

S-60A Two-Way Speaker System

- Two-way compact system
- Constant-directivity system for uniform coverage
- 6.5-inch woofer
- One-inch tweeter with dispersion-controlling Direktor™
- Automatically resetting tweeter-protection circuit

SPECIFICATIONS

Frequency Response, 1 Watt/ 1 Meter on Axis, Swept Sine Wave Input, Half-Space Anechoic Environment, ± 3 dB (see Figure 1):

70-18,000 Hz

Low-Frequency 3-dB-Down Point:
70 Hz

Usable Low-Frequency Limit (10-dB-down point):

52 Hz

Half-Space Reference Efficiency:
0.6%

Long-Term Average Power-Handling Capacity per EIA Standard RS-426A (see Power-Handling Capacity section):

100 watts

Maximum Woofer Acoustic Output:
0.6 watts

Sensitivity (SPL at 1 meter, 1 watt input, anechoic environment, band-limited pink-noise signal, 300-2,000 Hz):
88 dB

Dispersion Angle Included by 6-dB-Down Points on Polar Responses, Horizontal and Vertical Planes, Indicated One-Third-Octave Bands of Pink Noise (see Figure 2):

500-1,000 Hz:

170° $\pm 30^\circ$

1,000-10,000 Hz:

120° $\pm 20^\circ$

10,000-20,000 Hz:

70° $\pm 30^\circ$

Directivity Factor R_s (Q), 800-16,000 Hz Median (see Figure 4):

7.3 (+14.9, -4.5)

Directivity Index D_s , 800-16,000 Hz Median (see Figure 4):

8.6 dB +4.8/-4.1 dB

Distortion, 0.1 Full Power Input (see Figure 5),

Second Harmonic,

100 Hz:

8%

1,000 Hz:

<1%

10,000 Hz:

<1%

Third Harmonic,

100 Hz:

1.4%

1,000 Hz:

<1%

10,000 Hz:

<1%

Distortion, 0.01 Full Power Input (see Figure 6),

Second Harmonic,

100 Hz:

7%

1,000 Hz:

<1%

10,000 Hz:

<1%

Third Harmonic,

100 Hz:

<1%

1,000 Hz:

<1%

10,000 Hz:

<1%

Transducer Complement, High Frequency:

2.5-cm (1-in.) tweeter with 12.5-cm (5-in.) Direktor™

Low Frequency:

16.5-cm (6.5-in.) woofer

Box Tuning Frequency:

60 Hz

Crossover Frequency:

2,500 Hz

Crossover Slope:

12 dB per octave

Impedance,

Nominal:

8 ohms

Minimum:

5 ohms

Input Connections:

1/4-inch phone jack with parallel 5-way binding post

Materials,

Enclosure:

Black, vinyl-covered particle board

Baffle Board:

Injection-molded plastic

Grille:

Punched metal

Mounting:

EV S-60MB mounting bracket or OmniMount® Series 75 mounting hardware¹

Dimensions,

Height:

35.0 cm (13.8 in.)

Width:

22.0 cm (8.7 in.)

Depth:

21.1 cm (8.4 in.)

Net Weight:

7.0 kg (15.4 lb)

Shipping Weight:

9.5 kg (20.9 lb)

DESCRIPTION

The Electro-Voice S-60A is a compact, two-way, constant-directivity speaker system for sound reinforcement and monitoring. Its small

1. OmniMount® is a registered trademark of OmniMount® Systems, Inc.

S-60A SPECIFICATIONS GRAPHICS

FIGURE 1 — Axial Frequency Response

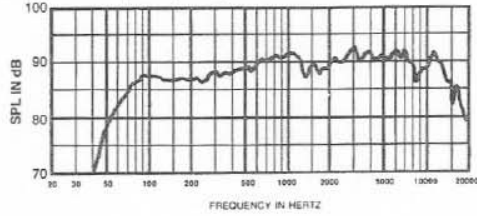


FIGURE 4 — Directivity vs. Frequency (whole space anechoic environment)

