

FRX-640

High-Output, Two-Way, Horn-Loaded Coaxial Speaker System

- 15-inch woofer
- 60° x 40° coverage
- Vented LF horn design delivers rated control to 500 Hz
- 400-watts long-term power capacity
- Ring-Mode Decoupling (RMD™)
- Available in black (BLK) unfinished (UN) and white (WH)
- Full-range or biamp operation with internal passive crossover
- DH2T 1-inch-exit titanium compression driver
- Built-in L-track rigging

Description

The Electro-Voice FRX-640 is a two-way, high-efficiency, horn-loaded speaker system designed for indoor sound reinforcement in fixed installations such as churches, meeting halls and auditoriums. Capable of producing sound pressure levels (SPL) in excess of 124 dB at 1 meter, the FRX-640 will give full-bandwidth reproduction without sacrificing sonic quality. The FRX-640 features a 60° x 40° horn. The DH2T compression driver provides smooth, extended response to 20 kHz and features a titanium diaphragm and a unique convex-drive Time Path™ phasing-plug structure (U.S Patent #4,525,604).

The optimally vented bass section of the FRX-640 is designed using Theile-Small parameters for efficient performance to below 50 Hz and utilizes a 400-watt DL15-FRX 15-inch woofer to provide high excursion with low coloration.

The FRX-640 is provided with a passive crossover which features 12-dB/octave slopes centered acoustically at 1,800 Hz and EV's self-resetting PRO™ circuit to guard the compression driver against damage. The system can be easily converted to be operated in the biamp mode by removing the input-panel assembly (eight screws) and moving the four jumpers

as indicated on the crossover. When used in biamp mode the woofer uses pins 1+ and 1- and the tweeter uses pins 2+ and 2-.

The enclosure is constructed from seven-ply plywood and is available in three alternative finishes; FRX-640 BLK (black textured paint), FRX-640 UN (unfinished and ready to stain) and FRX-640 WH (white textured paint).

The grille is constructed from 16-gauge powder-coated steel and is backed with foam.

Ring-Mode Decoupling (RMD™)

The FRX-640 controls both acoustical and mechanical ring modes to provide dramatically increased intelligibility, using techniques learned from the development of the Electro-Voice X-Array™ concert speakers. There is much less coloration of the sound from resonating sources, leaving only the intended sound to be heard by the audience.

Frequency Response

The FRX-640 axial frequency response was measured in Electro-Voice's large anechoic chamber at a distance of 10 feet with a swept sine-wave input (see Figure 1). The response curves show response with the passive crossover and with the FRX-640 in the biamped mode with presets for the Electro-Voice DX34A digital loudspeaker processor. On

Axis, one watt calculated using E^2/Z_{min} , 3.16-meter measurement distance referred to one meter.

Directivity

The directional characteristics of the FRX-640 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. All directional information was measured at 20 feet.

Figure 2 illustrates the horizontal and vertical polar responses with the internal crossover in the passive mode.

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 with the axial frequency response.

Figure 4 illustrates the total directivity of the FRX-640. The directivity factor $R_0(Q)$ is the relative value, at a point, of the FRX-640 output when compared to an ideal spherical response. The directivity index, D_i , is calculated by $D_i = 10 \log_{10} R_0$.

Power-Handling Test

Electro-Voice components and systems are manufactured to exacting standards, ensuring

FRX-640 High-Output, Coaxial Speaker System

they will hold up, not only through the most rigorous of power tests, but also through continued use in arduous, real-life conditions. The EIA Loudspeaker Power Rating Full Range (EIA RS-426-A 1980) uses a noise spectrum which mimics typical music and tests the thermal and mechanical capabilities of the components. Electro-Voice will support relevant additional standards as they become available. Extreme, in-house power tests, which push the performance boundaries of the system, are also performed and passed to ensure years of trouble-free service.

Specifically, the FRX-640 passes EIA RS-426-A 1980 with the following values:

$$R_{SR} = (1.15 \times R_E) = 6.9 \text{ ohms}$$

$$P_{E(MAX)} = 400 \text{ watts}$$

$$\text{Test voltage} = 52.5 \text{ volts rms,} \\ 105 \text{ volts peak}$$

The "peak" power-handling capacity of a woofer is determined by the peak test voltage amount. For the FRX-640 a 105-volt peak test voltage translates into a 1,600-watt short-term-peak power-handling capacity. This is the equivalent of four times the "average" power-handling capacity, and is a peak that can be sustained for only a few milliseconds. However, this sort of short duration peak is very typical in speech and music. Provided the amplifier can reproduce the signal accurately, without clipping, the system will also perform accurately and reliably, even at these levels.

