Electro-Voice®
a gulton company

Model EVM-10M™ Series II 10-Inch Musical Instrument Loudspeaker

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SPECIFICATIONS

Usable Frequency Response in Vented .33 cu ft Enclosure (see Frequency Response section):
120-6,500 Hz

Sound Pressure Level, Indicated Watts into Nominal Impedance (using spectrum specified in EIA Standard SE-103 Section SE3),
- **30 ft at .001 watt input:** 49.5 dB
- **10 ft at 1 watt input:** 89 dB
- **4 ft at 200 watts input:** 120 dB

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

Impedance, (see Figure 8)
- **Nominal:** 8 ohms
- **Minimum:** 7.4 ohms

Voice Coil Diameter:
6.35 cm (2.50 in.)

Magnet Weight:
2.2 kg (4.9 lbs)

Dimensions,
- **Overall Diameter:** 25.9 cm (10.20 in.)
- **Overall Depth:** 12.2 cm (4.81 in.)
- **Mounting Bolt Circle:** 24.4 cm (9.62 in.)

Mounting Hole Diameter, Eight Evenly Spaced Holes:
.71 cm (.281 in.) — Letter L Drill

Baffle Opening Diameter, Front or Rear Mounting:
22.9 cm (9.00 in.)

Optional Mounting Accessory:
SMH-1 (see Installation section)

Net Weight:
8.2 kg (18 lbs)

DESCRIPTION

The EVM-10M, Series II is a 10-inch speaker designed for professional high-level, high-quality musical instrument and sound reinforcement systems. The EVM-10M's frequency response is specially tailored for mid-bass performance. The EVM-10M, Series II incorporates voice coil refinements, including beryllium copper flatwire leads, that have improved performance. Power capacity is 200 watts per the revised EIA Standard RS-426A. The Power Handling Test section describes these ratings in detail.

The construction of the EVM-10M features a low mass edgewound voice coil on a rugged laminated polyimide coil form, driven by our largest 16-lb magnetic structure. Also featured are a heavy-duty curvilinear cone and a fatigue-resistant cone suspension. Both the coil and magnetic structure are vented. All of this is packaged in a husky eight-spoke diecast aluminum frame.

The EVM-10M may be front or rear mounted without an adaptor. The optional SMH-1 speaker mounting kit facilitates front mounting (see Installation section).

FREQUENCY RESPONSE

Frequency response was measured with the EVM-10M in a .33 cubic foot vented enclosure placed in a half-space anechoic (echoless) environment at 10 feet on axis with 4 volts of swept 1/3-octave random noise. The frequency response curve is shown in Figure 2.

DIRECTIONAL PERFORMANCE

The directional characteristics of the EVM-10M in a .33 cubic foot vented enclosure, were measured by running a set of polar responses, in EV's large anechoic chamber, at selected octave band center frequencies. The test signal was octave bandwidth-limited pseudo-random pink noise centered at the frequencies indicated in Figure 3. The curves show horizontal (side-to-side) dispersion when the enclosure's long axis is vertical. The vertical (up-and-down) polar responses deviate only slightly from the horizontal responses.

Additional typical data is provided in Figures 4 and 5 which indicate 6-dB-down beamwidth versus frequency and directivity factor, respectively, for an EVM-10M in a .33 cubic foot vented enclosure.

