

**PLEASE NOTE: This is the original manuscript for the Acoustat Spectra 4400/6600 Owner's Manual. It is text-only, and includes no diagrams. There may be minor differences between this version and the final published version. See "Schematics" and "Specifications" for further information on these models.**

OWNER'S MANUAL

SPECTRA 4400 & 6600  
ELECTROSTATIC  
LOUDSPEAKER SYSTEM

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Congratulations on your purchase of Acoustat Spectra Technology. The Spectra 4400 and Spectra 6600 offer the listener virtually unlimited dynamics in medium to large rooms, while still maintaining precise sound-staging and high frequency time-alignment.

## INTRODUCTION

### BREAK IN PERIOD

Your new Acoustat loudspeaker 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 hole located in the TOP METAL CAPTURE PLATE, as well as a colored dot on the bottom surface of the array: RED for right, and GREEN for left. The hole is on the LEFT side of the LEFT array and RIGHT side of the RIGHT array--when viewed from the listening side. The two interfaces and bases are IDENTICAL.
- 2) The hardwood bases are easily scratched. They require careful handling and following of precautions given later.
- 3) The light colored cloth arrays are easily soiled, and all colors 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.
- 4) Spectra's sectorized operation requires a complex connection-set from interface to array. Care is required when making the connections.

We will repeat these warnings when appropriate.

## INTERFACE/BASE ASSEMBLY

1) Remove the interfaces (step-up transformer units) from their shipping cartons. Needed hardware is enclosed in a hardware bag in each interface carton. Each bag should contain the following:

.....1 Wall Transformer  
.....4 Black Nylon Washers  
.....4 Metal Washers  
.....4 1" (long) Phillips Head Screws  
.....4 1/2" (short) Allen Head Screws  
.....1 Allen Wrench

2) Remove the hardwood bases from their shipping carton.

3) Referring to FIGURE 1, place one of the interfaces in INVERTED position, on the rug or other protective surface.

4) Select the four 1" screws (longer of the two sizes supplied) and the four METAL flat washers from the hardware bag.

5) Carefully place one of the hardwood bases (INVERTED) over the inverted interface so that its mounting holes align with the threaded holes in the bottom of the interface, and that the logo is positioned as shown in FIGURE 1. Avoid excessive sliding of wood on metal.

6) Using the 1" screws and METAL flat-washers, start all four screws through the base and into the threaded holes on the interface.

7) Tighten all 4 screws firmly.

8) Turn the mated base/interface right side up. The other base is identically assembled.

## ARRAY MOUNTING

Referring to FIGURE 2:

1) Place one of the interface-shipping plastic bags over the entire front part of the hardwood base, to prevent marring the wood surface.

NOTE: If the speaker is being assembled near its final position, you may want to choose the appropriate Left or Right speaker.

2) Carefully lay the selected array face down on the floor with its top on the floor, and its bottom resting up over the protective plastic bag you placed over the base. If you have removed the array protective bag, lay it under the array for protection from the floor.

3) Retrieve the 3 sleeved wire-bundles out of the end of the array-shipping bag.

4) Study the wiring diagram in FIGURE 2 carefully. The colors YELLOW and BLACK appear on TWO pin-plugs and on TWO pin-jacks. On closer inspection you will see that the proper connections are unambiguous--there are two DIFFERENT GROUPS: A BLUE group and a WHITE group.

5) Connect the 7 color-coded pin-plugs into the proper pin-jacks. There is only one correct set of these connections, but there are 5039 incorrect ones.

WARNING: The next steps have a very high chance of scratching the hardwood base. Both the TILT BRACKETS and the STAPLES under the array are quite capable of scratching the wood. It is necessary to use TWO PEOPLE for these steps.