Suspending the FRX-640

The quick-release, aircraft-rated heavy-duty L-track-type hardware design allows arrays of loudspeakers to be assembled very quickly, and offers such flexibility in the vertical angling of cabinets that pull-up points are usually unnecessary. However, if the need for pull-up points is required, two 3/8-16 threaded nuts are located on the rear of enclosure for this purpose.

Additional flying hardware is installed on the bottom of the enclosure for arraying purposes. However, a maximum of two FRX enclosures (304 lb max.) can be "daisy-chained" together, allowing the construction of vertical arrays. If longer arrays are required, or for loads exceeding the 304-lb maximum load limit, provision must be

made to independently suspend each enclosure.

Fittings are not included in the system packaging. Contact the following to purchase:

Ancra International, 3300 Turfway Rd., Erlanger, KY 41018, 800/233-5138 or Sound Manufacturing, 3336 Primera Ave., Hollywood, CA 90068-1550, 231/850-5042

Suspending an object is potentially dangerous and should only be attempted by individuals who have a thorough knowledge of the techniques and regulations of rigging objects overhead. It is the responsibility of the installer to ensure the FRX-640 is safely installed in accordance with applicable regulations. If the FRX-640 is suspended, Electro-Voice strongly recommends that the system be inspected at least once a year. If any sign of weakness or damage is detected, remedial action should be taken immediately.

Architects' and Engineers' Specifications

The loudspeaker system shall be a coaxial, two-way full-range design consisting of a 15-inch woofer, a high-frequency compression driver on a fiberglass molded constant-directivity horn and a dividing network providing an acoustic crossover frequency of 1,800 Hz. The system shall be configurable in a biamp mode through internal switches in the crossover network. The loudspeaker shall meet the following performance criteria; power handling, 400 watts, based upon ANSI/EIA RS-426-A 1980 standard for full-range loudspeaker systems; frequency response, smooth and usable at high SPL levels from 50 Hz to 20 kHz; pressure sensitivity, 101 dB SPL (passive mode) or 105 dB (LF)/109 (HF) in biamp mode for 1 W at 1 m; impedance, 8 ohms nominal, 5 ohms minimum. The system shall have a distribution pattern with 60° nominal horizontally from 3 kHz to 20 kHz and 40° nominal vertically from 3 kHz to 20 kHz. The enclosure shall be constructed from plywood and braced appropriately, and the grille will be constructed from powder-coated steel, backed by a weather-resistant foam. The dimensions shall be 78.7 cm (31.0 in.) high by 71.9 cm (28.3 in.) wide by 66.0 cm (26.0 in.) deep. Net weight shall be 68.95 kg (152 lb). The system shall

be the Electro-Voice FRX-640 BLK (black texturlac paint with black grille), or the FRX-640 UN (unfinished ready for staining with black grille), or the FRX-640 WH (white texturlac paint with white grille).

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 Service or any of its authorized service representatives. **Obtaining Warranty Service:** To obtain warranty service, a customer must deliver the product, prepaid, to Electro-Voice Service 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 Service at 600 Cecil Street, Buchanan, MI 49107 (800/234-6831 or FAX 616/695-4743). **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**

FRX-640 High-Output, Coaxial Speaker System

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 de-

tails are included in the Uniform Limited Warranty statement.

For warranty repair or service information, contact the service repair department at: 616/695-6831 or 800/685-2606.

