

sound as clear as light

amt MONITOR

OWNERS MANUAL

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SERIAL # 4231

INTRODUCTION

The amt Monitor is the ultimate ESS loudspeaker. It is sonically distinguished from all other ESS speakers by its unmatched excellence.

An extremely "open" sounding bi-polar Heil air-motion transformer couples to an exceptionally high transmission 12" Bextrene low frequency driver, specially designed for this system. A newly designed diaphragm and a newly devised 18 dB per octave crossover that integrates the air-motion transformer and bass driver result in improved midrange performance free of phase distortion. Bass performance below 30 Hz is assured by a structurally reinforced cabinet of exceptionally large internal volume and by a front mounted passive radiator.

Carefully reading the Owner's Manual will help you properly connect and thoroughly understand the achievement your amt Monitor speaker represents. The excellence you demand will be yours. Even under the most exacting listening conditions your ESS amt Monitor speaker will exceed your expectations and provide a lifetime of listening pleasure.

SINGLE AMPLIFIER CONNECTION

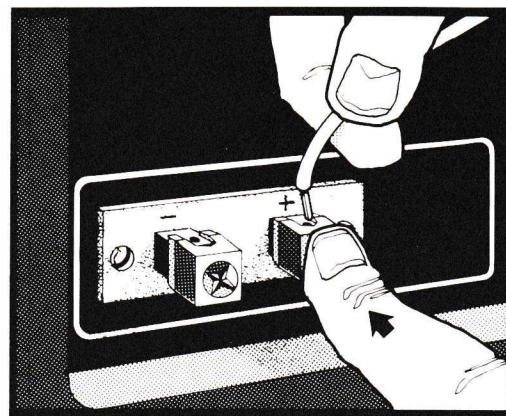
The input connector of your ESS amt Monitor is located on the recessed crossover panel at the rear of the speaker. The terminal posts are designed to accept bare wire and require no attachment hardware.

At this time switch your electronics OFF. If you plan to drive more than one pair of speakers simultaneously with your stereo receiver, or if you plan to drive more than four speakers with a 4-channel unit, turn to "Multiple Speaker Connection".

18 gauge "lamp" or "zip" cord is recommended for most installations. (Use 16 gauge wire if your speakers will be in excess of 25 feet from your electronics.) All double strand connector wires are coded to insure that ground (-) and positive (+) leads can be easily identified along the length of the cord. Solid colored cord has one conductor length that is smooth and one length that has ridges. Connect the ridged wire to the negative (Black) terminal on the speaker and the corresponding negative post on your electronics. Most clear insulated cord contains silver and copper colored wire. The copper wire should be connected to the negative (Black) terminal.

The input terminals at the rear of the speaker are spring loaded. Strip ¼ inch of insulation off the wire you are connecting. Press inward on the plastic cap and insert the stripped wire. Release the cap to secure the wire. *Be certain that no wire strand touches any portion of the adjacent terminal at the speaker or the electronics.* Shorting of an amplifier's output can potentially cause damage not covered by the warranty. Connect the left speaker to the amplifier left channel output terminals, the right to the right.

Once the leads are properly connected, your system is ready to turn on.



INPUT TERMINAL CONNECTION

PHASING

If your speakers seem to image poorly or if the bass seems inadequate, it is possible that they have inadvertently been connected OUT OF PHASE. To check for proper phasing, follow this procedure:

Switch your receiver or preamplifier to the MONO mode. Select a program source and position yourself equidistantly in front of the speakers. If the sound seems to emanate clearly from between the two speakers, they are properly phased. However, if you hear a broad vague sound which leaps from side to side as you move your head off center, your speakers are out of phase. The problem can easily be corrected by reversing the connections to ONE of the speakers. Switching to stereo should reveal the dramatic, natural sound that you have come to expect of proper stereo imaging.

SPEAKER PLACEMENT

A speaker's room placement and its orientation to the listener has a major bearing on the quality of the sound that you hear. The front placement of the passive radiator provides unexcelled imaging and allows the speaker to be placed directly against the wall. Generally, optimal stereo imaging is obtained by placing both speakers along one plane, parallel to each other no less than five feet apart. Placement near corners will augment bass response but may tend to make the bass dominate the rest of the audio spectrum. If the bass seems excessive, try moving the speaker a few feet away from the corners. Aside from not placing the amt Monitor directly in a corner, you will probably want to experiment with room placement if your room and furnishings do not limit placement possibilities.