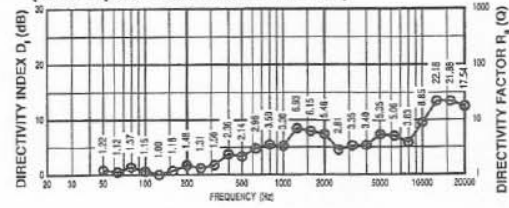


FIGURE 2 — Polar Response

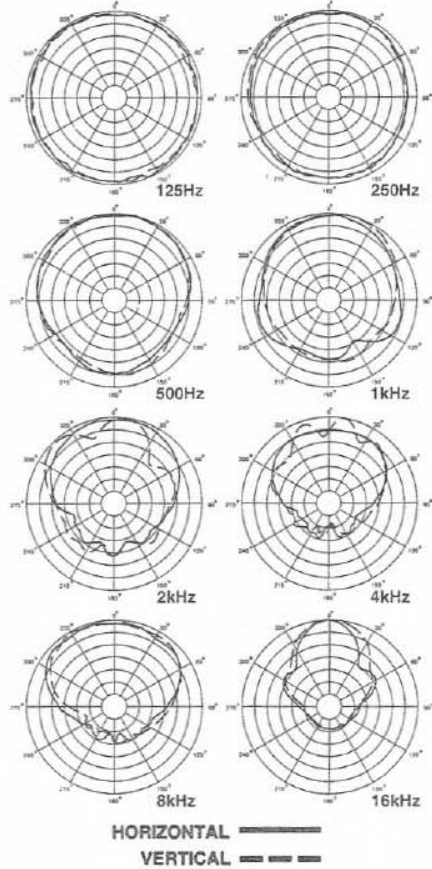


FIGURE 5 — Harmonic Distortion, 0.01 Rated Power Input put (1 watt)

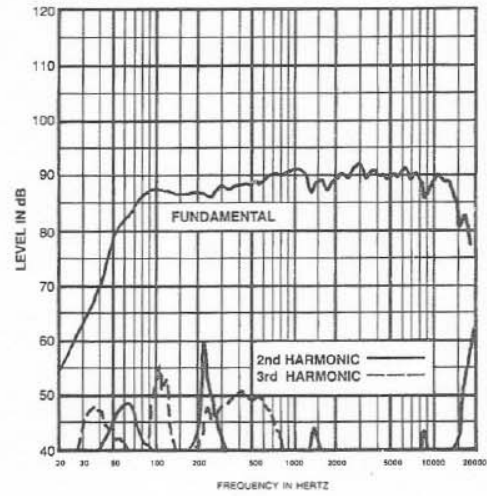


FIGURE 3 — Beamwidth vs. Frequency (whole space anechoic environment)

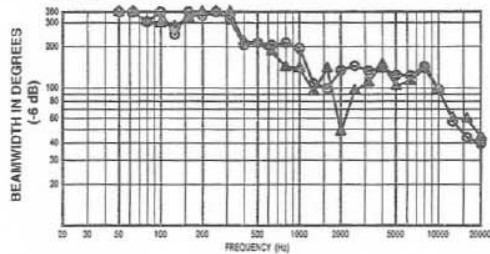


FIGURE 6 — Harmonic Distortion, 0.1 Rated Power Input put (10 watts)

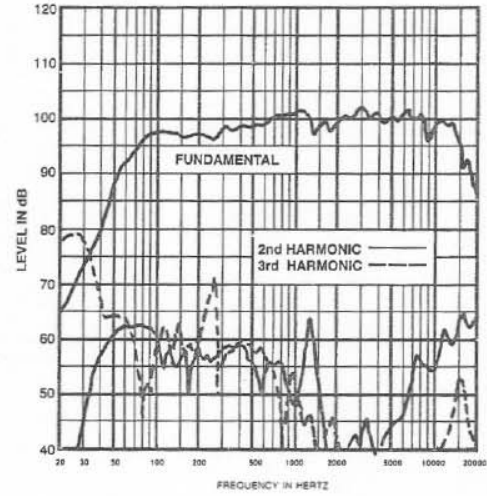


FIGURE 7 — Two Examples of S-60A Mounting Using the OmniMount® Series 75 Support System¹