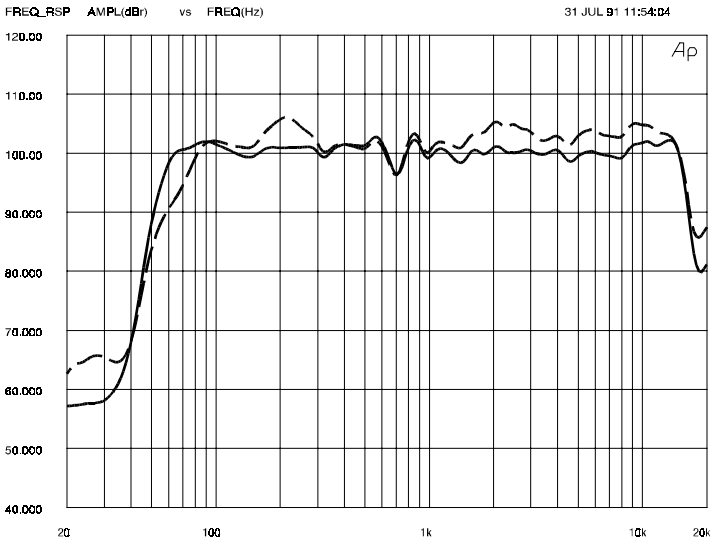
For technical assistance, contact Technical Support at 800/234-6831 or 616/695-6831, M-F, 8:00 a.m. to 5:00 p.m. Eastern Standard Time.

Specifications subject to change without notice.

FRX-640 High-Output, Coaxial Speaker System

Figure 1— Axial Frequency Response (anechoic environment, 1 watt at 1 meter)