The furnishings in your room can also importantly affect how your speakers sound. Large windows, paneled walls and wooden floors and/or ceilings are characteristic of "live" rooms. Ideally, highly reflective surfaces are acoustically optimized by opposite absorptive surfaces. Heavily draped, upholstered and carpeted rooms lacking any reflective surfaces tend to be acoustically non-reverberant or "dead". Rooms with a balance between reflective and absorptive surfaces will tend to be most acoustically ideal. If possible, experiment with speaker and decor placement to obtain a sound quality that you find most pleasing.

CONTROLS

A Presence/Brilliance Control is provided with the amt Monitor to compensate for acoustic deficiencies that may exist in your listening environment. The control is located on the recessed crossover panel at the rear of the speaker near the input terminals. Variable attenuation from +3 dB to $-\infty$ occurs in a

shelflike, linear fashion (as opposed to rolling off the high end) from about 1200 Hz to beyond 23 kHz. Roll off characteristic of the typical component treble control will usually only roll off frequencies above 5 kHz. The Presence/Brilliance Control will be especially valuable for controlling upper midrange frequencies and may be used along with or in conjunction with your electronic's treble control to achieve desired high frequency performance relative to equalization and room acoustic effects.

Any adjustment of the control should start *from* the OPTIMUM RANGE position since this region should provide the flattest frequency response in most acoustical environments. Severe reduction of the Presence/Brilliance Control can dramatically affect the performance of the speaker from 1200 Hz to beyond audibility. If the midrange or high frequency performance of your speakers seems lacking, always check the control to see if they are severely turned towards the DECREASE position: Moving the control towards the region marked OPTIMAL RANGE should dramatically improve the sound quality and provide the linear, balanced sound you can expect from the amt Monitor.

MULTIPLE SPEAKER CONNECTION

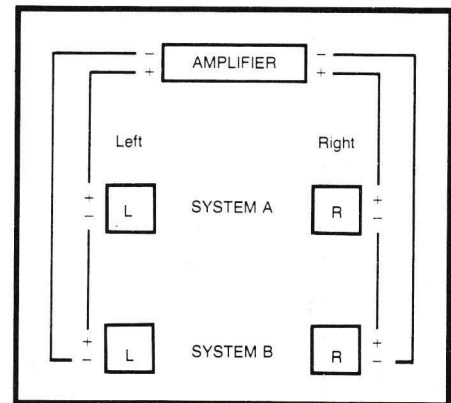
These ESS speakers have a nominal impedance of 6 Ohms. Most receivers and basic amplifiers have no difficulty whatsoever with impedance loads above 4 Ohms, but can develop problems if the load drops below 4 Ohms. *Connecting an additional set of speakers to these ESS speakers will probably drop the system impedance below 4 Ohms; consequently, they should not be connected in parallel.* If you own a receiver, driving your ESS speakers in the A & B mode with another set of speakers might drop the system impedance below the 4 Ohm level.

A second set of speakers may be connected IN SERIES. Series connection keeps the system impedance *above* 4 Ohms, assuring that your electronics will handle the load properly. Your dealer can help to clarify and answer any questions you may have about multiple connections to your speakers. Switching boxes are also available which simplify series connections; your dealer can help you obtain such a box. The basic series connection is diagrammed below and should be used if you plan to connect another set of speakers to your ESS speakers.

Connecting additional speakers to a 4-channel receiver will also require connection IN SERIES. You may use the diagram above as a model for this procedure. If you have questions, it is wise to contact your dealer or the manufacturer of your 4-channel receiver.

Once you understand the ramifications and procedure of connecting multiple speakers, return to "Connecting Your Speakers."

Driving the loudspeakers with sine wave signals at high dB output levels is *not* advisable. Driver failure from excessive input levels, faulty electronic equipment, or owner neglect will not be covered under the conditions of the warranty. Used properly, the rugged, reliable components in your ESS speakers system should provide a lifetime of outstanding service.