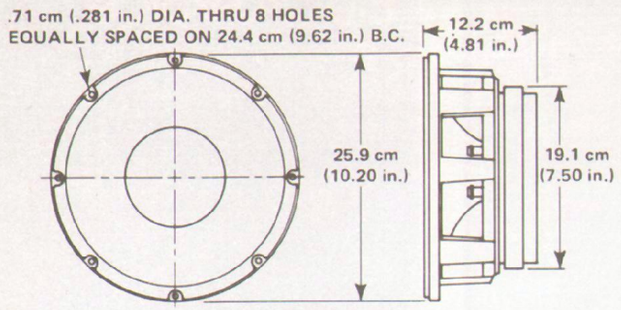

FIGURE 1 – Dimensions

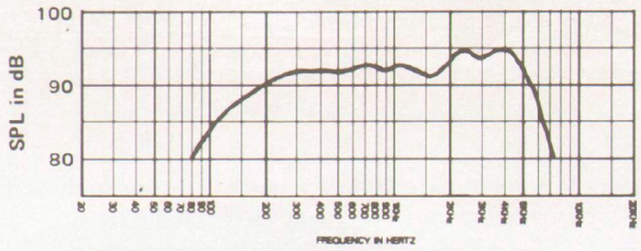

FIGURE 2 – *EVM-10M Frequency Response
(Swept 1/3-Octave Band Pink Noise, 4 V at 10 ft.
on Axis, Half-Space Environment)

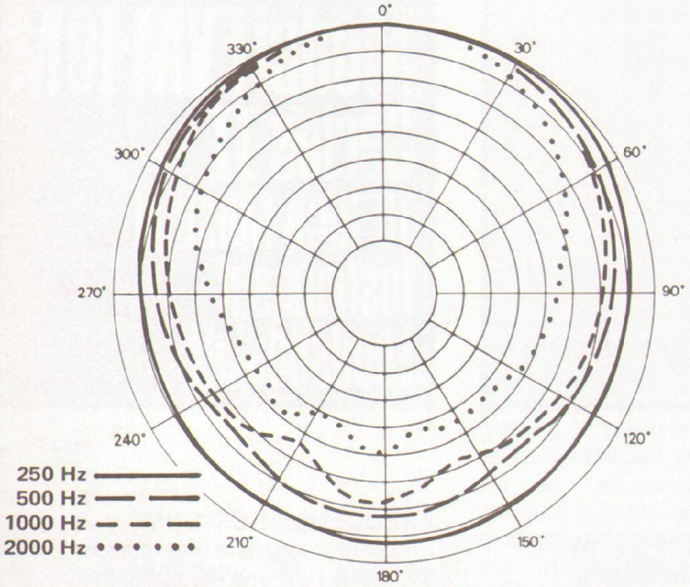

FIGURE 3 – *EVM-10M Polar Response
4 V RMS of Octave Band Limited Pink Noise in
Anechoic Environment, 10 ft on axis in Horizontal
Plane (5 dB per Division, Scales not normalized)

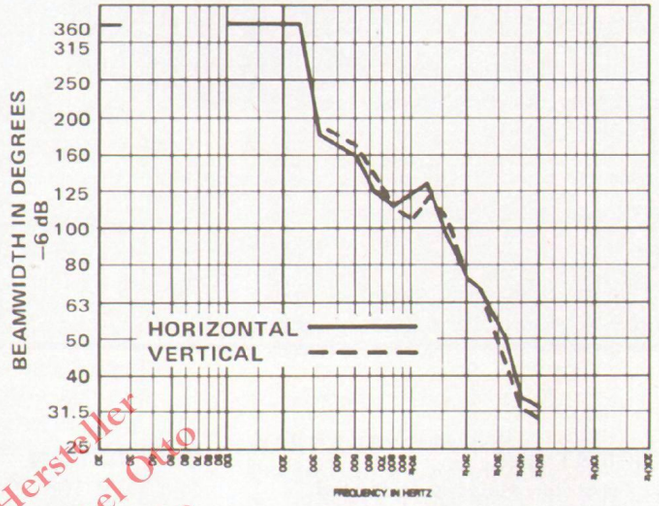

FIGURE 4
***EVM-10M Beamwidth vs. Frequency**

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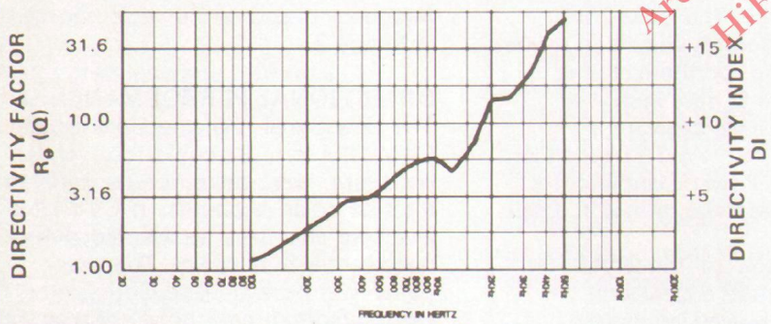


