

Power Handling Capacity: 50 Watts
Finish: Polished Walnut
Size – Cabinet: 28½" w. x 20½" d. x 34½" h.
 72.4cm w. x 52.1cm d. x 87.6cm h.
Pedestal: 1½" high
 38mm high
Weight: 156 lbs. (70.8kg)

DESCRIPTION AND APPLICATION

The SENTRY™ III is one of a generation of monitor loudspeaker systems resulting from creative engineering and critical listening by the Electro-Voice product engineering staff. The SENTRY III is a direct descendant of the SENTRY IV, utilizing the same high-frequency components but with a new low-frequency section. This new low-frequency section permits a reduction in overall size of 30% and extends the low-frequency performance 10 Hz relative to the SENTRY IVA.

The low-frequency section is driven by a newly designed, 15-inch, direct radiator woofer installed in a vented enclosure with fourth order Butterworth tuning.¹ The enclosure's moderate size combined with the selected low-frequency cutoff of 40 Hz dictates a 4 dB loss in on-axis sensitivity compared to the SENTRY IVA. Such extended low-frequency response is simply not attained in most high efficiency transducers now employed. Throughout the rest of the frequency range the SENTRY III embodies the remarkably uniform dispersion and uniform total power output of the SENTRY IVA, providing a level of performance unequalled in transducers of such high efficiency and power handling capacity.

The SENTRY III system is housed in a handsome walnut veneer enclosure with a dramatic dark grille treatment, making the system as equally appropriate for demanding home installations as for professional monitoring and sound reinforcement. Since the efficiency of the SENTRY III is a full 10 dB higher than many bookshelf high fidelity speaker systems, it represents a unique opportunity to reproduce without clipping and with amplifiers of practical size, the 115 dB peak sound pressure level characteristic of live music.²

SPECIFICATIONS

Frequency Response (See Fig. 1): 40–18,000 Hz ± 3 dB
EIA Sensitivity (on axis measurement): 48 dB
Sound Pressure (4' on axis, 50W): 113 dB
Conversion Efficiency (2π steradians): 3.2%³
Impedance: 8 ohms nominal

TWEETER PROTECTION

A tweeter protection device is provided (internally mounted) to allow maximum performance without tweeter damage. The device senses for maximum safe voltage to the tweeter and opens the tweeter circuit (variable speed relay) if that voltage is exceeded. When safe voltage is resumed, the tweeter is instantly brought back into the circuit.

A purely electrical system of protection would sense for a given voltage and disconnect the tweeter. However, the protection device used in the SENTRY III employs not only electrical sensing components, but a selected relay which is voltage/duration sensitive. Program material may have high frequency "spikes" or transient surges of very short duration which will exceed the average voltage level. The protection circuit will pass short surges (which will not damage the tweeter) while not allowing the same voltage with a longer duration to reach the tweeter. This effectively extends the dynamic range of the entire system.

Note: When the system is operating at high power threshold, the tweeter may switch in and out with a clicking sound. If this is objectionable, either reduce the power or roll the tweeter off with the attenuator switch.

POWER HANDLING CAPACITY

Power handling specifications are usually meaningless because they fail to indicate the nature of the test signal and/or how this test signal relates to actual use. The 50-watt specification for the SENTRY III is based on filtered random noise (FM interstation noise and tape hiss are common forms of random noise), which is fed to the speaker for an extended time (more than 15 hours).

Random noise testing is used because, like real music and speech program material, it contains many frequencies at once. Low frequencies, which cause large excursions of the woofer suspension are present as well as mid-bass frequencies which contribute mainly to woofer voice coil heating. Thus the woofer is simultaneously tested for mechanical fatigue and voice coil overheating. Similarly,

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the midrange driver and tweeter are tested for both mechanical and thermal failure at appropriate power levels.

There is no generally accepted standard for testing loudspeakers for power capacity. At Electro-Voice, we expect each speaker and system to survive 15 hours continuous application of rated power without failure of any component or permanent change in performance.