- Dx34A processor (biamp mode)
- - - - - Passive crossover



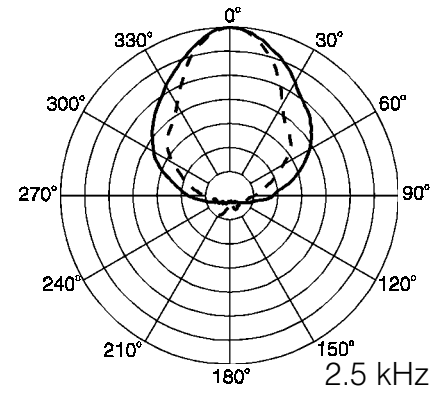
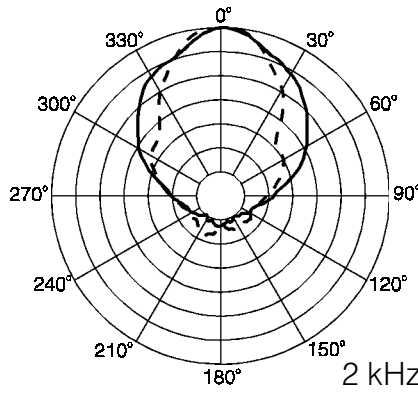
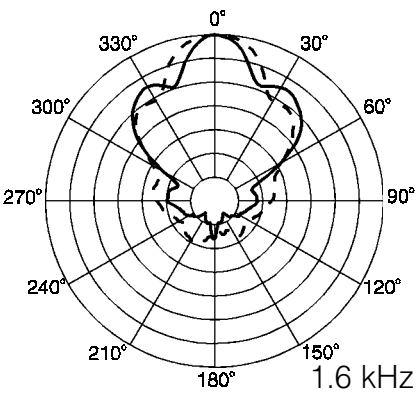
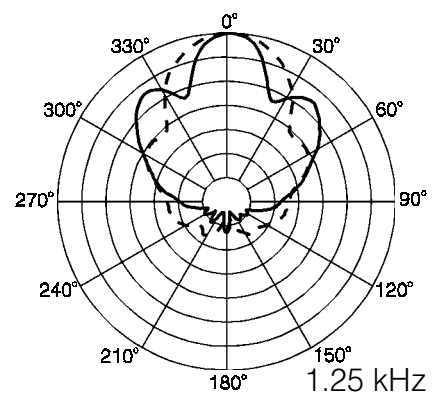
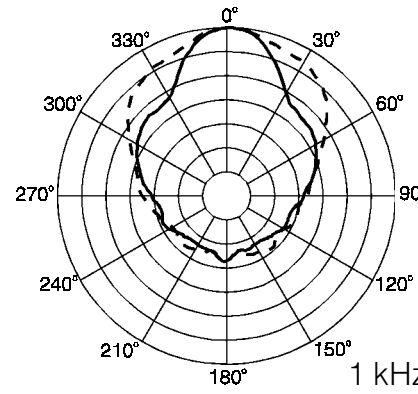
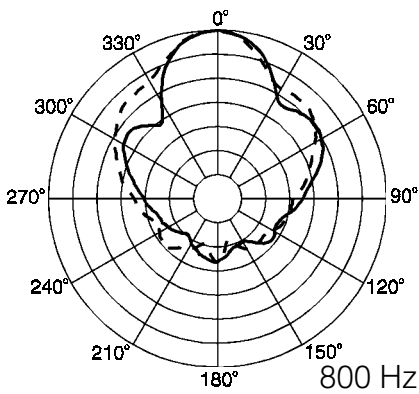
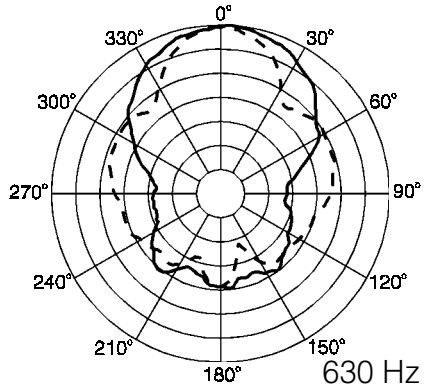
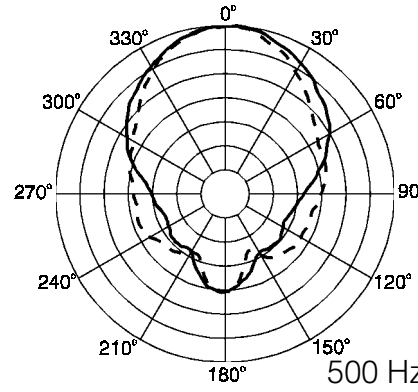
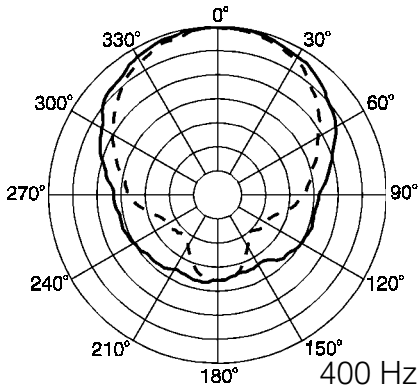
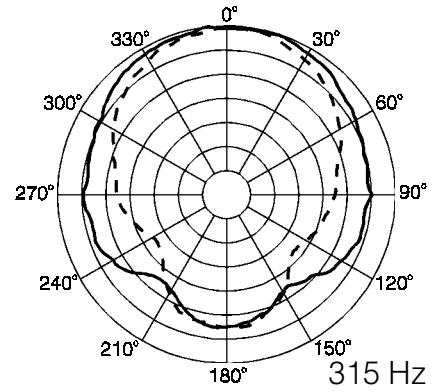
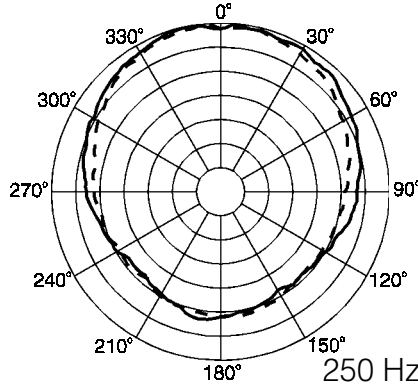
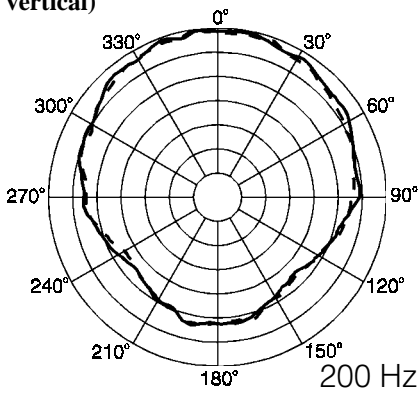
FRX-640 High-Output, Coaxial Speaker System

Figure 2—One-Third-Octave Polar Response (anechoic environment, with passive crossover, long box axis vertical)

