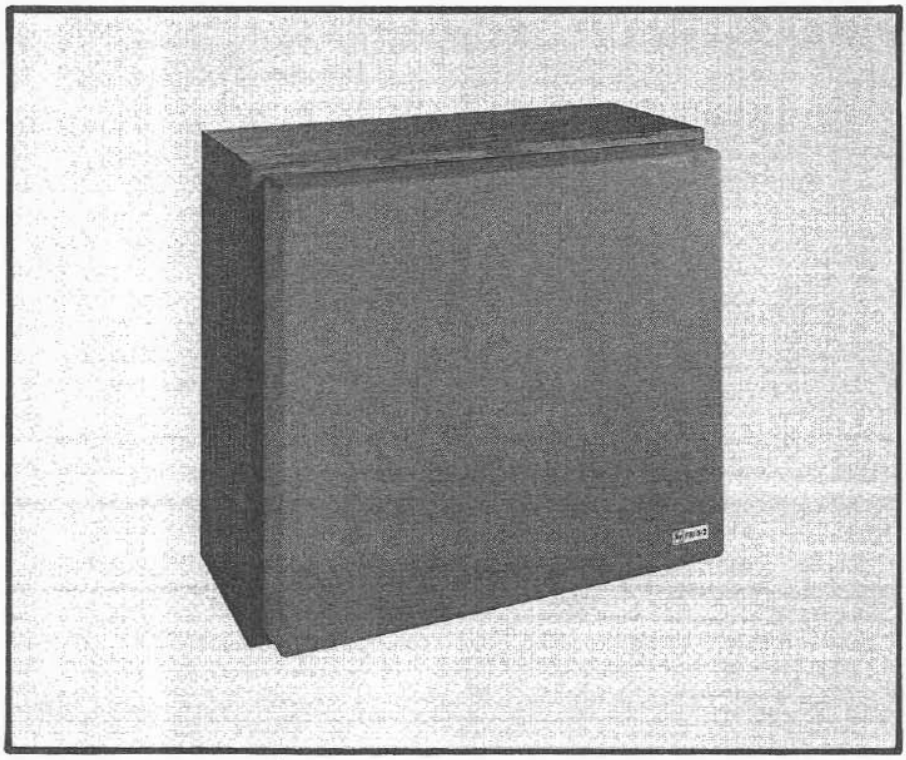

Electro-Voice®
a gulton company

FIGURE 1 – Axial Frequency Response 4 volts/10 feet

Model FR15-2
Speaker System

SPECIFICATIONS

Frequency Response, 10 Feet on Axis, Swept Sine Wave, Half-Space Anechoic Environment (see Figure 1):
50-15,000 Hz

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

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

Half-Space Reference Efficiency:
6.2%

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

Maximum Woofer Acoustic Output:
12 watts

Sound Pressure Level at 1 Meter, 1 Watt Input, Anechoic Environment, Band-Limited Pink Noise Signal, 300 to 2,000 Hz:
97 dB

Dispersion Angle Included by 6-dB-Down Points on Polar Responses, Indicated One-Third Octave Bands of Pink Noise,
250-20,000 Hz Horizontal (see Figure 3):
$100° \pm 25°$
5,000-20,000 Hz Vertical (see Figure 3):
$42° \pm 5°$

Directivity Factor R_θ (Q), 800-16,000 Hz Median (see Figure 4):
10 (+9, –4)

Directivity Index D_i, 800-16,000 Hz Median (see Figure 4):
10 dB (+3 dB, –2.5 dB)

Distortion, 0.1 Full Power Input (see Figure 5),
Second Harmonic,
100 Hz: 5%
1000 Hz: 1.5%
10,000 Hz: 6%
Third Harmonic,
100 Hz: 1.5%
1000 Hz: 1%
10,000 Hz: 1%

Distortion, 0.01 Full Power Input (see Figure 6),
Second Harmonic,
100 Hz: 2%
1000 Hz: <1%
10,000 Hz: 2.5%
Third Harmonic,
100 Hz: <1%
1000 Hz: 1%
10,000 Hz: 1%