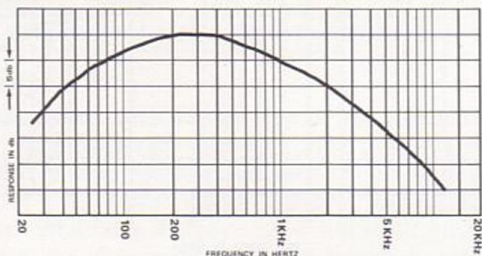


FIGURE 2
Random Noise Spectrum Specified by D.I.N. 45573 for Power Testing of Loudspeakers (1/10 octave analyzer)

One noise test standard, the West German D.I.N. 45573, specifies the random noise spectrum shown in Figure 2. This spectrum agrees approximately with studies of voice and music spectra that appear in several textbooks on acoustics (4,5). However, only about 0.7% of the power applied to a Sentry III would be in the range of the tweeter using this spectrum. A system input of 50 watts would therefore test the tweeter with 0.35 watts of random noise. Obviously this would not be a very severe test particularly in light of the wide-band nature of rock and synthesized music.

A study done by John P. Overley of Electro-Voice⁶ resulted in the more realistic spectrum of Figure 3.

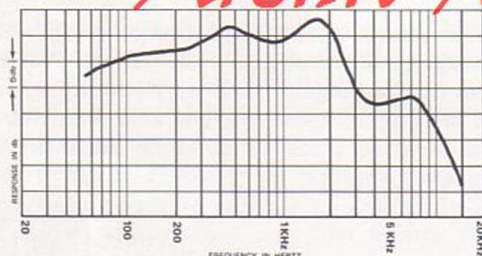


FIGURE 3 — Ensemble Average of Peak Energy Levels (relative), Symphony Orchestra

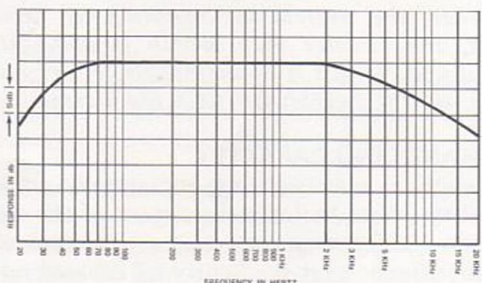


FIGURE 4 — Random Noise Spectrum for Testing Sentry III (1/10 octave analyzer)

The curve shows the relative levels in octave bands of average peak energy found in many musical passages of a symphony orchestra. "Based upon peaks as short as a fraction of a second in duration... it represents the approximate distribution of energy vs. frequency under highest signal conditions... exactly those conditions which should determine the power handling requirements

of audio components."⁷ The musical passages were taken from disc recordings that were played back on "carefully equalized high quality transcription equipment."⁸

The test signal actually used in developmental testing of the Sentry III is shown in Figure 4. It is an approximation to measured spectra of the output of a lead guitar amplifier driven into heavy clipping, and represents a worst case situation. The Sentry III will survive 50 watts of this input for at least 15 hours. Using this spectrum, 10% of the power is in the tweeter passband or 5 watts in the case of a 50-watt system input.

The power handling specification applies to long term application of power; for short duration peaks the loudspeaker system is capable of handling many times the rated power. For example: for a few milliseconds the system will handle 10 dB peaks. If the average input power level were 50 watts then it would handle peak power inputs on the order of 500 watts.

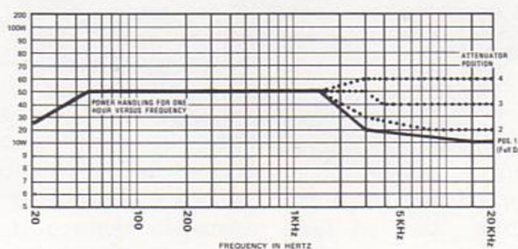


FIGURE 5 — Power Handling Chart (average sine wave power, nominal 8 ohm load)

Figure 5 shows continuous sine wave power handling with relation to frequency. The graph is designed to be used to calculate power handling when unusual program sources with substantial high frequency energy are anticipated.

To protect against extremely high-frequency, high-power signals that could damage the tweeter, an automatic relay device is installed to "turn off" the tweeter for as long as safe power levels are exceeded. The tweeter is automatically "turned on" when power levels subside.

STEP-DOWN KIT

The Sentry III, as supplied, is 3 dB down at 40 Hz (see Fig. 1). It is possible to extend this 3 dB down point to 28 Hz by means of an accessory electronic equalizer available from Electro-Voice plus the port cover supplied with the Sentry III. The port cover is attached to the bottom of the cabinet with four No. 10 — 1/4" long phillips head wood screws. These screws may be used to attach the port cover to the lower section of the speaker system's port using the predrilled pilot holes.

The electronic equalizer provides a *modest* amount of low frequency boost (maximum, 6 dB at 28 Hz) without any radical change in harmonic distortion. The equalized configuration exhibits a small loss in maximum acoustic power output below 100 Hz. This loss is 1 dB at 80 Hz and 3 dB at 50 Hz. Keep in mind that this loss does not affect frequency response which remains the same as the standard Sentry III with a one-half octave linear extension of bass response.

