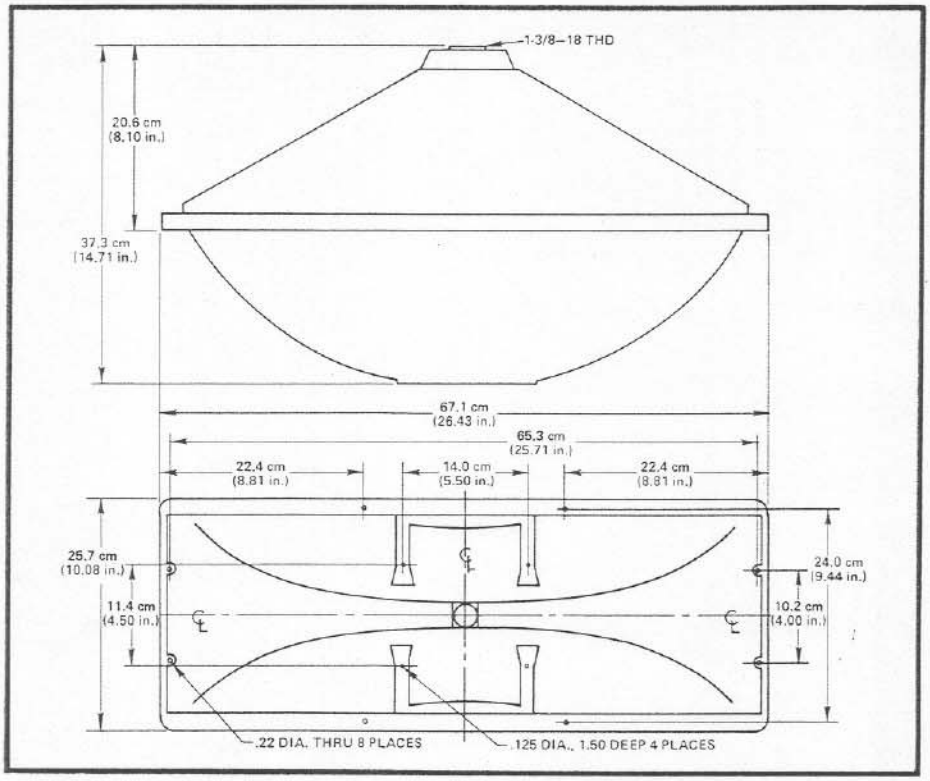


Electro-Voice®
a gulton company

Model SM120A
120° x 40° High-Frequency Horn

GENERAL SPECIFICATIONS

(All acoustical specifications taken from 1/3-octave bandwidth noise measurements.)

Horizontal Beamwidth:
118°

Vertical Beamwidth:
40° (nominal)

Polar Pattern:
Pie slice
(see page 3)

Directivity Factor R_θ (Q):
8.7
(average 2 kHz – 16 kHz)

Directivity Index D_i:
9.4 dB (10 log R_θ, average 2 kHz – 16 kHz)

Usable Lower Frequency Limit:
500 Hz, driver loading limited (The DH1506 driver will not accept maximum power down to 500 Hz)

Recommended Minimum Crossover Frequency:
800 Hz, beamwidth limited

Sound Pressure Level,
DH1506:
99 dB SPL, 1 watt at 10 ft
1824M:
96.5 dB SPL, 1 watt at 10 ft

Construction:
Rigid urethane foam

Size:
25.7 cm (10.08 in.) high
67.1 cm (26.43 in.) wide
37.3 cm (14.71 in.) deep

Throat Diameter:
2.2 cm (.87 in.)

Shipping Weight:
5.4 kg (12 lb)

U.S. patent number 4071112.