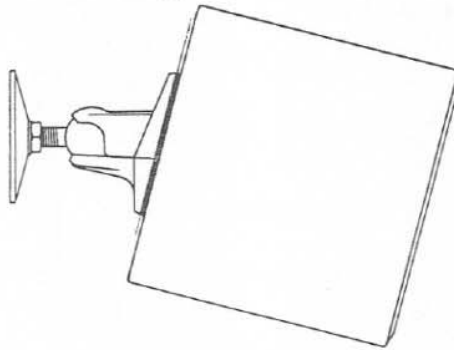


FIGURE 8 — Dimensions

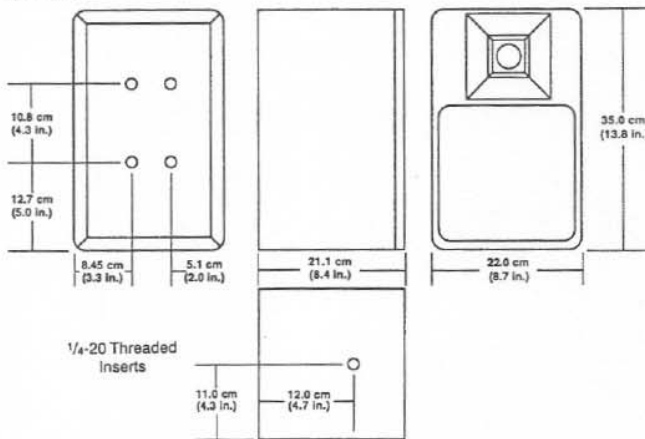
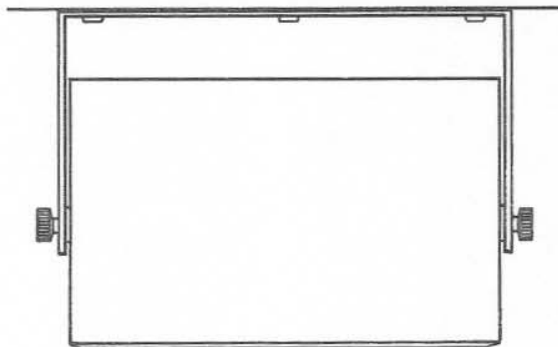


FIGURE 9 — Using the S-60MB with the S-60A



size, high sensitivity and high power-handling capacity make it an excellent choice for use in studios, clubs, bars, theaters or other applications. The combination of optimal crossover frequency and high-frequency, dispersion-controlling Direktor™ ensures uniform audience coverage throughout, eliminating the problems of "hot spots" and "dead zones" that might occur at certain frequencies with other two-way speaker systems.

The low-frequency section is a 16.5-cm (6.5-in.) direct-radiating woofer installed in an optimally vented enclosure. This results in exceptionally extended bass response and high efficiency in a very small cabinet.

Both drivers feature low-leakage magnet designs, and the woofer is also screened to permit use close to video monitors. For very critical video-monitoring applications, a minimum distance of approximately 10 cm (4 in.) is recommended between the edge of the loudspeaker and the edge of the CRT.

The front section of the enclosure is constructed from high-impact ABS plastic, and the rear section is constructed from vinyl-covered particle board. Both sections have been specially treated to allow the enclosure to be painted using commonly available finishes. The system can be mounted using OmniMount® Series 75 mounting hardware or the EV S-60MBA mounting bracket.

CONSTANT-DIRECTIVITY SPEAKER SYSTEM

The crossover frequency and speaker-component geometries have been carefully selected so that the directional characteristics of the woofer and Direktor™ match at the crossover frequency (approximately 120 degrees circular coverage patterns for each) to create a special system type—the constant-directivity system. At higher frequencies, the horizontal and vertical coverage pattern remains essentially constant. Response within the 120° x 120° rated coverage angle is uniform, which means dependable audience coverage without "hot spots" or "dead zones" at certain frequencies. The 120° x 120° dispersion characteristic permits this small system to be used either horizontally or vertically, allowing greater flexibility in setup or installation. The controlled directivity of the high- and low-frequency transducers also eliminates response irregularities caused by diffraction off enclosure edges. This, combined with an essentially flat on-axis response, produces a total acoustic power output that is uniform with frequency.