FIGURE 5
***EVM-10M Directivity Factor and Directivity
Index vs. Frequency**

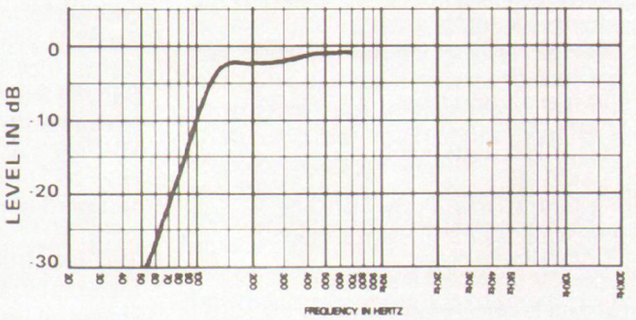
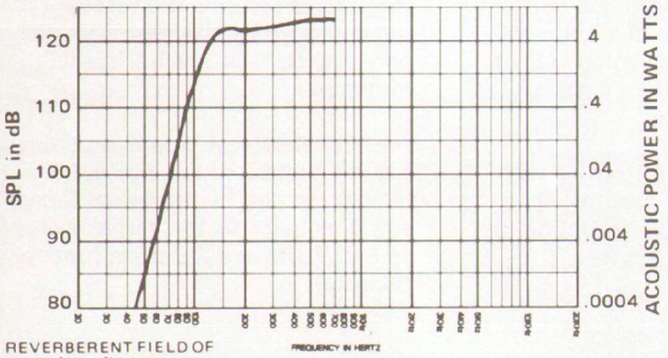


FIGURE 6
***EVM-10M Low Frequency Response**



REVERBERENT FIELD OF
3000 ft³ (85m³) ROOM WITH
200 SABINS ABSORPTION
(ROOM CONSTANT = 200)

FIGURE 7
***EVM-10M Theoretical Low Frequency
Maximum Acoustic Output vs. Frequency**

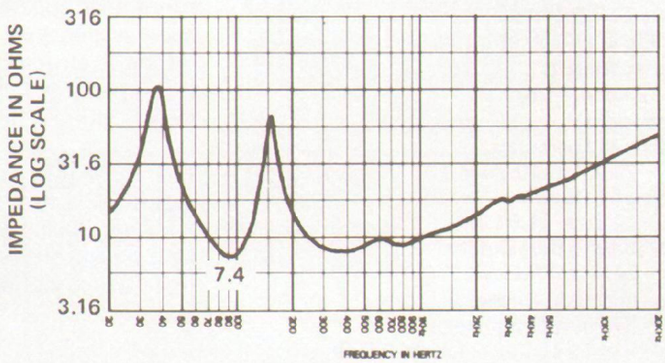


FIGURE 8
***EVM-10M Input Impedance vs. Frequency**

*This data obtained using .33 ft³ enclousre with box tuning at 120 Hz.

POWER HANDLING TEST

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 program. 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 thermally (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.

Specificially, the EVM-10M is designed to withstand the power test described in the revised 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 the usual constant-percentage bandwidth analyzer (one-third octave), this shaping filter produces a spectrum whose 3-dB-down points are at 100 Hz and 1200 Hz with a 3-dB-per octave slope above 1200 Hz. This shaped signal is sent to the power amplifier with the continuous power set at 200 watts into the 6 ohms EIA equivalent impedance, (34.7 volts true RMS). Amplifier clipping sets instantaneous peaks at 6 dB above the continuous power, or 800 watts peak (69.4 volts peak). This procedure provides a rigorous test of both thermal and mechanical failure modes.