BEFORE you stand up the array:

- 1) RECHECK for the presence of the protective plastic bag covering the front of the wood base.
- 2) LOCATE the four 1/2" Allen Head screws (shorter of the two sizes supplied) and the four black NYLON flat washers.
- 3) Carefully stand up the array. Now bring the array back to mate with the interface. You will have to guide the wire bundles into a "U-TURN" loop fitting into the empty space at the right end of the interface and also get the brackets to enter INSIDE the edges of the interface.

NOTE: If the brackets seem too wide to fit inside the interface chassis, or are vertically mis-aligned, the brackets' mounting screws may be temporarily loosened and the brackets re-aligned.

- 4) Make sure than none of the individual wires get pinched between the tilt bracket and the interface side.
- 5) Now install two of the 1/2" screws through each side of the interface, into the threaded inserts in the tilt brackets. Be sure to include the black nylon washers under each screw head, and tighten with supplied Allen wrench.
- 6) At this time you can remove the protective sheet covering the wood base and the protective bag over the array.

Remember, the light cloth is easily soiled and your hands are likely now oily from handling the hardware.

The other speaker is assembled identically. Remember to check again the LEFT and RIGHT identifiers before you make final placement.

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.

In any event you should keep PERMANENTLY the two INTERFACE boxes, and all the plastic foam parts from all the cartons, as these take little space and will save you money if you ever need new boxes in the future.

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 array from the interface, but BEFORE disconnecting any internal wires, the speaker must be discharged.

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 center RED pin-plug and touch its tip (while holding the wire's insulation, NOT the metal plug) to any other pin-plug 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.

The terminals are to be connected to the amplifier's output. 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 diaphragm will move forward.

## AUDIO FUSE

The rear panel fuse is directly in the audio path to protect the interface electronics in case of amplifier over driving or failure, and to protect the amplifier in case of speaker failure. If in need of replacement, always use a 5 ampere fuse (Type 3AG) with a slow-blow characteristic. The voltage rating of the fuse is not important. Evidence suggesting damage due to a larger than recommended fuse value may void the warranty for that repair.

## 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). The pilot lamp on the interface will glow whenever power is applied.

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.

## MODIFYING BASS RESPONSE

The apparent bass response of you Spectra will depend on the nature of the room, and the speaker system's position within that room. The factors affecting this are outlined in the following section "The Listening Environment."

If, after extended experimentation and listening, you are not satisfied with the amount of bass produced, it is possible to slightly modify the low-end response.

A few cautions are in order. First, the change that can be made will affect frequencies as high as 200 Hz. So, if you are attempting to change only very low frequencies, the modification may affect a broader range than desired. Secondly, the modification is neither quick nor easy, and should be attempted only by those experienced with electronic assembly techniques. It is for this reason that the specific instructions are NOT included in this manual. We recommend that the modification be performed at the factory.

For the Spectra 4400, it is possible to boost response by 1 dB, or cut response by 1 or 2 dB. The dB figure corresponds to the 30-40 Hz region. The amount of boost or cut will decrease as frequency increases.

For the Spectra 6600, no cut in response is available, but the bass response may be boosted by 1, 2, or 3 dB. Consult the factory for further details.

## THE LISTENING ENVIRONMENT

### ROOM SIZE

The Spectra 4400 is best suited to medium to large rooms: those with minimum dimensions of 15 to 20

feet. Quite acceptable performance will be obtained in smaller rooms, but with a slight loss of deep bass, and a sound stage that, at least on some recordings, will be "larger than life." The Spectra 6600 is best suited for large rooms, with dimensions larger than 20 feet. Again, smaller listening environments will yield good results, but with the same possible penalties in bass response and sound staging.

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 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 substantially 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.

#### DISTANCE FROM THE SIDE WALLS

Some space is desirable from the side walls, but the asymmetric nature of Spectra 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

##### CARE OF THE HARDWOOD BASES AND TRIM

The hardwood bases and trim are hand finished with ~~Watco~~ brand Danish Oil. This top quality finish penetrates the wood providing deep protection while enhancing its natural beauty. Watco Satin Wax is then hand rubbed and buffed into the wood, bringing the finish to a high lustre. This high quality oil finish is easily

maintained. We recommend these steps for optimum preservation, preferably once a month.