FREQUENCY RESPONSE

The S-60A's axial frequency response was measured in Electro-Voice's large anechoic chamber at a distance of 10 feet with a swept sine-wave input of four volts. No additional equalization was used. Figure 1 has been averaged and corrected for 1 watt at 1 meter.

DIRECTIVITY

The directional characteristics of the S-60A were measured in Electro-Voice's large anechoic chamber. The test signal was one-third-octave filtered pink noise at the frequencies indicated. A full spherical measurement system was used, which is compatible with the AcoustACADD™ computer-aided design program. All directional information was measured at 20 feet.

Figure 2 illustrates the horizontal and vertical polar responses.

Figure 3 shows the horizontal and vertical beamwidths. Beamwidth is the angle at which the horizontal and vertical polar responses have decreased in level by 6 dB when compared to the axial frequency response.

Figure 4 illustrates the total directivity of the S-60A. The directivity index, D_i , is calculated using the formula $D_i = 10 \log R_p$.

POWER-HANDLING CAPACITY

To our knowledge, Electro-Voice was the first U.S. manufacturer to develop and publish a power test closely related to real-life conditions. First, we use a random-noise input signal because it contains many frequencies simultaneously, just like real voice or instrument programs. Second, our signal contains more energy at extremely high and low frequencies than typical actual program, adding an extra measure of reliability. Third, the test signal includes not only the overall "long-term average" or "continuous" level—which our ears interpret as loudness—but also short-duration peaks which are many times higher than the average, just like actual program. The long-term average level stresses the speaker ther-

mally (heat). The instantaneous peaks test mechanical reliability (cone and diaphragm excursion). Note that the sine-wave test signals sometimes used have a much less demanding peak value relative to their average level. In actual use, long-term average levels exist from several seconds on up, but we apply the long-term average for several hours, adding another extra measure of reliability.

Specifically, the S-60A is designed to withstand the power test described in EIA Standard RS-426A. The EIA test spectrum is applied for eight hours. To obtain the spectrum, the output of a white-noise generator (white noise is a particular type of random noise with equal energy per bandwidth in Hz) is fed to a shaping filter with 6-dB-per-octave slopes below 40 Hz and above 318 Hz. When measured with an analyzer having the usual constant-percentage bandwidth (one-third octave), this shaping filter produces a spectrum whose 3-dB-down points are at 100 Hz and 1,200 Hz with a 3-dB-per-octave slope above 1,200 Hz. This shaped signal is sent to the power amplifier with the continuous power set at 100 watts into the 4.7-ohm EIA equivalent impedance (21.7 volts true rms). Amplifier clipping sets instantaneous peaks at 6 dB above the continuous power, or 400 watts peak (43.4 volts peak). This procedure provides a rigorous test of both thermal and mechanical failure modes.

SUSPENDING THE S-60A

The S-60A is fitted with six 1/4-20 threaded inserts and can be suspended as follows:

1. S-60MB is a universal U-bracket designed to allow the suspension of the S-60A at any angle and orientation from the wall or ceiling (see Figure 9). Full instructions are included with the S-60MB.
2. OmniMount® Series 75 support system. Four 1/4-20 threaded inserts are located in the rear panel to allow use of the OmniMount® Series 75 support system. A safety chain should be used to ensure safe operation. Full instructions can be obtained from:

OmniMount® Systems, Inc.
1501 W. 17th St.
Tempe, AZ 85281
Tel: 602/829-8000
Fax: 602/756-9000

WARNING: IT IS THE RESPONSIBILITY OF THE INSTALLER TO ENSURE THAT THE MOUNTING SURFACE HAS SUFFICIENT RIGIDITY TO SUPPORT THE S-60A AND THAT THE MOUNTING BRACKET IS CORRECTLY FITTED TO THE SURFACE AND TO THE S-60A.

CONSTRUCTION

The baffle board is constructed from molded plastic, and the enclosure from particle board covered with vinyl. The S-60A is supplied in an all-black finish and can be painted if required.

