetric nature of Spectra's horizontal high frequency radiation makes side wall reflection less of a problem than with most other speakers. A spacing of 1 foot (30 cm) is the minimum recommended distance from the side wall to the array's outer edge. In wide rooms, of course, this distance may be much greater.

Toe-In And Distance Between Speakers: There are numerous combinations of toe-in angle and distance between speakers that will yield excellent sonic performance. In most situations, the distance between speakers should be roughly equal to the distance from each speaker to the listening position. The speakers should also be toed-in at an angle so that they more-or-less face the listening position.

The Area Between The Speakers: This area should be kept clear of major obstructions to airflow if optimum imaging is to be achieved. The size, shape, and material of any objects placed between the speakers will determine the extent of any negative effects on imaging.

ADDITIONAL INFORMATION

Specifications

PHYSICAL DIMENSIONS:

Height	67.5" (171.5 cm)
Width	16" (40.6 cm)
Array Depth	3" (7.6 cm)
Woofer Depth	16.75" (42.5 cm)

RECOMMENDED AMPLIFIER POWER:

75 - 100 watts per channel or greater (based on 8 ohm amplifier rating). See further discussion under "Amplifier Recommendations".

BIAS POWER SUPPLY CONSUMPTION:

Less than 10 watts.

EFFICIENCY 88 dB SPL'

* (400 Hz, 1 watt into 8 ohms equivalent at one meter, extrapolated from measurements taken at 10 watts into 8 ohm equivalent, measured at a distance of 3.16 meters.)

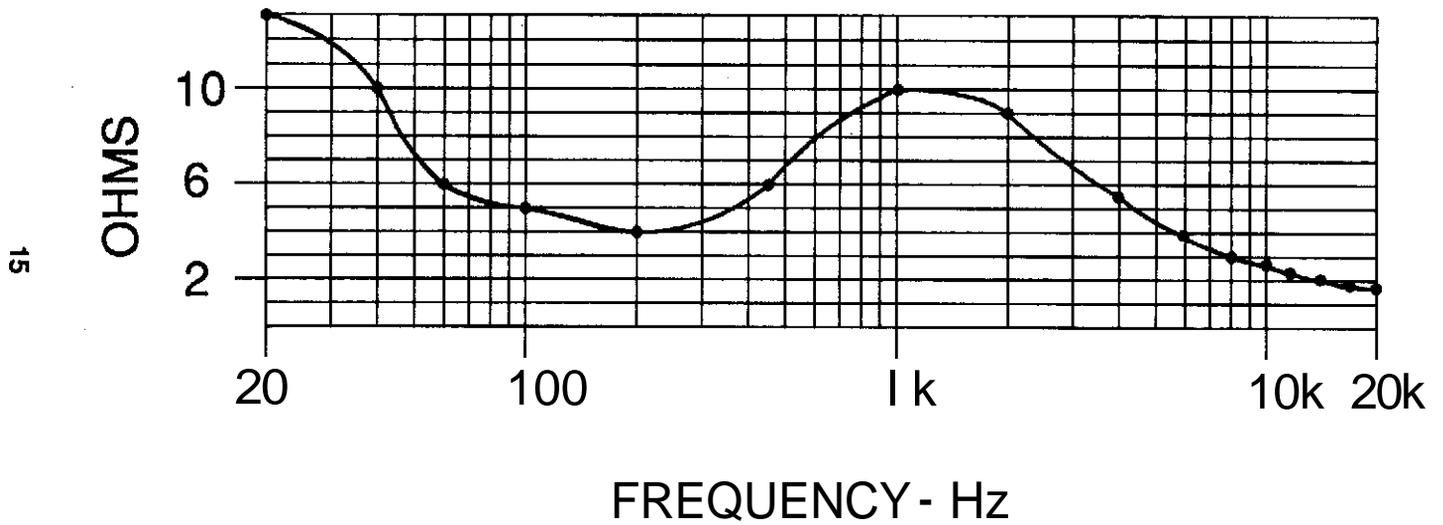
IMPEDANCE: Typically greater than 6 ohms, minimum of 2 ohms at high frequencies (see graph).