R_θ and D_i vs FREQUENCY

(one-third octave bandwidths)

Freq. (Hz)	R_θ	D_i (dB)	Freq. (Hz)	R_θ	D_i (dB)
500	3.1	4.9	3.15 k	6.0	7.8
630	2.6	4.1	4.0 k	7.7	8.9
800	3.1	4.9	5.0 k	7.8	8.9
1 k	4.0	6.0	6.3 k	9.0	9.5
1.25 k	2.7	4.3	8.0 k	9.5	9.8
1.6 k	3.8	5.6	10.0 k	12.0	10.8
2.0 k	6.5	8.1	12.5 k	17.0	12.3
2.5 k	6.6	8.2	16 k	20.0	13.0

DESCRIPTION

The Electro-Voice Model SM120A is a light-weight, urethane form, wide-angle high-frequency horn that provides precise pattern control over the full frequency range from 800 Hz to 16 kHz. The results of latest research into theoretical horn behavior by Electro-Voice engineers is incorporated in its design.[1] An optimal joining of hyperbolic-exponential (throat region) and conical flare shapes [2] provides good low-frequency response coupled with very uniform beamwidth and directivity.

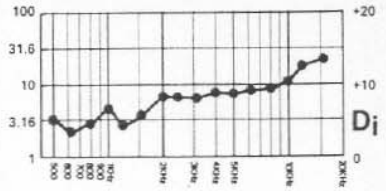
The SM120A performance exceeds conventional radial/sectoral and multicellular horns in a number of important areas:

a. It does not exhibit midrange (630 Hz – 1.6 kHz) horizontal beamwidth narrowing.

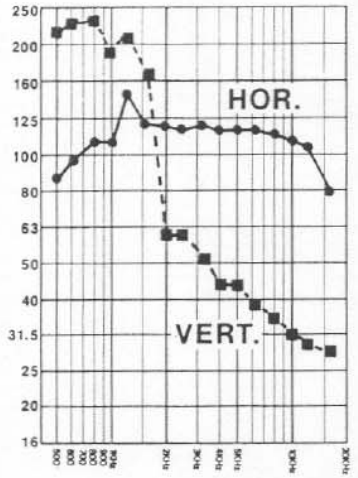
b. High-frequency polar response is smooth without the characteristic multicell fingering.

The SM120A is designed to be used with the 1824M and DH1506 drivers in fixed, indoor applications.

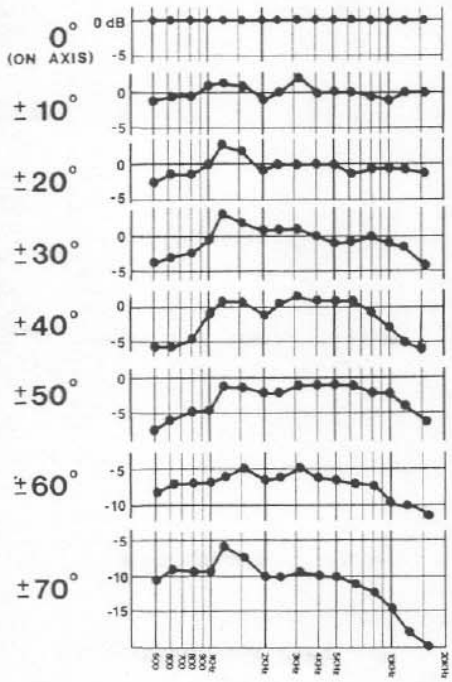
DIRECTIVITY FACTOR R_θ (Q)



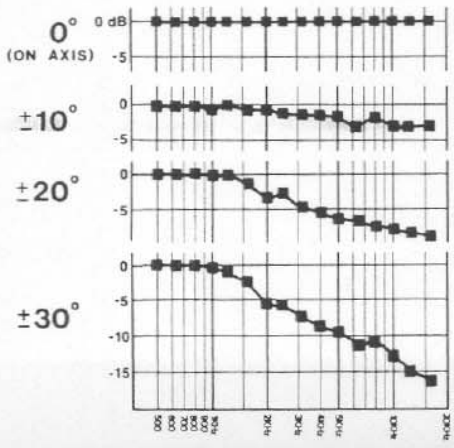
BEAMWIDTH IN DEGREES (-6dB)