Transducer Complement,
High-Frequency:
DH1202 compression driver on 90° x 40° constant-directivity horn
Low-Frequency:
EVM-15L Series II

Box Tuning Frequency:
53 Hz

Crossover Frequency:
1500 Hz

Crossover Slope:
12 dB per octave

Impedance,
Nominal:
8 ohms
Minimum:
7.2 ohms

Input Connections:
Screw terminals (#8-32) on barrier strip

Enclosure Materials and Colors:
Oak-grain vinyl on particle board with beige cloth grille

Mounting:
Hanging via four concealed 5/16-18 propeller nuts on each side

Dimensions:
72.1 cm (28.4 in.) high
80.0 cm (31.5 in.) wide
42.2 cm (16.6 in.) deep

Net Weight:
43.5 kg (96 lb)

Shipping Weight:
48 kg (106 lb)

DESCRIPTION

The Electro-Voice FR15-2 is a two-way, high-efficiency, constant-directivity speaker system designed for indoor sound reinforcement in commercial installations, such as churches, meeting halls, and small auditoriums. FR15-2 components — including a 90° x 40° constant-directivity high-frequency horn — are of a quality associated with those used in arrays of separate high- and low-frequency elements. However, the FR15-2's oak-grain vinyl enclosure with detachable beige grille avoids the "utility" appearance of separate components, with colors and styling that complement most interiors.

The high-frequency section of the FR15-2 utilizes a 90° x 40° constant-directivity horn molded from a high stiffness low weight structural material. The horn is driven by the DH1202 wide-bandwidth driver for the frequency range of 1500 Hz to 15,000 Hz. A unique combination of crossover and equalizer is used with the DH1202 to give flat response without the need for an external equalizer.

The bass section of the FR15-2 is designed using Thiele parameters for efficient low-frequency performance to a cutoff frequency of 50 Hz (3 dB down). The 15-inch woofer used in the system is an EVM-15L Series II that features beryllium copper lead wires connected to a low mass edgewound voice coil supported by a laminated polyimide coil form. The coil is driven by a massive (16 lb) magnetic structure.