SERIES SPEAKER CONNECTION

COMPONENTS

THE AIR-MOTION TRANSFORMER. The 12 lb. 15 oz. (5.87 kg) bi-polar Heil air-motion transformer features a refined, newly designed Teflon diaphragm for resonant free, improved midrange response. The bi-polar amt incorporates a focus plate array that evenly envelops the diaphragm in magnetic field and produces an extremely airy, "open" sound that magnificently blends with the superb performance of the 12 inch Bextrene bass driver. Excellent side and rear dispersion characteristic of the bi-polar design is assured by the striking design of the Monitor's cabinet. The precision, efficiency and clarity of the Heil driver is superior to other designs because the air-motion transformer is revolutionary.

Conventional midrange and high frequency drivers, unlike the Heil driver, are highly susceptible to diaphragm resonance. When a cone, for instance, is driven at certain frequencies, it begins to change shape "in sympathy" with the drive frequency. This vibration, known as diaphragm resonance, absorbs energy, blunting transient attack and causing overhang. Moreover, when another signal is introduced at the same time the resonating diaphragm tightens up, like a rubber band stretched between two points. This forces the resonating frequency to rise in frequency. This change in frequency, or pitch variation, is a major factor in "masking" clarity.

One can avoid resonance by making the diaphragm absolutely rigid. Unfortunately, this entails making the diaphragm massive and difficult to drive.

A more effective way to avoid resonance is by distributing the driving force. When a driving force is distributed uniformly over a diaphragm's entire moving surface area, it supports the diaphragm at every point. The diaphragm is thus effectively made rigid without extra weight. Resonant vibrations simply do not occur.

The diaphragm of the Heil air-motion transformer incorporates both concepts. Its surface area is folded into deep vertical pleats. Conductive aluminum strips bonded to the pleat walls move with the electronic signals, causing the pleats to close or open along their entire length. As the pleats expand or contract, air is sucked in or forced out the open end. The pleat walls move only one fifth as far as the escaping air, thus reducing the possibility of flexing. The air-motion transformation ratio is thus 5 to 1.

The Heil's pleat action has two major advantages over conventional cones. First, it eliminates the possibility of diaphragm or cone resonance. Since the Heil's pleat walls are totally drive-supported by the aluminum strips, they cannot bend out of shape to go into resonance. Second, when the Heil's deep pleats force the air out, they move the air much farther — and faster — than they themselves move — creating a large, high velocity air motion from a short, precise diaphragm movement.

This gain — or "transformation" of 5 times the air motion to 1 times the diaphragm motion — is important because it drastically reduces the effective moving mass of the diaphragm. The Heil builds up only a fraction of the momentum generated by conventional one-to-one drivers, transferring energy to the air efficiently at all frequencies.

The Heil transformer's pleated configuration has the added advantage of spectacular dispersion by virtue of its small radiating source. Conventional

speakers reproducing similar midrange frequencies are usually so wide by comparison that sound waves from one side of the diaphragm interfere with waves on the other side, narrowing the speaker's clean output to a constricted central beam. This makes speaker placement extremely critical. The Heil air-motion transformer avoids this side cancellation because of its compact configuration. With a 120° horizontal pattern at 20,000 Hz, the Heil maintains a solid expanse of stereo imagery to frequencies beyond audibility. A spacious sound stage can be enjoyed from virtually any point in the listening field.

Definitive clarity, freedom from resonance, and full-range sound dispersion — the inherent benefits of superior design. For conventional speakers, they remain yet to be realized.

BEXTRENE LOW FREQUENCY DRIVER. A 12 inch (30.48 cm) low frequency driver is constructed on a heavy cast aluminum, open back frame that rigidly supports a 7 lb. 6½ oz. (3.36 kg) ceramic magnet structure. The cone surface is vacuum formed to extremely close tolerances out of Bextrene, a polystyrene compound of exceptional physical properties. Bextrene was originally developed by the BBC for studio reference systems. Unlike typical paper cones, Bextrene is a compound that combines unexcelled transmission velocity, clean wave propagation with low mass and excellent damping characteristics. A newly developed dual support system provides additional rigidity and damping to the moving assembly.