HORIZONTAL OFF-AXIS RESPONSE IN dB



VERTICAL OFF-AXIS RESPONSE IN dB



FREQUENCY IN HERTZ

DIRECTIVITY

The axial directivity factor R_θ (formerly Q) of the SM120A horn was computed at each one-third octave center frequency from the horizontal/vertical polars which are displayed on the next page.[3] The graph to the left illustrates this data over the range 500 Hz to 16 kHz. Note the uniformity above 2 kHz with no large increase above 6.3 kHz. The axial frequency response of the SM120A horn with a particular driver is in close correspondance to that driver's power response above 2 kHz.

BEAMWIDTH

A plot of the SM120A's 6-dB-down total included beamwidth angle is shown to the left for each one-third octave center frequency.

FREQUENCY RESPONSE ON AND OFF AXIS

The one-third octave frequency response of the SM120A, at various on and off-axis angles, was derived from the accompanying polars and is displayed to the left. All curves are referenced to the on-axis level. These responses illustrate the curves one would get with a real-time spectrum analyzer at the different angles if the horn/driver were equalized flat on axis.

Horizontal Response

These curves indicate that the SM120A's frequency response stays relatively flat as you go off axis horizontally except for a general decrease in level (roughly −6 dB at 60°, −10 dB at 70°, etc.). Note that the response above 6.3 kHz does not drop off as you go off axis.

Vertical Response

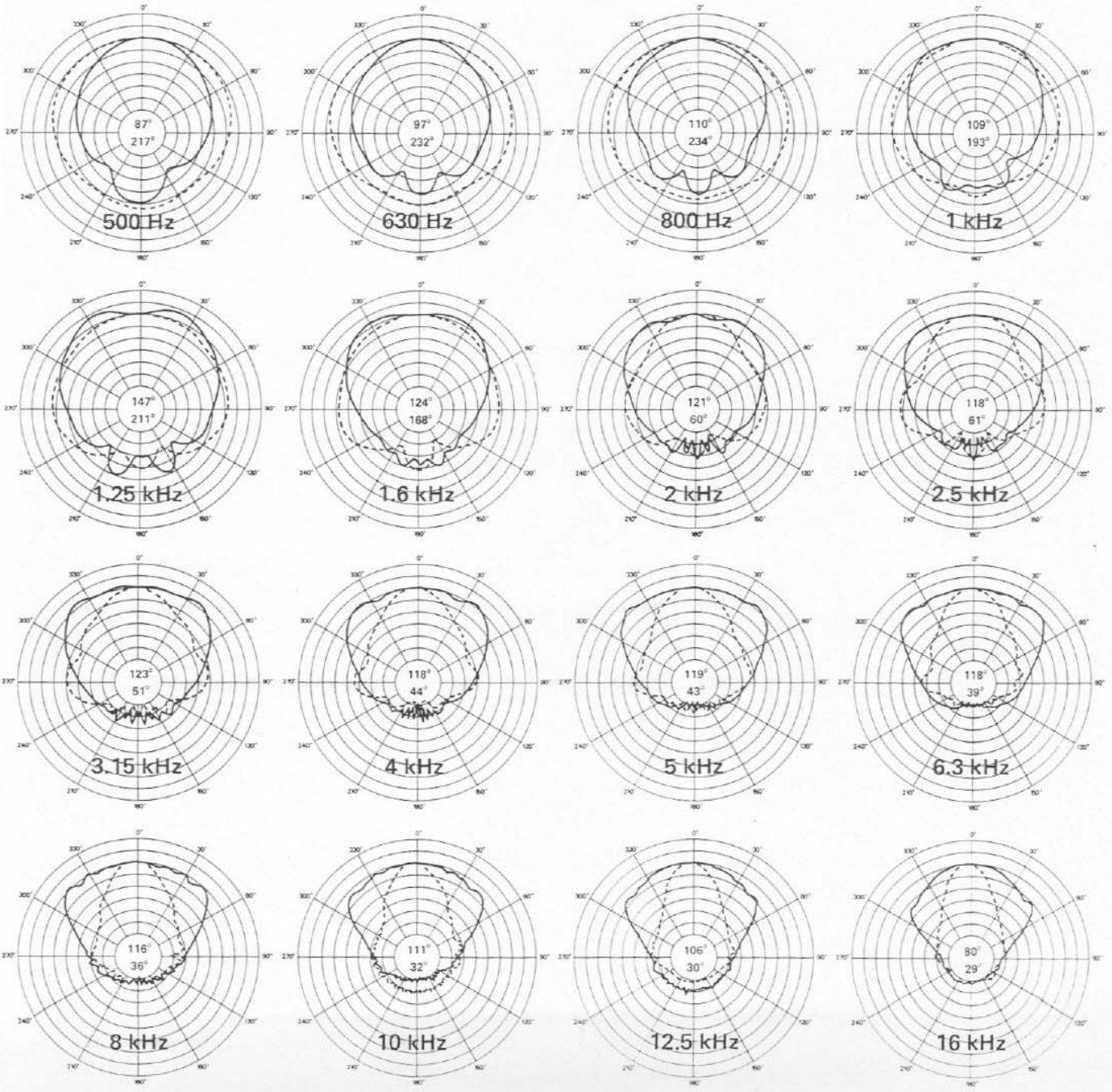
The adjoining vertical responses show that the extreme high frequencies do not droop at off-axis angles.