RECOMMENDED ENCLOSURES

Replacement Use in Existing Enclosures

The EVM-10M will often be used to replace inferior speakers in existing enclosures. Mechanical and electrical characteristics are such that the superior efficiency, sound quality, and reliability of the EVM-10M will be realized in virtually any sealed, vented (bass reflex), horn, or open-backed enclosure designed for mid bass use.

Vented Enclosures

The most extended, lowest distortion, and best controlled bass performance is usually realized in properly designed vented enclosures. In such designs, the vent, or port, actually reproduces the lowest octave or so of bass response. The vent is driven to full acoustic output by a relatively small motion of the speaker cone itself, acting through the air contained within the enclosure. The excursion of the EVM-10M at these frequencies is much reduced compared to sealed or open-backed enclosures, directly reducing harmonic distortion and the possibility of speaker "bottoming."

Optimum performance for the EVM-10M is obtained in very small enclosures. The recommended enclosure volume is 1/3 cubic foot with a box tuning at 120 Hz. The 3 dB down point of 120 Hz is ideal for mid bass use.

Figure 6 shows small-signal total acoustic power output vs. frequency for the EVM-10M in a .33 cubic foot vented enclosure. In addition, Figure 7 shows the maximum acoustic power output versus frequency. The maximum output is limited by either (1) the thermal power handling capacity of the speaker, or (2) the speaker's maximum linear cone excursion capabilities, whichever occurs first.

SPECIAL NOTE ON LOW-FREQUENCY PERFORMANCE

The vented enclosure and associated performance specifications shown earlier were determined in accordance with the definitive analysis of A. N. Thiele, R. H. Small, and others (for example, see A. N. Thiele, "Loudspeakers in Vented Boxes," **J. Audio Eng. Soc.**, Part 1, Vol. 19, May 1971, pp. 382-391; Part 11, vol. 19, June 1971, pp. 471-483). Other vented box sizes and tunings are quite feasible and may give performance more suitable for a particular application.

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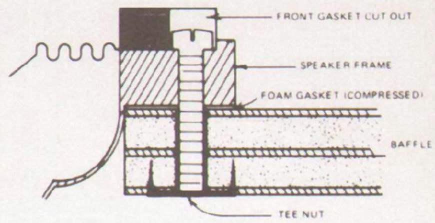

FIGURE 9
Front Mounting Detail
(Not to scale)

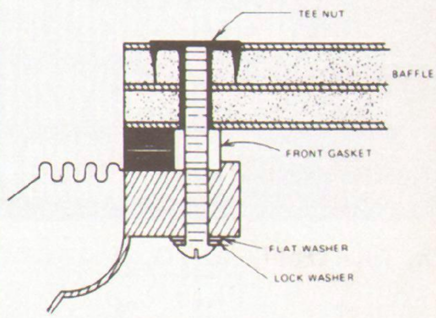

FIGURE 10
Rear Mounting Detail
(Not to scale)

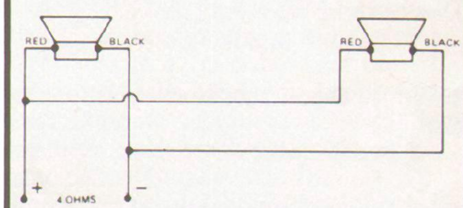

FIGURE 11
Connection of 2 EVM-10M Speakers in Parallel

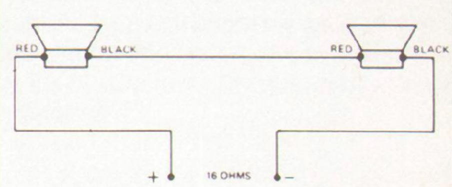

FIGURE 12
Connection of 2 EVM-10M Speakers in Series

By applying the work of Thiele and Small, Electro-Voice engineers developed a computer program which easily, quickly, and accurately predicts the performance of any speaker-box combination in the frequency range where the diaphragm is acting as a simple piston. The Thiele-Small Driver Parameters shown below include the speaker characteristics required by the computer program to develop the small and large signal performance of a given speaker and enclosure combination. Technically advanced users will find these parameters useful in the design of vented enclosures for the EVM-10M.