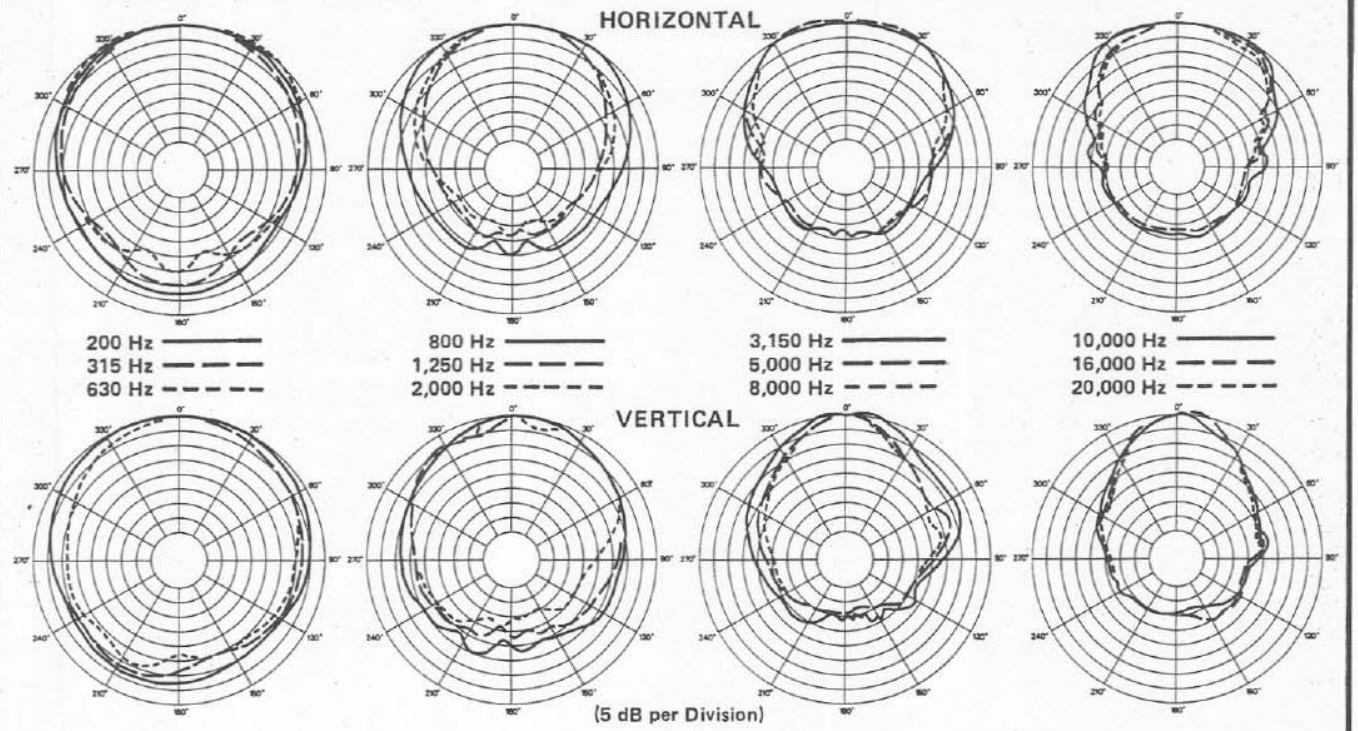

FIGURE 2 – Polar Response (1/3 octave pink noise 4 volts/10 feet)

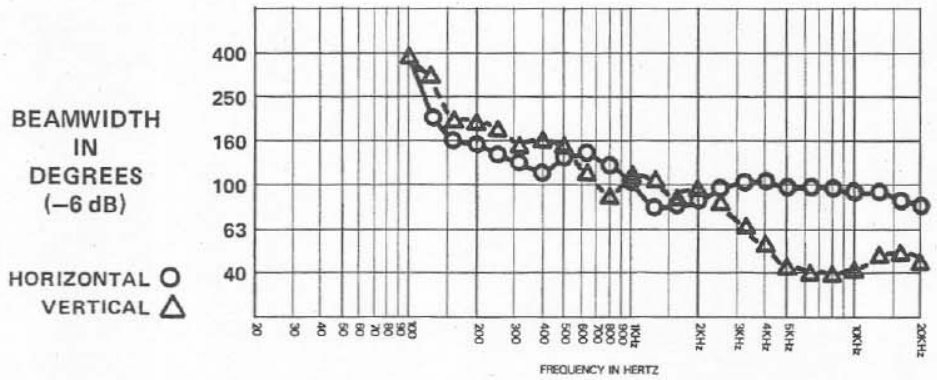

FIGURE 3 – Beamwidth vs Frequency Whole Space (anechoic)

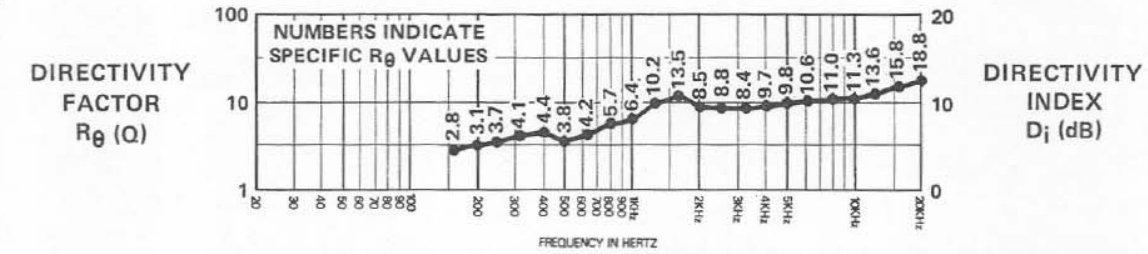

FIGURE 4 – Directivity vs Frequency Whole Space (anechoic)