Extremely high power handling is assured by a 2" copper voice coil bonded with high temperature epoxy on an aluminum former.

All of the features built into the 12" Bextrene driver combine to produce deep articulate bass below 30 Hz and incisive clarity in the higher registers.

PASSIVE RADIATOR. The front mounted 12" passive radiator on your amt-Monitor is driven by the motional energy of the woofer. The passive radiator works in the same way as a port except that the velocity of the passive diaphragm is much lower than that of air moving through a typical port. As a result, *low frequency distortion is lower when using a passive radiator system than when using a ported system.* The passive radiator keeps the back radiation of the woofer where it belongs: in a tuned system within the box.

The passive radiator in conjunction with large cabinet volume and the excellence of the 12" Bextrene driver delivers bass below 30 Hz. The front mounted passive radiator provides clearer imaging and more impactful and unified bass with a resulting effect of greater sonic integrity and coherence.

FREQUENCY DIVIDING NETWORK. A newly designed sophisticated parallel type 18 dB per octave frequency dividing network at 1000 Hz assures the proper operation of the large Heil air-motion transformer and the 12" Bextrene bass driver. Resistors, capacitors and air core inductors of the highest caliber are individually quality controlled to assure uniform operation throughout. Improved phase linearity at the crossover point in a critical midrange region is assured by a new crossover that smoothly integrates the Heil amt and the Bextrene woofer. Steep crossover slopes integrate both drivers within their most effective range and provide freedom from phase interference that can severely deteriorate midrange definition.

A Presence/Brilliance Control is provided with the amt Monitor at the rear of the cabinet near the input terminals. The Control will help compensate for acoustic deficiencies that may exist in your listening environment. (See: Controls)

BIAMP CONNECTION

Screw terminal inputs are provided for applications in which the amt Monitor is biamplified through the use of an active electronic crossover and two power amplifiers for each stereo configuration. The amt Monitor HF and LF connections bypass the built-in passive crossover for direct access to the Heil transformer and low frequency driver. When biamplified, the Monitor's two drivers are completely isolated. Bi-amplification increases a speaker's dynamic range and damping factor, and reduces phase shift distortion. Clarity and definition are significantly enhanced. (See: Advantages of Bi-amplification)

There are two critical requirements for biamp connection:

- 1) The straps from crossover output to speaker input are for use with the built-in passive crossover only, and **MUST BE REMOVED** when connecting the biamp leads to HF & LF speaker input terminals. To avoid damage to your amplifiers, remove these straps before connecting any biamp leads.
- 2) **CROSSOVER FREQUENCY:** It is crucial that your electronic crossover be set to deliver only frequencies of 1000 Hz or above to the Heil transformer. Crossover slopes at 18 dB per octave are strongly recommended. Six dB per octave slopes should *not* be used. Frequencies below 1000 Hz will cause damage to the Heil driver which is identifiable by ESS and does not fall under warranty coverage.

For optimal performance and safety, ESS recommends that the 1000 Hz crossover point be maintained when bi-amplifying the amt Monitors.

To connect the amt Monitors in the biamp mode, remove the terminal straps, and connect the positive and negative leads from your amplifiers to the positive and negative terminals for HF & LF speaker input.

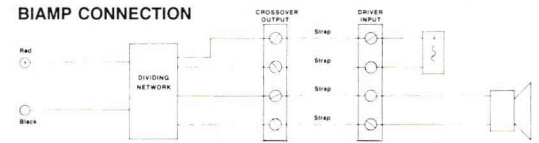
NOTE: Always make connection to the woofer first. In the event that a wiring error has placed the wrong frequency band through the two leads there is less likelihood of damage occurring to the woofer.

When used bi-amplified, it is recommended that the amplifier driving the Heil air-motion transformer be of lesser rated power output than the one driving the woofer. An amplifier with half the rated output of that driving the woofer will be more than adequate to drive the Heil transformer.

If you desire further assistance in obtaining optimum bi-amp performance from your amt Monitor speakers, contact the authorized ESS dealer from whom they were purchased and he will be glad to advise you.