CROSSOVER NETWORK

The integral crossover network is a 12 dB/octave (18 dB on midrange) two section type, crossovers occurring at 600 Hz and 3,500 Hz. The network includes provision for bi-amping (covered in the next section) and rolling off high frequency response (above 1,000 Hz).

The control to accomplish high-frequency rolloff is a

screwdriver-adjustable, four position switch located behind the grille cloth next to the tweeter. The grille cloth assembly is held on with Velcro strips so that removal and replacement is accomplished without tools and with little effort. The maximum clockwise position, No. 1, is the flat position while positions 2, 3, and 4 cause progressively greater rolloff as shown in Figure 1. *This high frequency rolloff might be desired to account for different environments and listening tastes.*

BI-AMPING

Bi-amping of the high-frequency assembly (tweeter and midrange) and low-frequency assembly is possible. This can be accomplished in two ways:

1. Two amplifiers utilizing Sentry III's crossover.

Remove the buss wires between the input connectors on the crossover network and connect a separate power amplifier to the low-frequency section and to the high-frequency section. With this method, the passive internal crossover still functions (18 dB/octave at 600 Hz midrange, 12 dB/octave woofer) precluding the need of an external crossover.

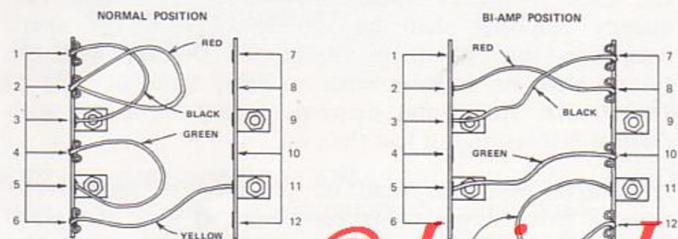


FIGURE 6 - Wiring Change for Bi-Amping

2. Two amplifiers and external crossover.

Remove the buss wires between the input connectors on the crossover network and remove the entire crossover assembly by removing the sixteen No. 10 - 1½" long phillips head wood screws. On the backs of the input connectors you will find two terminal strips. There are four jumper wires on these terminal strips whose position is changed in order to disable the 600 Hz crossover. (Figure 6 indicates the wiring change.) The black wire is removed from terminal 1 and pushed on to terminal 7. The red wire is moved from terminal 2 to terminal 8. The green wire is moved from terminal 4 to terminal 10, and the yellow wire is moved from terminal 6 to terminal 12. The internal 600 Hz crossover will be bypassed if the preceding instructions were followed.

Using a standard electronic crossover network, it will not be possible to duplicate the complex phase adjustment accomplished in the supplied crossover network. Consequently, the Sentry III bi-amped with electronic crossover network will likely sound "different" from a standard system due in part to a change in frequency response about the crossover point. The degree of change will be affected by the electronic nature of the crossover network and how it is used with the system.

Assuming that bi-amping with an electronic crossover is still desirable, a crossover point of 600 Hz is suggested