Constant-Directivity Speaker System
The crossover frequency and speaker component geometries have been carefully selected so that the directional characteristics of the woofer and constant-directivity horn match at the crossover frequency (approximately 90 degrees circular coverage patterns for each) to create a special system type — the constant-directivity system. At higher frequencies the horizontal coverage pattern remains constant and the vertical pattern smoothly transitions to a constant 42 degrees above 5,000 Hz. Response within the 90° x 40° rated coverage angle is uniform, which means dependable audience coverage without "hot spots" or dead zones at certain frequencies. The 90° x 40° dispersion characteristic also helps avoid early reflections from nearby floor or ceiling surfaces which could degrade performance and reduces the high-frequency energy being directed to carpets or other lossy surfaces close to the system. The controlled directivity of the high- and low-frequency transducers also eliminates response irregularities caused by diffraction off enclosure edges and, in combination with an essentially flat on-axis frequency response, produces a total acoustic power output that is uniform with frequency.

FREQUENCY RESPONSE

The combination of a 15-inch woofer, wide-bandwidth, high-frequency driver and an equalized crossover results in the wide and smooth overall response shown in Figure 1. This response was measured at 10 feet, using a 4-volt input in an anechoic chamber. The response is 1/3 octave averaged. No external equalization was used.

DIRECTIVITY

A unique feature of the FR15-2 is the constant-directivity dispersion provided by the 90° x 40° horn. The polar response of the system at selected 1/3-octave bandwidths is shown in Figure 2. These polar responses were measured in an anechoic environment at 10 feet using 1/3-octave pink noise inputs. The frequencies selected are fully representative of the polar response of the system. Beamwidth of the system utilizing the complete 1/3-octave polar data is shown in Figure 3. R_Θ (Q) and directivity index (D_i) are plotted in Figure 4.

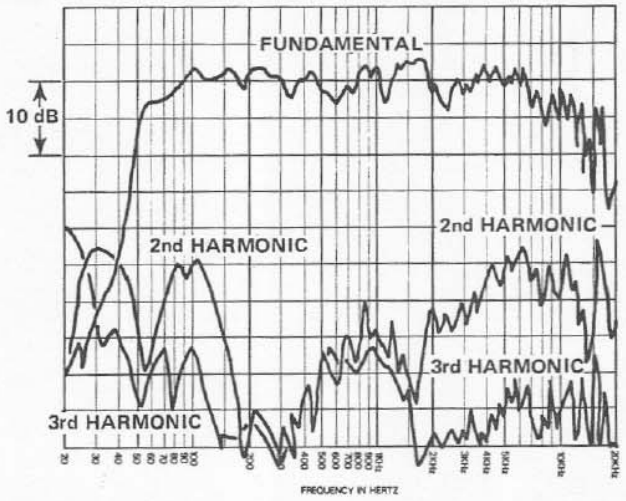

FIGURE 5 — Harmonic Distortion, 0.1 rated power input (20 watts)

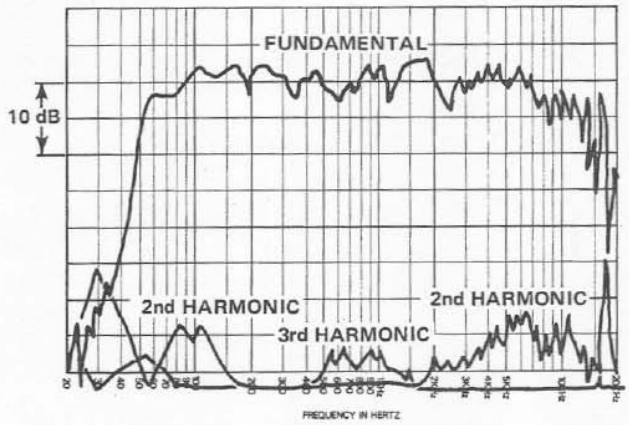

FIGURE 6 — Harmonic Distortion, 0.01 rated power input (2 watts)