ADVANTAGES OF BIAMPLIFICATION

The very nature of the music we normally desire to reproduce provides the best argument in favor of bi-amplification. An average music program consists of frequencies of various amplitudes or values across the audible spectrum, with the lower frequencies (fig. 1) generally producing much greater amplitude than the higher (fig. 2). When two or more frequencies are present at the same time, their values add or subtract from each other to create a composite wave form (fig. 3). To properly reproduce this wave form, a power amplifier must have sufficient "head room," the ability to amplify the signal without clipping the sum of their peak amplitudes.



Remove shorting straps before hookup to HF and LF driver input terminals. The straps must be replaced to again utilize the passive cross over network.

A system driven by only one amplifier can clip even when program material is being played at low volume. When an amplifier reaches the clipping point — and it inevitably will (fig. 4) — the percentage of a given cycle that is clipped relates to the percentage of distortion of that cycle. When the incoming signal from one amplifier is separated by a passive crossover, the distortion of the lower frequency (which probably produced clipping in the first place) may be relatively small (fig. 5); but the upper frequencies which were superimposed on the composite wave form are completely eliminated or at least seriously distorted during the period of clip (fig. 6).

Had the high and low frequencies been separated by an electronic crossover prior to reaching their respective power amplifiers, the low frequencies might still exhibit clipping distortion; the high frequencies, however, would be completely unaffected.

There is another benefit to bi-amplification: since, in a bi-amplification mode, a single amplifier unit need no longer handle a composite signal, power requirements will be less than that necessary for comparable performance from an amplifier required to handle all frequencies with a passive crossover network. As a case in point, the ESS Series Eclipse 500C stereo amplifier rated at 250 watts per channel @ 8 ohms, when combined with another basic amplifier at 125 watts per channel @ 8 ohms in a bi-amp configuration, give a total capability on a stereo basis equivalent to a 750 watt single-channel amp — or 1,440 watts for two channels!

There are a number of additional advantages, as well. Power-wasting passive components between the speaker and the amp, which also severely affect the damping factor of the overall system, are eliminated; bi-amplification, therefore, produces tighter, cleaner bass with far less overhang than passive crossovers.

Passive crossover components operate directly in series with a low-impedance load with a net effect of reducing the efficiency of coupling from the amplifier to the load; overall power supplied by the amplifier is reduced by virtue of the increased effective total impedance, and a significant portion of that reduced power is dissipated, with no useful output, by the crossover components as heat.

Furthermore, that same series impedance of the passive components adds to the output impedance of the power amplifier and seriously degrades the damping factor of the system (derived by dividing the load impedance by the source impedance — which now includes the impedance of the passive crossover).

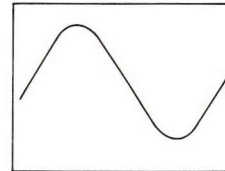


Fig. 1

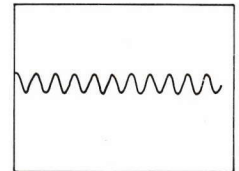


Fig. 2

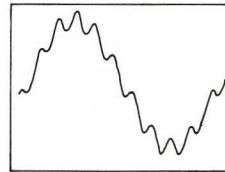


Fig. 3

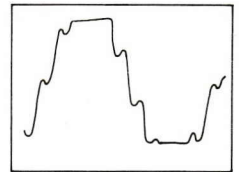


Fig. 4

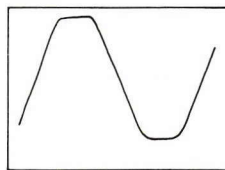


Fig. 5

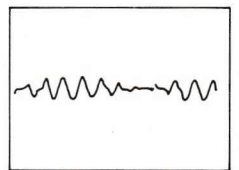


Fig. 6

CABINET CARE

The veneer exterior of your ESS speaker is carefully crafted and finished to enhance your decor. The woodwork is first carefully oiled with a Danish walnut oil stain and is then hand sanded with a high quality wax. The beauty of the walnut surface can be maintained and enhanced by a periodic furniture finish treatment such as the non-aerosol "Scott's Liquid Gold." Silicone dusting sprays and strong abrasive compounds should not be used on the speaker surfaces.

SERVICE

The dealership where you purchased your ESS speakers can best verify any complaint you may have and can arrange for any necessary servicing.