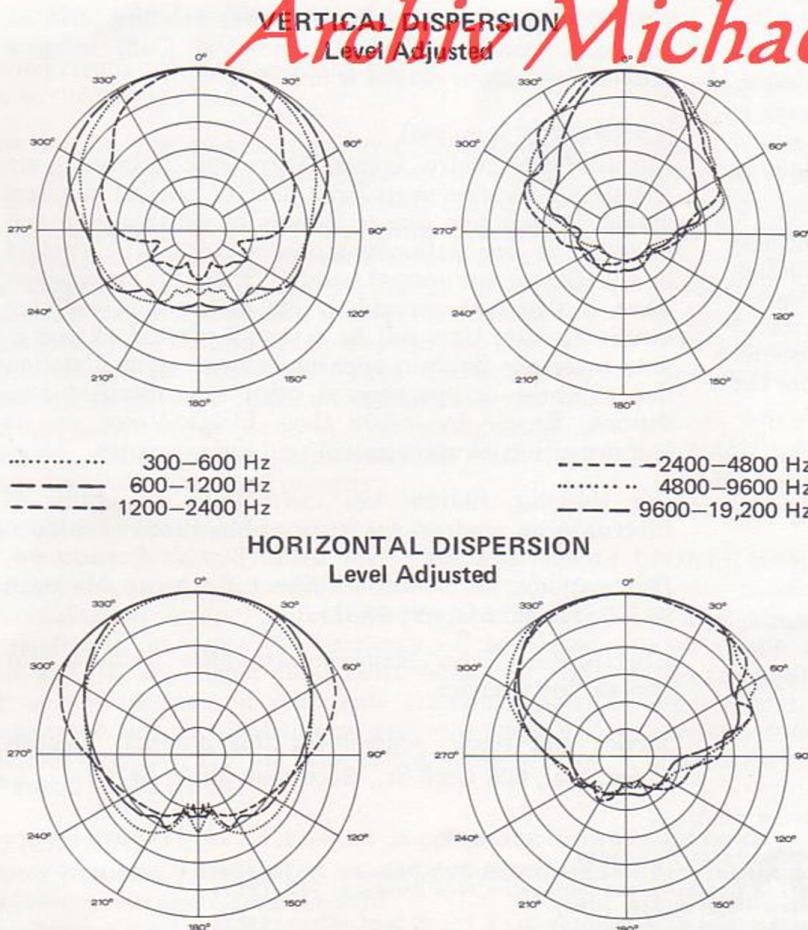


FIGURE 7 - Frequency Dispersion

(lack of symmetry caused by tweeter not being along cabinet axis)
(5 dB PER DIVISION)

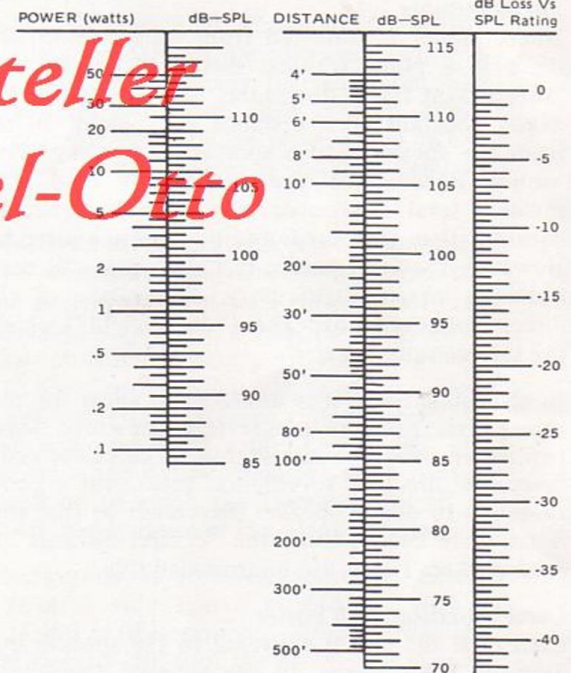


FIGURE 8 - Nomographs

WHEN TWO SIGNALS DIFFER BY:	ADD TO THE LARGER READING
0 dB	3.00 dB
1	2.50
2	2.10
3	1.70
4	1.40
5	1.10
6	.97
7	.79
8	.63
9	.51
10	.43
11	.35
12	.26

FIGURE 9 - Sound Pressure Level Chart

with slopes of 18 dB/octave. Electrical phasing at the power amplifiers can be accomplished by comparing the system components electrically in-phase and out-of-phase and determining a preference through listening tests. Take care that all Sentry III's in use are identically phased.

A Word of Caution! Be certain not to apply full range program material to the high frequency assembly. Over-excursion of the diaphragm of the midrange driver is certain to occur if much energy under 400 Hz is applied to it. Consequently, consider 400 Hz to be the lowest crossover point and use an 18 dB/octave roll-off.

SYSTEM LAYOUT

Accurate system layout with the Sentry III may be made by referring to the axial frequency response of the system (Figure 1) as well as the octave band random noise polar response (Figure 7). From these figures, the sound pressure level available at a distance of 4' with full power in (50 watts) may be determined for any octave band at any angle.

Level Variations with Distance: Nonreverberant Environments

In a non-reverberant environment (such as out-of-doors), sound pressure level will drop 6 dB every time the distance from the speaker is doubled (inverse square law). The nomograph of Figure 8 shows the sound pressure decrease to be expected as distance from the Sentry III is changed.

Level Variations with Distance: Reverberant Environments Indoors

Where sound is reflected from walls and other surfaces there is a point (critical distance) beyond which the "reverberant field" dominates, and total sound pressure is nearly constant. This distance is typically 10 to 15 feet from the speaker and is shortest in the most reverberant rooms. Because of the reverberant field, the sound pressure level obtainable in a room is higher and more constant than that predicted by inverse square law alone. However, the information in Figure 6 is still necessary in order to obtain satisfactory distribution of the sound direct from the loudspeaker ("direct field") which follows the inverse square law.