5 dB per Division

— HORIZONTAL
- - - VERTICAL

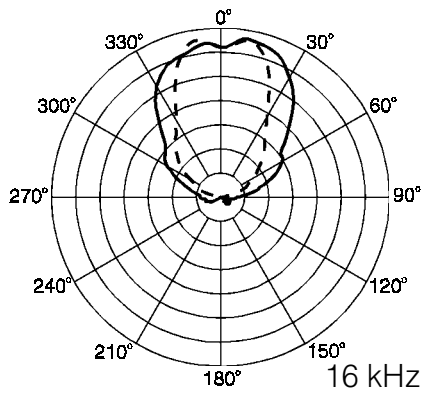
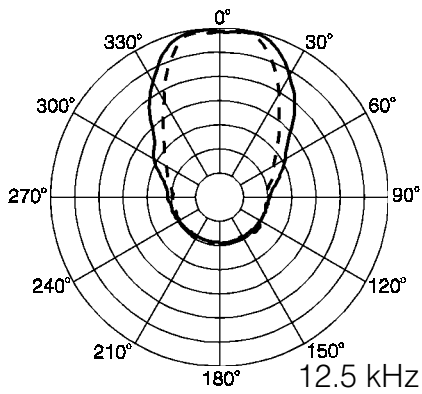
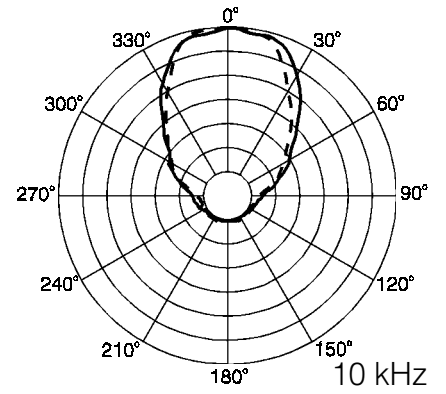
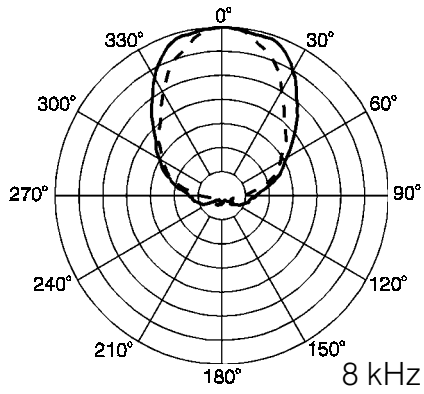
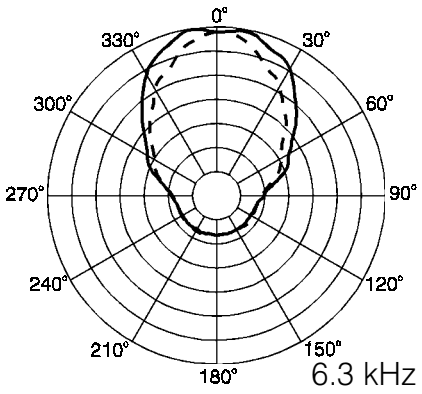
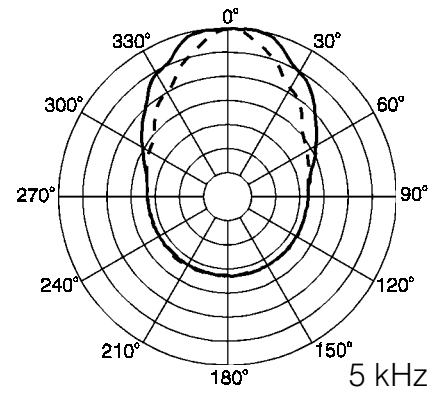
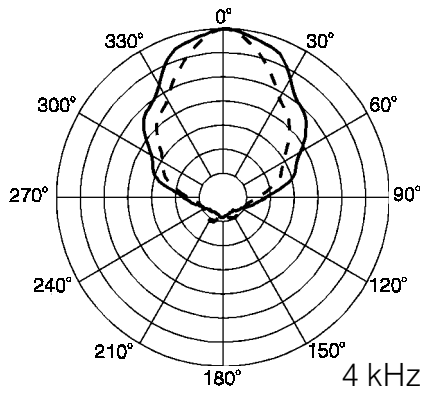
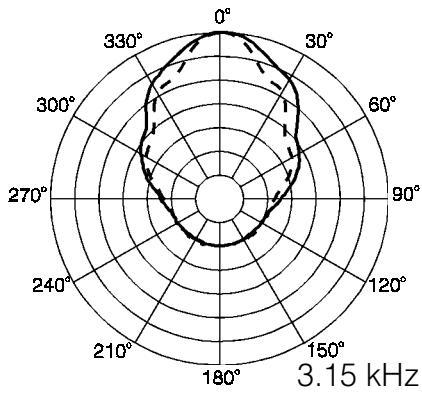
FRX-640 High-Output, Coaxial Speaker System