If your dealer cannot be contacted, please write ESS, Inc. Attention: Customer Services, and include the following information:

- The model and serial number of your speakers.
- The dealer from whom your speaker was purchased, the date of purchase, and, if possible, your phone number.
- A specific description of the problem.
- Associated equipment (including RMS power ratings of your amp) used with the speakers.

If ESS deems return to the factory necessary, please ship freight prepaid and be sure to use the "Authorized Return" labels which ESS will provide. Once repaired, your unit will be returned freight prepaid.

LIMITED THREE-YEAR WARRANTY

When ESS speakers are used in accordance with the written instructions contained in the Owner's Manual, ESS will repair any defect in workmanship and materials that occurs in normal use for a period of 36 months from the date of original purchase without charge for parts or labor. The warranty applies only to the original owner and is contingent upon purchase from an authorized dealer, except where prohibited by law. The owner's responsibilities are to provide proof of purchase and transportation to the ESS factory authorized service facility in the event that repair is required.

If your speakers are removed from the country of original purchase, ESS distributors and/or authorized dealers in any subsequent country are not obligated by the terms of this warranty. Any repairs under the terms of this warranty will be made at the discretion of the distributor or dealer.

This warranty is void if the serial numbers have been removed or defaced, or if repair has been attempted by any unauthorized person or agency. In addition the warranty does not cover tampering, abuse or accidental damage. The right is further reserved to re-adjust prices or design parameters and specifications without notice and without incurring responsibility to modify previously purchased systems. ESS specifically excludes from this warranty any responsibility for consequential damage.

Retention of your ORIGINAL BILL OF SALE is required to obtain service under the terms of the warranty. Any card or other form of registration does not constitute proof of purchase and will not be regarded as such. During the three year warranty period, only presentation of your ORIGINAL BILL OF SALE to either an authorized warranty station or the factory itself will insure your rights under the warranty policy described above.

SPECIFICATIONS

FULL SYSTEM

POWER CAPACITY	375 watts (clean music power)
NOMINAL IMPEDANCE	6 ohms minimum
DISPERSION	120° Horizontal, 30° Vertical
CROSSOVER FREQUENCY	1,000 Hz
SENSITIVITY	1 watt input produces 87 dB sound pressure at a distance of 1 meter
AMPLITUDE-FREQUENCY RESPONSE	±3 dB 30 - 23,000 Hz

CONTROLS

PRESENCE/BRILLIANCE:	Continuously variable attenuation from +3 dB to - ∞ from 1,200 Hz to beyond audibility
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HEIL AIR-MOTION TRANSFORMER

TOTAL RADIATING AREA	21.5 in. ² (139 cm. ²) (equivalent to an 8" cone)
SQUARE WAVE RISE TIME	15 microseconds at 5,000 Hz
TRANSFORMATION RATIO	5.3:1 velocity increase
MAGNET ASSEMBLY WEIGHT	12 lbs. 15 oz. (5.87 kg)
FLUX DENSITY	4,500 Gauss

LOW FREQUENCY DRIVER

NOMINAL DIAMETER	12 in. (30.48 cm)
CONE MATERIALS	Bextrene
MAGNETIC ASSEMBLY WEIGHT	7 lbs. 6½ ozs. (3.36 kg)
FLUX DENSITY	10,500 Gauss
VOICE COIL	2 in. (5.08 cm) Copper bonded with high temperature epoxy to an aluminum former

INSULATION

Single polythermaleze

PASSIVE RADIATOR

NOMINAL DIAMETER	12 in. (30.48 cm)
DIAPHRAGM MATERIAL	.5 in. rigid EPS styrene foam base material laminated to a damping skin of .250" open cell foam. Unitary free air resonance: 5 Hz

DECOR

FINISH	Oiled Walnut
GRILLE COLOR	Black-brown
DIMENSIONS	39.25 in. (99.7 cm) H X 15.63 in. (39.7 cm) W X 15.88 in. (40.3 cm) D
SHIPPING WEIGHT	103.5 lbs. (47 kg)

IMPORTANT

ESS is constantly researching new materials, production methods and design refinements which may be introduced into existing product lines without notice or obligation. For this reason, any current ESS product may differ in some respects from its published description but will always equal or exceed performance of the original design.

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