In all installations, it is desirable to allow for the highest possible ratio of direct to reverberant sound. Many design parameters must be considered to calculate and insure a favorable direct to reverberant ratio, but a good rule of thumb is to design speaker placement so that the listener is no more than 4 times the "critical distance" from the loudspeaker. This is not an iron clad rule.

Level Variation with Power

Each time the power delivered to the speaker is halved, a drop of 3 dB occurs, in any type of environment. The nomograph of Figure 8 shows this effect.

Level Variations Due to Multiple Speakers

Figure 9 indicates the total sound pressure level resulting from two loudspeakers aimed at the same points. This chart greatly facilitates layout of systems employing multiple speakers.

Environments

The Sentry III professional system was designed for ¼ to ½ space use. (System coupled to — in near proximity to — floor or wall or both.) The unit should be as close to reflecting planes (floor and wall) as possible so that out-of-phase low frequency irregularities from near reflecting surfaces may be reduced. Cavities around the device are undesirable as resonances may be excited, causing degradation of the system frequency response.

PEDESTAL BASE

The Sentry III is shipped with a 1½" high, black pedestal base. If the base is not required, as may be the case in wall mounting, it may be removed by unscrewing the eight No. 10 — 1½" long phillips head wood screws.

ARCHITECTS' AND ENGINEERS' SPECIFICATIONS

Speaker shall be a 3-way, wide-range system. High frequency and midrange drivers shall be horn-loaded. Low frequency assembly shall consist of a 15-inch woofer and a vented enclosure. The midrange shall consist of a 120° sectoral horn and driver, and the high frequency unit shall consist of a 120° sectoral tweeter with integral driver. Electrical crossover frequencies shall be 600 and 3,500 Hz. Low frequency cutoff shall occur at 40 Hz. Frequency response shall be smooth (in ¼ to ½ space coupling) from 40 Hz to 18,000 Hz. Dispersion of the system shall be uniform with no lobes from 600 Hz to 18,000 Hz. Horizontal dispersion shall be 120°, with vertical dispersion not less than 60°.

A tweeter protector shall be provided to protect the tweeter from surges of excess power. It shall automatically disconnect the tweeter as power exceeds the tweeter's power handling capacity (see Figure 1) and reconnect the tweeter when power levels are safe.

With no high-frequency rolloff, power handling shall be 50 watts continuous (8 ohm nominal load) using a suitable noise input shaped as in Figure 4.

WARRANTY (Limited)

Electro-Voice Sentry Loudspeakers and accessories are guaranteed for five years from date of original purchase against malfunction due to defects in workmanship and materials. If such malfunction occurs, unit will be repaired or replaced (at our option) without charge for materials or labor if delivered prepaid to the proper Electro-Voice service facility. Unit will be returned prepaid. Warranty does not cover finish or appearance items or malfunction due to abuse or operation at other than specified conditions. Repair by other than Electro-Voice or its authorized service agencies will void this guarantee.

For shipping address and instructions on return of Electro-Voice products for repair and locations of authorized service agencies, please write: Service Department, Electro-Voice, Inc., 600 Cecil Street, Buchanan, Michigan 49107 (Phone: 616/695-6831).

Electro-Voice also maintains complete facilities for non-warranty service.

Service and repair address for this product: Electro-Voice, Inc., 600 Cecil St., Buchanan, Mich. 49107.

1. A.N. Thiele, "Loudspeakers in Vented Boxes: Part 1," J. AUDIO ENGINEERING SOCIETY, Vol. 19, No. 5, pp. 386-387 (1971)
2. F. Messa, ACOUSTIC DESIGN CHART (Blakiston Co, Philadelphia, Pa., 1942)
3. A.N. Thiele, "Loudspeakers in Vented Boxes: Part 11," J. AUDIO ENGINEERING SOCIETY, Vol. 19, No. 6, p. 472 (1971)
4. H.F. Olson, Ph.D., "Acoustical Engineering" (D. Van Nostrand Company, Inc., Princeton, New Jersey, p. 588, 1957)
5. L. Beranek, "Acoustics" (McGraw-Hill Book Company, New York, p. 338, 1954)
6. John P. Overley, "Energy Distribution in Music," IRE Transactions on Audio, Vol. AU-4, No. 5, Sept.—Oct., (1956)
7. Ibid. Pg. 121
8. Ibid. Pg. 121