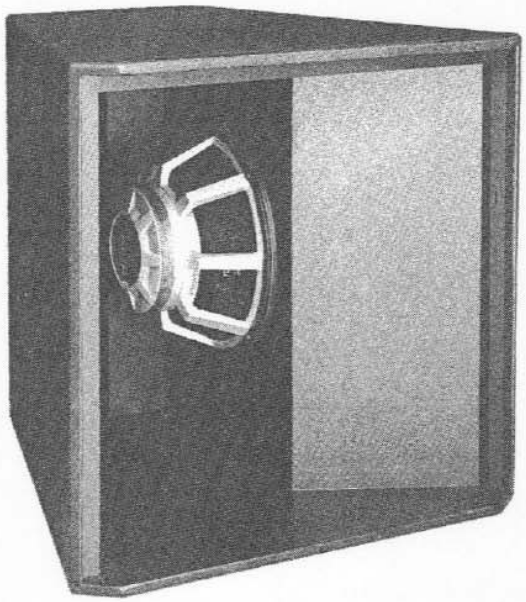
Electro-Voice®



PI115L

Horn-Loaded Low-Frequency Sound Reinforcement Module for Permanent Installations

- Modular concept for easy configuration
- Low-frequency section for PI series products
- EVX-150A woofer for high-impact reliable bass
- Integral suspension system for safe and easy installation
- Metal grille for protection
- Paintable to blend into any surroundings

SPECIFICATIONS

Typical Axial Frequency Response (swept one-third-octave pink noise, anechoic environment, 4 volts at 10 feet, normalized for 1 watt/1 meter; see Figure 1):
50-200 Hz

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

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

Recommended Crossover Frequency:
100-200 Hz

Crossover Slope per Octave, Suggested:
24 dB

Average Efficiency:
5.0%

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

Sensitivity (SPL at 1 meter, 1 watt input power, anechoic environment, band-limited pink-noise signal):
100 dB

Impedance,
Nominal:
8 ohms
Minimum:
7 ohms

Maximum Long-Term Average Acoustic Output:
30 watts

Beamwidths (angles included by 6-dB-down points on polar responses, one-third-octave bands of pink noise, horizontal and vertical, 50-200 Hz; see Figure 5):
160° (+20°, –20°)

Directivity Factor R_θ (Q), 50- to 200-Hz Median (see Figure 3):
2.3

Directivity Index D_I, 50- to 200-Hz Median (see Figure 3):
4.5 dB (+1.6 dB, –2.8 dB)

Distortion, 0.1 Full Power Input (see Figure 4),
Second Harmonic,
100 Hz: less than 1%
1,000 Hz: less than 1%
10,000 Hz: less than 1%
Third Harmonic,
100 Hz: less than 1%
1,000 Hz: less than 1%
10,000 Hz: less than 1%

Transducer Complement:
EVX-150A 38.1-cm (15-in.) woofer in a SubScoop™ enclosure

Polarity:
A positive voltage applied to the positively marked input terminal produces a positive acoustic pressure at the front of the system

Input Connections:
#10 screw terminals on barrier strip

Enclosure Materials and Color:
Multi-layered Plywood with Black Textured Paint

Grille:
Removable, black vibration-resistant steel

Hanging:
Integral four-point flying system (accepts Ancra 42546-10 single-stud tie-down cargo fitting; four fittings supplied with system; see Suspending PI115L Enclosure section)

Dimensions (see Figure 6),
Height:
73.7 cm (29.0 in.)
Width:
74.9 cm (29.5 in.)
Depth:
77.0 cm (30.3 in.)

Net Weight:
44.5 kg (98 lb)

Shipping Weight:
53.5 kg (118.0 lb)

Packing:
Wooden pallet and carton

DESCRIPTION

The Electro-Voice PI115L Permanent Installation system was specifically designed with the contractor in mind. It is part of the PI series of modular sound reinforcement, which allows the contractor to customize the system to suit any acoustic environment. The PI115L is a horn-loaded, low-frequency section that incorporates an EVX-150A driver for maximum output and reliability. The section's trapezoidal shape allows the easy construction of circular and spherical arrays. The angled enclosure sides allow ceiling mounting with a reduced vertical profile and an aiming angle that is inherently in the general direction of the audience.The enclosure is made of black painted, multilayer plywood and incorporates certified, integral flying hardware as standard.

The PI115L operates between 50 and 200 Hz and has been designed for superior performance in the air as well as on the ground. The EVX-150A 15-in. woofer will handle very large levels of input power, producing high acoustic output with low distortion.