FREQUENCY RESPONSE: -3 dB at 30 Hz, -3 dB at 19 kHz ("High" setting)

CROSSOVERS:

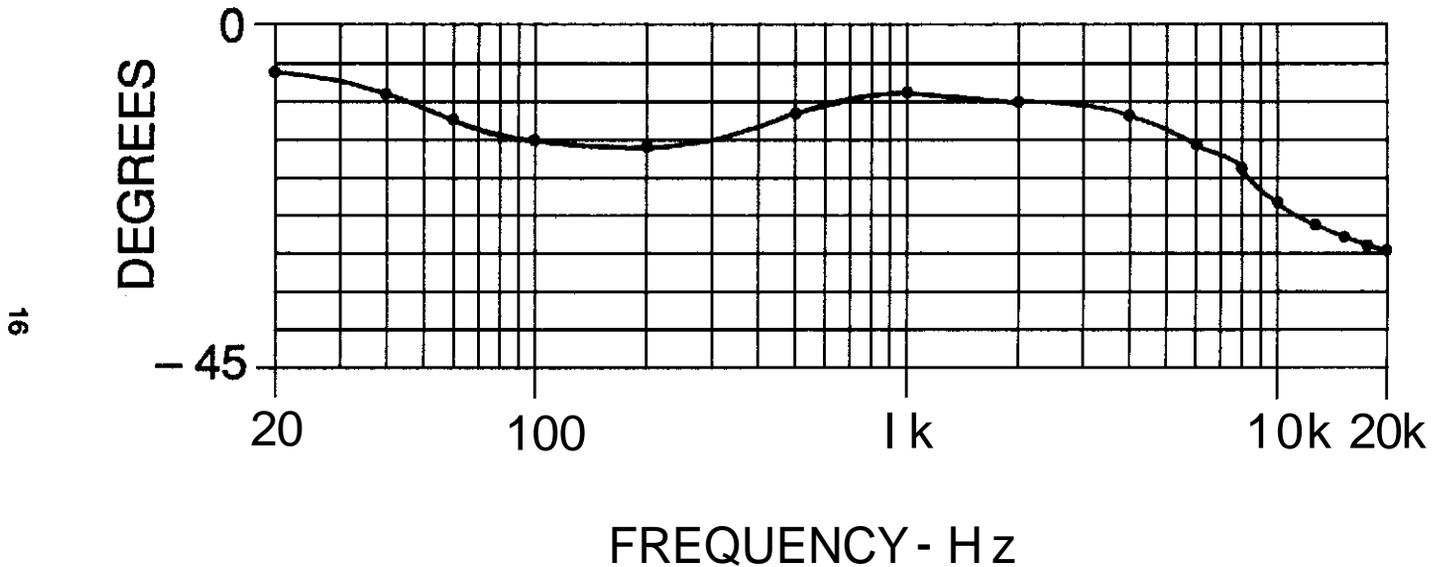
Electrostat:	250 Hz. -6 dB per Octave electrical, -12 dB effective acoustic rolloff.
Woofer:	250 Hz. modified -12 dB per octave, internal phase reversal.

IMPEDANCE PLOT



NOTE: VALUES PLOTTED FOR "MEDIUM" SETTING OF HIGH FREQUENCY CONTOUR SWITCH. IMPEDANCE SLIGHTLY LOWER ABOVE 10 KHZ FOR "HIGH" SETTING, AND SLIGHTLY HIGHER FOR "LOW" SETTING.

PHASE SHIFT PLOT



NOTE: VALUES plotted FOR "MEDIUM" SETTING OF HIGH FREQUENCY CONTOUR SWITCH. PHASE SHIFT SLIGHTLY GREATER ABOVE 10KHZ FOR "HIGH" SETTING, AND SLIGHTLY LESS FOR "LOW" SETTING.

AMPLIFIER RECOMMENDATIONS

As compared to most electrostatic loudspeakers, the Spectra 1100 possesses *good* efficiency and is relatively easy to drive. However, compared to traditional magnetic loudspeakers, the 1100 possesses only medium efficiency, and can occasionally pose driving difficulties at high frequencies where impedance can dip to as low as 2 ohms.

Therefore, when choosing a power amplifier, a few factors must be considered. The recommended minimum of 75-100 watts per channel will yield good results, but will not realize the speakers' full potential, especially in larger rooms. Amplifiers as large as 200 watts per channel may be used, as long as good common sense is employed: the speaker/amplifier should not be pushed to the limit of distortion. The Spectra 1100 is very rugged, and the electrostatic panel itself cannot be damaged by excessive drive, but the interface electronics and woofer system do have finite power handling capacity. The advantage in using a large power amplifier is not so much to allow the system to play much louder, but rather to allow for unrestricted dynamic headroom. In bi-amping configurations, the power requirements for each amplifier can be somewhat lower.