FRX-640 High-Output, Coaxial Speaker System

5 dB per Division

— HORIZONTAL
- - VERTICAL



FRX-640 High-Output, Coaxial Speaker System

FRX-640 High-Output, Coaxial Speaker System

Figure 3—Beamwidth vs. Frequency (anechoic environment, with passive crossover, long box axis vertical)

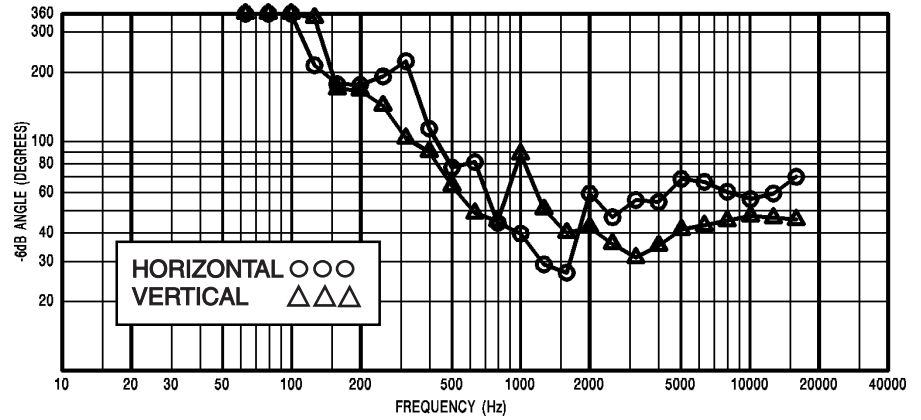


Figure 4—Directivity vs. Frequency (anechoic environment, with passive crossover)

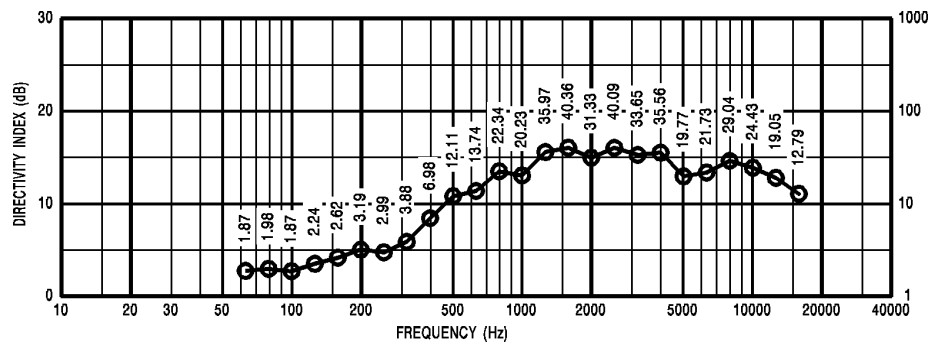
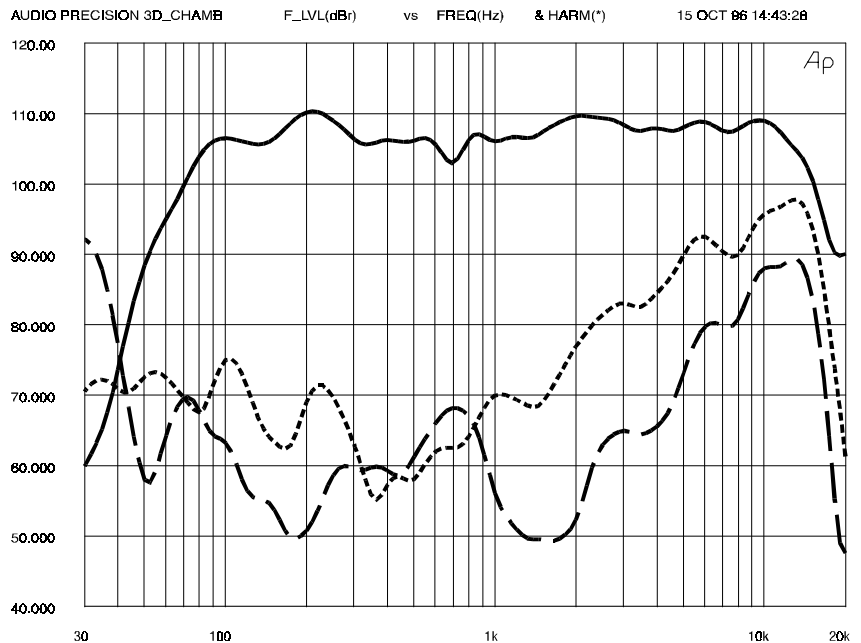