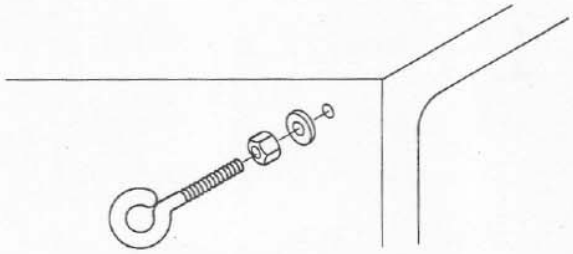

FIGURE 7 — Eyebolt Attachment

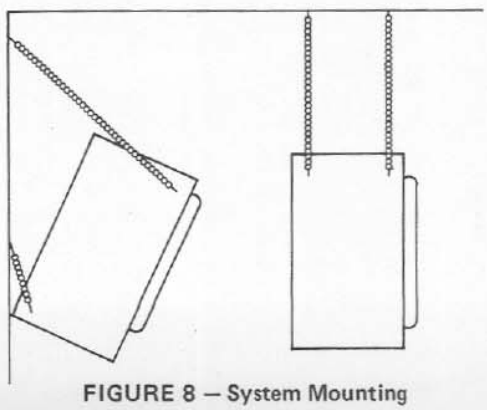

FIGURE 8 — System Mounting

DISTORTION

Following AES (Audio Engineering Society) recommended practice, plots of second and third harmonic distortion for 0.1 rated power (20 watts) are shown in Figure 5. Additionally, plots are shown for 0.01 rated power in Figure 6.

In the important mid-band frequencies between 300 and 3000 Hz where voice and music energy is usually the highest, the median values for any component of distortion are at or below approximately 1.5% for the input powers measured.

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 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.

Specifically, the FR15-2 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 7.7 ohms EIA equivalent impedance, (39.2 volts true RMS). Amplifier clipping sets instantaneous peaks at 6 dB above the continuous power, or 800 watts peak (78.4 volts peak). This procedure provides a rigorous test of both thermal and mechanical failure modes.

MOUNTING

Most rooms will require that the FR15-2's long axis be mounted horizontally to take proper advantage of its 90° x 40° constant-directivity dispersion. The system may be inverted, if desired, to change the relative position of the horn and woofer (horn below woofer).

Four integral 5/16-18 propeller nuts are situated near the corners on each side of the enclosure to provide for mounting flexibility. Cap plugs provide access to the nuts, while maintaining the cabinet seal when not used.

To suspend the system from the ceiling or wall, 5/16-18 eye bolts with one-inch thread length should be screwed into the propeller nuts and secured with an external washer and nut, as shown in Figure 7. Chain or cable is then used to attach the system to the wall or ceiling, as shown in Figure 8. The cable or chain should be securely fastened to the ceiling or wall, ***and should be positioned to pull at right angles to the axis of the eye bolt.***

GRILLE REMOVAL

The grille of the FR15-2 is fastened to the enclosure with two concealed screws. To remove the grille, expose the supporting screws by pulling the cap plugs from enclosure, one on each side of the enclosure in a front-center location. Loosen the two screws and pull the grille away from the enclosure.

WARRANTY (Limited) —

Electro-Voice Professional Sound Reinforcement 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) or Electro-Voice West, 8234 Doe Avenue, Visalia, California 93277 (Phone: 209/651-7777).

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

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

Specifications subject to change without notice.

Part Number 530330 — 338

a Gulton COMPANY **ELECTRO-VOICE, Inc., 600 CECIL ST., BUCHANAN, MICH. 49107**

MANUFACTURING PLANTS AT ■ BUCHANAN, MICH. ■ NEWPORT, TENN. ■ SEVIERVILLE, TENN. ■ GANANOQUE, ONT. ■ LITHO IN U.S.A.

SCHEMATIC
FR15-2