POLAR RESPONSE

The directional characteristics of the SM120A with driver attached were measured by running a set of horizontal/vertical polar responses, in E-V's large anechoic chamber, at each one-third octave center frequency. The test signal was one-third octave bandwidth limited pseudo-random pink noise (1.0 Hz repetition rate) centered at the indicated frequencies. The measurement microphone was placed 3.5 m (11.5 ft) from the horn mouth, while rotation was about the horn rear driver flange. The horn was suspended freely with no baffle. The polars shown on this page display the results of these tests. The center frequency and beamwidth angle are noted on each polar. The top angle at the center on each chart is the horizontal beamwidth (—) and the bottom angle is the vertical beamwidth (---).

HORIZONTAL —— VERTICAL – – –

SCALE IS 5 DECIBELS PER DIVISION



HORN INSTALLATION

The SM120A should be mounted using the screw holes in the flange. The drivers should be supported during transport.

HORN AIMING

The straight-sided horizontal and vertical wall geometry of the SM120A facilitates horn aiming. A specific audience area is properly covered if contained within an imaginary extension of the horn's straight side walls. Additionally, note that the SM120A's axis may be aimed at the rear of a given audience area and still provide uniform coverage of closer listeners, up to 30° below the horn's axis.

DRIVERS

The HR120 horn has been designed for use with the Electro-Voice 1824M and DH1506, wide-range drivers. Detailed information on the DH1506 and 1824M is presented on separate engineering data sheets.

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 Ave., P.O. Box 3297, Visalia, California 93277 (Phone: 209/625-1330,-1).

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

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

Specifications subject to change without notice.

REFERENCES

1. D.B. Keele, Jr., "Optimum Horn Mouth Size," presented at the 46th Convention of the Audio Eng. Soc., New York (Sept. 1973), Preprint No. 933 (B-7).

   D. B. Keele, Jr., "What's So Sacred About Exponential Horns?," presented at the 51st Convention of the Audio Eng. Soc., Los Angeles (May 1975), Preprint No. 1038 (F-3).

2. U.S. patent number 4071112.

3. R_θ was calculated using the spherical shell technique as described by G. L. Wilson, "Directivity Factory: Q or R_θ? Standard Terminology and Measurement Methods," J. Audio Eng. Soc., vol. 21, pp. 828-833 (Dec. 1973). Also see D. Davis, "On Standardizing the Measurement of Q," J. Audio Eng. Soc., vol. 21 pp. 730-731 (Nov. 1973).

Part Number 530235 – 225

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.