Figure 5—Harmonic Distortion, 0.1 Rated Power Input (40 watts) (anechoic environment, with passive crossover)

- Fundamental
- - - 2nd Harmonic
- · - 3rd Harmonic



FRX-640 High-Output, Coaxial Speaker System

Figure 6—Impedance (anechoic environment, log scale)

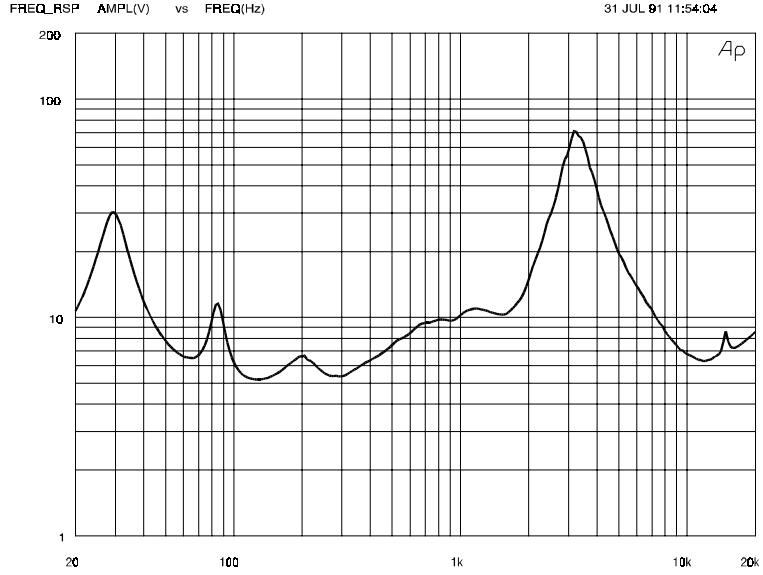
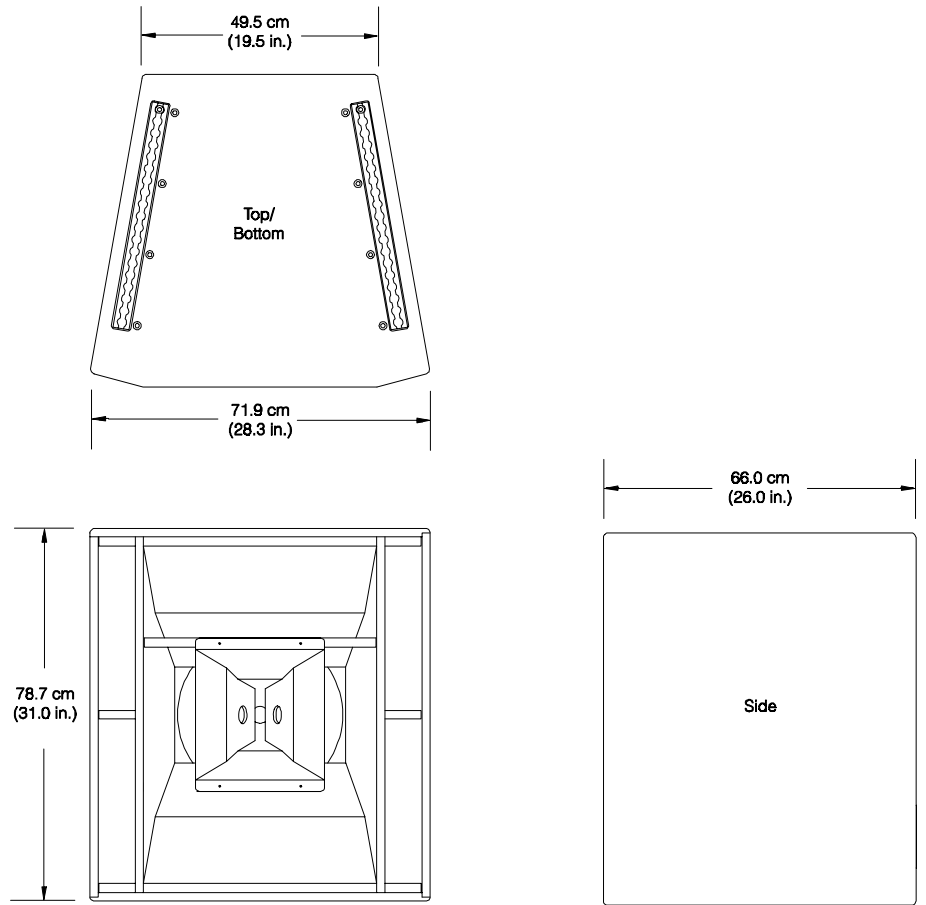