1) Apply a coat of Satin Oil to clean and polish.

2) Wipe dry with a clean soft cloth.

NATURAL OAK bases should be oiled with Satin Oil and waxed with Natural Satin Wax.

DARK OAK bases should be oiled with Satin Oil and waxed with Dark Satin Wax.

For repairing minor scratches use Watco Danish Oil Finish:

Dark Oak bases should be repaired using Black Walnut Oil.

Natural Oak bases should be repaired using Natural Oil.

Care must be used on speakers with light fabric to shield the cloth from being stained. You can use a piece of cardboard as a protective "fence" as you apply the processes discussed above.

BLACK OAK bases and trim have a painted finish and should not be treated as above. Clean these surfaces with a damp cloth to remove dust and dirt.

## SPECIFICATIONS

PHYSICAL DIMENSIONS: inches (cm)

SPECTRA 4400: .....Array Height: 94 (238.8)  
.....including base

.....Array Width: 22.5 (57.2)

.....Array Depth: 3.5 (8.9)

.....Base Width: 24.25 (61.6)

.....Base Depth: 17 (43.2)

SPECTRA 6600: .....Array Height: 94 (238.8)  
.....including base

.....Array Width: 32.75 (83.2)

.....Array Depth: 3.5 (8.9)

.....Base Width: 34.5 (87.6)

.....Base Depth: 17 (43.2)

RECOMMENDED AMPLIFIER POWER: 100 watts per channel or greater (based on an 8 ohm amplifier rating). See further discussion under "Amplifier Recommendations".

BIAS POWER SUPPLY CONSUMPTION: Less than 10 watts.

IMPEDANCE: Typically greater than 6 ohms, minimum of 1.5 ohms at high frequencies. See graphs.

EFFICIENCY: (400 Hz, 1 watt into 8 ohms equivalent at one meter)\*



.....4400: 87 dB SPL

.....6600: 89 dB SPL

\* extrapolated from measurements taken at 10 watts into 8 ohms equivalent, measured at a distance of 3.16 meters.

## AMPLIFIER RECOMMENDATIONS

As compared to traditional magnetic loudspeakers, the 4400 and 6600 possess only medium efficiency, and can occasionally pose driving difficulties at high frequencies where impedance can dip to as low as 1.5 ohms.

Therefore, when choosing a power amplifier, a few factors must be considered. The recommended minimum of 100 watts per channel will yield good results, but will not realize the speakers' full potential, especially in larger rooms. Amplifiers as large as 250-300 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 is very rugged loudspeaker, and the electrostatic panel itself cannot be damaged by excessive drive, but the interface electronics 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 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 less than 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 1.5 ohm minimum then becomes a .75 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 AND PRACTICE OF SPECTRA OPERATION

Spectra 4400 and 6600 represent a very high state of perfection of full range electrostatic loudspeakers.

The interface 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 full range electrostatics 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, about 13" wide at middle frequencies, and full array-width at lowest frequencies.

Spectra's excellent midrange results from the magic of wave physics which causes the 13" 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 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 4400 and 6600 are warranted against defective materials and workmanship for the life of the product. The electronic components contained in the interface are warranted against defective materials and workmanship for a period of ten 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, both the electrostatic elements and electronic components are warranted against defective materials and workmanship for a period of ten 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 pre-paid. This warranty does not cover damage due to negligence, misuse, modification, shipping damage or accident.

Except as provided herein, Acoustat makes no warranties, expressed or implied, including warranties of merchant-ability and fitness for a particular purpose. Some states do not permit limitation or exclusion of implied warranties; therefore the aforesaid limitations or exclusions may not apply to the purchaser.

## IN CASE OF DIFFICULTY

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 trouble-shooting 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.

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