Both the baffle board and the enclosure have been specially treated to enhance the adhesion of paints. The S-60A has been tested with several commercially available paints with success. Electro-Voice cannot, however, guarantee that all commercially available paints will be satisfactory. It is, therefore, recommended that a small area should be tested with the paint in order to ensure that there are no adverse effects and that the paint has sufficient adhesion.

Care should be taken not to get paint onto the woofer cone or the tweeter screen.

TWEETER-PROTECTION CIRCUIT

The S-60A crossover is fitted with an automatically resetting tweeter-protection device. This new design permits short-term transients to pass, but protects the tweeter from long-term power extremes that would normally destroy the tweeter.

ARCHITECTS' AND ENGINEERS' SPECIFICATIONS

The loudspeaker system shall be a constant-directivity, two-way system. The speaker system shall contain a 16.5-cm (6.5-in.) low-frequency loudspeaker and a 2.5-cm (1-in.) high-frequency tweeter with dispersion-controlling Direktor™. The dividing network crossover frequency shall be 2,500 Hz. The loudspeaker system shall meet the following performance criteria: power handling, 100 watts per EIA RS-426A; frequency response, ±3 dB from 70 to 18,000 Hz; pressure sensitivity, 88 dB SPL at 1 watt/1 meter band-limited pink noise in an anechoic chamber; impedance, 8 ohms nominal, 5 ohms minimum. The enclosure shall be two-piece construction with a particle-board cabinet and a molded plastic baffle. The unit shall be 35.0 cm (13.8 in.) high, 22.0 cm (8.7 in.) wide and 21.1 cm (8.4 in.) deep. The loudspeaker system shall be the Electro-Voice model S-60A.

UNIFORM LIMITED WARRANTY

Electro-Voice products are guaranteed against malfunction due to defects in materials or workmanship for a specified period, as noted in the individual product-line statement(s) below, or in the individual product data sheet or owner's manual, beginning with the date of original purchase. If such malfunction occurs during the specified period, the product will be repaired or replaced (at our option) without charge. The

product will be returned to the customer prepaid. **Exclusions and Limitations:** The Limited Warranty does not apply to: (a) exterior finish or appearance; (b) certain specific items described in the individual product-line statement(s) below, or in the individual product data sheet or owner's manual; (c) malfunction resulting from use or operation of the product other than as specified in the product data sheet or owner's manual; (d) malfunction resulting from misuse or abuse of the product; or (e) malfunction occurring at any time after repairs have been made to the product by anyone other than Electro-Voice or any of its authorized service representatives. **Obtaining Warranty Service:** To obtain warranty service, a customer must deliver the product, prepaid, to Electro-Voice or any of its authorized service representatives together with proof of purchase of the product in the form of a bill of sale or receipted invoice. A list of authorized service representatives is available from Electro-Voice at 600 Cecil Street, Buchanan, MI 49107 (616/695-6831 or 800/234-6831). **Incidental and Consequential Damages Excluded:** Product repair or replacement and return to the customer are the only remedies provided to the customer. Electro-Voice shall not be liable for any incidental or consequential damages including, without limitation, injury to persons or property or loss of use. Some states do not allow the exclusion or limitation of incidental or consequential damages so the above limitation or exclusion may not apply to you. **Other Rights:** This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Electro-Voice Speakers and Speaker Systems are guaranteed against malfunction due to defects in materials or workmanship for a period of five (5) years from the date of original purchase. The Limited Warranty does not apply to burned voice coils or malfunctions such as cone and/or coil damage resulting from improperly designed enclosures. Electro-Voice active electronics associated with the speaker systems are guaranteed for three (3) years from the date of original purchase. Additional details are included in the Uniform Limited Warranty statement.

Service and repair address for this product: Electro-Voice, Inc., 600 Cecil Street, Buchanan, Michigan 49107 (616/695-6831 or 800/234-6831).

Specifications subject to change without notice.



ELECTRO-VOICE a MARK IV company **600 Cecil Street, Buchanan, Michigan 49107**

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