Figure 7—FRX-640 Dimensions



FRX-640 High-Output, Coaxial Speaker System

FRX-640 High-Output, Coaxial Speaker System

Specifications

Axial Frequency Response (swept sine wave, 4 volts at 10 feet on axis, anechoic environment normalized for 1 watt/1 meter; see Figure 1):

50-20,000 Hz

Low-Frequency 3-dB-Down Point:

50 Hz

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

43 Hz

Half-Space Reference Efficiency:

4.5%

Long-Term Average Power-Handling Capacity (per ANSI/EIA RS-426-A 1980; see Power-Handling Capacity section):

400 watts

Maximum Woofer Acoustic Output:

17.6 watts

Sensitivity (SPL at 1 m, 1 W into nominal impedance, anechoic environment, band-limited pink-noise signal, 100-15,000 Hz):

Passive:

101 dB

Bi-amp:

105 (LF)

109 (HF)

Beamwidth (passive mode, angle included by 6-dB-down points on polar responses, horizontal and vertical planes, indicated one-third-octave bands of pink noise; see Figure 3),

2,000-16,000 Hz,

Horizontal:

60° +10°/-13°

Vertical:

40° +7°/-9°

Directivity Factor R_0 (Q), 500- to 16,000-Hz Median (see Figure 4):

25.4 (+14.1, -13.8)

Directivity Index D_0 , 500- to 16,000-Hz Median (see Figure 4):

14.1 dB (+1.9 dB, -3.5 dB)

Transducer Complement,

Low-Frequency:

DL15-FRX 15-inch woofer

High-Frequency:

DH2T Driver

Box Tuning Frequency:

65 Hz

Crossover Frequency:

1,800 Hz acoustically

Crossover Slope:

12 dB per octave

Impedance,

Nominal:

8 ohms

Minimum:

5.0 ohms

Input Connections:

Dual barrier strip with screw terminals

LF/Full Range

1+/1-

HF/Biamp Mode

2+/2-

Enclosure Materials and Colors:

Seven-ply plywood with removable grille

FRX-640 BLK

Black textured paint, black grille

FRX-640 UN

Unfinished (ready to stain),

FRX-640 WH

White textured paint, white grille

Grille:

Powder-coated steel backed with foam

Suspension: See suspending the FRX-640 section

Two-point heavy-duty L-track system, accepts New Haven NH32102-2 double-stud fittings, New Haven NH8192-2S or Ancra 42546-10 single-stud fittings with safety pins (not included);

Contact the following to purchase:

Ancra International

3300 Turfway Rd.

Erlanger, KY 41018

800/233-5138

or

Sound Manufacturing

3336 Primera Ave.

Hollywood, CA 90068-1550

231/850-5042

Dimensions,

Height:

78.7 cm (31.0 in.)

Width:

71.9 cm (28.3 in.)

Depth:

66.0 cm (26.0 in.)

Net Weight:

68.95 kg (152 lb)

Shipping Weight:

71.21 kg (157 lb)

Electro-Voice®

600 Cecil Street, Buchanan, MI 49107

616/695-6831, 616/695-1304 Fax