In addition to the 8 ohm power rating of the amplifier, the amplifier's ability to drive low impedances should be considered. Despite the speaker's rating of 2 ohms at high frequencies, the amplifier does not necessarily have to be rated for 2 ohms, since this minimum occurs over only a very narrow frequency range. However, to yield optimum performance from the loudspeaker, the amplifier should be rated to drive 4 ohm loads, and/or be advertised as being a "high current" design.

Acoustat does not generally recommend the use of mono-bridged amplifiers with Spectra loudspeakers. When a stereo amplifier is bridged into mono, each

half of the amplifier "sees" only half the load impedance. Therefore, that 2 ohm minimum then becomes a 1 ohm minimum, which can cause overheating or instability in some amplifiers. At the very least, very few amplifiers can deliver more power at 1 ohm: most deliver considerably less.

The choice of amplifier device technology (transistor, MOSFET vacuum tube, etc.) is an entirely personal one. Acoustat does not favor one technology over another. Each amplifier must be evaluated on its own particular merits. The same comments hold true for the choice of speaker cable.

THEORY & PRACTICE OF SPECTRA OPERATION

Spectra 1100 represents a very high state of perfection of electrostatic hybrid loudspeakers.

The *integrated* techniques allowing the Symmetric Pair Electrically Curved Transducer (SPECTRA) mode of operation were only perfected in late 1986.

At that time Acoustat made a quantum leap in the product of STEP-UP EFFICIENCY and BANDWIDTH which allowed for the first time a combination of traditional Acoustat high performance with the half-century old ideal of VARIABLE GEOMETRY operation.

This breakthrough solved the long-standing impasse which had not allowed high SPL electrostats to have optimum behavior at all audio frequencies.

You will find Spectra has wide, pleasant dispersion at all frequencies, razor-sharp high-frequency time alignment, and clean low bass.

Spectra achieves this by effectively changing size and shape at different frequencies. Spectra is about 3" wide at highest frequencies and about 9" wide at middle frequencies. The lowest frequencies are

smoothly transitioned to an 8" dynamic woofer. Spectra's excellent midrange results from the magic of wave physics which causes the 9" of array operational at these frequencies to act dispersively for waves leaving both the front and the rear of the array. Spectra is devoid of the midrange beaming common in planar speakers using large flat midrange radiators.

For those wishing more in-depth information about electrostats in general and specifically Spectra, contact the factory and ask for our "White Paper" entitled "Full Range Electrostatic Loudspeakers."

An electrical schematic is included in this owner's manual. However, the schematic is intended only for the academically curious: field repair is not recommended and **not** authorized.

WARRANTY STATEMENT

The electrostatic elements of the Spectra 1100 are warranted against defective materials and workmanship for the life of the product. The electronic components contained in the interface and the woofer are warranted against defective materials and workmanship for a period of five years from the original date of purchase. This warranty extends to the original owner, purchased from an authorized Acoustat dealer only. A dated proof of purchase must accompany all warranty claims.

For subsequent owners, the electrostatic elements, electronic components and the woofer are warranted against defective materials and workmanship for a period of five years from the date of manufacture. Manufacturing date shall be determined from a code contained in the serial number.

During the warranty period, defective parts will be repaired or replaced, at Acoustat's option, without charge for labor or materials. The warranty does not cover transportation costs to the repair site. Acoustat will return warranty repairs to the owner freight

The Spectra loudspeaker has been designed for a lifetime of trouble-free music enjoyment. On the rare occasions that an apparent malfunction should occur, be sure to check all system signal sources, fuses, and connecting cables. If investigation pinpoints the Spectra as the source of difficulty please contact (by telephone, preferably) our Customer Service Department before sending any equipment for service. Very often, we can offer further troubleshooting hints that simplify or even eliminate the need for factory service. Should your Spectra loudspeaker require factory service, please use original factory packaging for shipment and include a copy of a dated Bill of Sale and a brief note describing the difficulty. Every effort will be made to perform service in a timely manner, with typical turn-around times of about one week, exclusive of transit time.

ALL RETURNS TO THE FACTORY, REGARDLESS OF WARRANTY STATUS, REQUIRE PRIOR RETURN AUTHORIZATION.

Acoustat
A Division of Rockford Corporation
613 South Rockford Drive
Tempe, Arizona 85281
602-967-3565