Thiele-Small Driver Parameters,

f_s
Free-Air Resonance Frequency
65 Hz

Q_{es} Electro-Magnetic Q at f_s
.175

Q_{ms} Mechanical Q at f_s
5.8

Q_{ts} Total Q at f_s $\frac{(Q_{es}\,Q_{ms})}{(Q_{es}+Q_{ms})}$
.17

V_{as}
Volume of Air Having Same Acoustic Compliance as Driver Suspension
.04 M^3 (1.4 ft^3)

η_o
Half-Space Reference Efficiency
5%

V_d
Peak Displacement Volume of Diaphragm ($=S_d \times X_{max}$)
103.6 cm^2 (6.3 $in.^2$)

Effective Diaphragm Area
S_d
314 cm^2 (49 $in.^2$)

Peak Linear Displacement of Diaphragm
X_{max}
2.8 mm (0.11 in.)

P_e (MAX)
Thermally Limited Maximum Input Power
200 watts EIA

DC Resistance of Voice Coil
R_e
5.2 ohms ± 10%

INSTALLATION

The EVM-10M may be front-or rear-mounted, although front mounting is preferred because of convenience. For simple front mounting, the convenient SMH-1 mounting accessory is recommended. Complete mounting instructions are included with the SMH-1. Instructions for standard front mounting are given below. It is important that recommended baffle openings and mounting hole locations be followed.

Front mounting requires a 9.00 inch diameter cutout and a 9.62 inch bolt circle. Mark baffle opening and screw locations on the blank panel first. Drill the screw holes before cutting the large baffle opening. If 1/4-20 screws are used, four screws are sufficient for secure mounting of the speaker. T-nuts are recommended for simple, secure mounting. If T-nuts are used, the holes should be .281 inch diameter (letter L drill). Apply glue to the flanges of 1/4-20 long shank T-nuts before driving into the rear of the holes.

Sealing of the front-mounted speaker is accomplished with the adhesive-backed foam gasket segments. Strip off protective paper and apply gasket to the rear mounting surface of the speaker rim, making certain that holes in the gasket line up with the mounting holes in the speaker frame.

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Length of the 1/4-20 screws should be 1/2 inch plus the panel thickness when using T-nuts. The screws must have fillister heads to seat down in the recess of the speaker frame. Screws should be tightened evenly and securely. Maximum torque possible with a proper size screwdriver should be sufficient.

IMPORTANT! When front mounting, the screw head must fit down into the front gasket cutout. See Figure 9.

Rear mounting requires the same diameter cutout and screw circle as front mounting. Other comments regarding the use of T-nuts apply to rear mounting as well.

Screw length should be 3/4 inch plus panel thickness if using T-nuts – longer for standard hex nuts. If hex nuts are used, a second nut should be tightened against the first nut to prevent loosening during operation. A lock washer and flat washer are recommended between the screw head and frame. See Figure 10.

Screws should be tightened evenly, but not excessively. Maximum torque possible with a proper size screwdriver should be sufficient. Do not use adhesive-back gasket segments for rear mounting.

If a cabinet is to be constructed from scratch, 3/4-inch solid and jointed or marine plywood is recommended. After construction, be certain interior is completely free of metal filings, wood chips, etc.

CONNECTIONS

Use No. 18 or larger stranded wire to connect the two terminals on the loudspeaker to the amplifier output. If a choice of amplifier output impedance is available (4, 8, 16 ohms), a single EVM-10M speaker should be connected to the 8-ohm tap. Two EVM-10M speakers may be connected in parallel as shown in Figure 11. Be sure to connect the red terminals together as shown in Figure 4. If series wiring is desired, wiring and polarity should follow Figure 12.

WARRANTY (Limited) –

Electro-Voice Loudspeakers 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, appearance items, burned coils, or other 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 repair information and service locations, please write: Service Dept., Electro-Voice, Inc., 600 Cecil Street, Buchanan, Michigan 49107 (Phone: 616/695-6831) or Electro-Voice West, 8234 Doe Ave., Visalia, California 93277 (Phone: 209/651-7777).

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

Specifications subject to change without notice.

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