The PI115L is equipped with a number of additional features to make operation and installation easy and secure. A proprietary structural extrusion is incorporated into the enclosure, providing for safe and flexible suspension. Up to two enclosures (from any of the PI series family) can be suspended without additional support, so arrays can be created quickly and

PI115L SPECIFICATION GRAPHICS

FIGURE 1 — Typical Axial Frequency Response
(anechoic environment, 1 watt/1 meter)

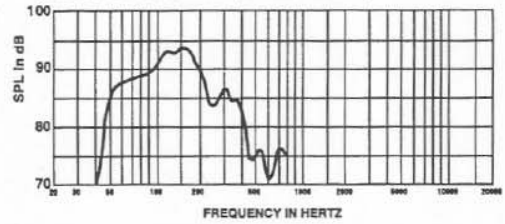


FIGURE 2 — Beamwidth vs. Frequency

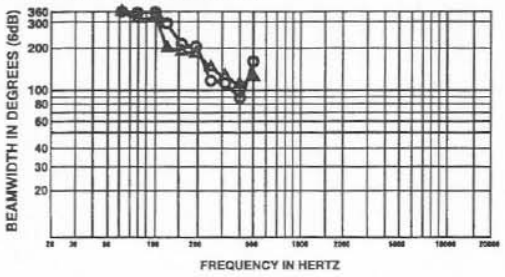


FIGURE 3 — Directivity Factor and Directivity Index
vs. Frequency Response

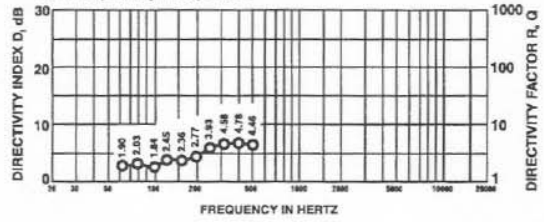


FIGURE 4 — Harmonic Distortion 10% Rated Power Input
1 Meter on Axis

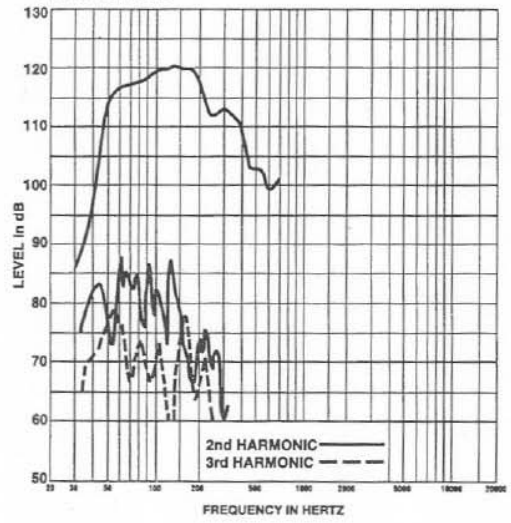


FIGURE 5 — Polar Response

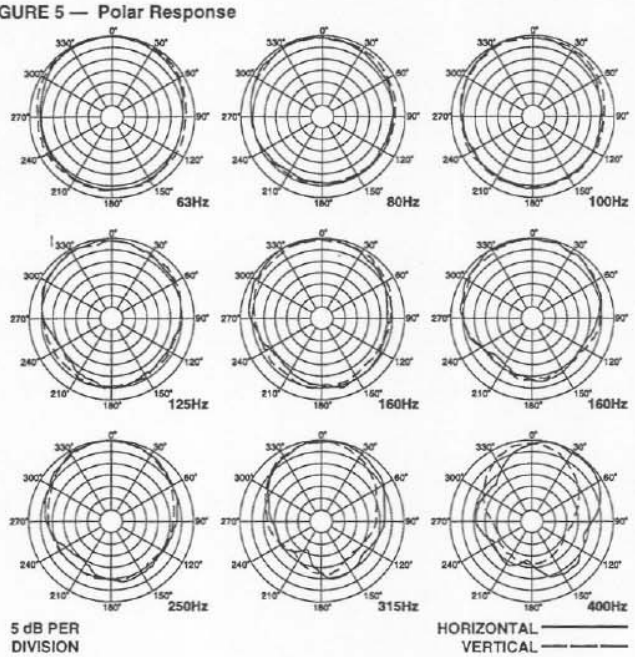
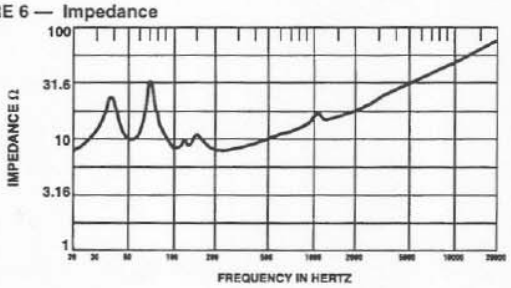


FIGURE 6 — Impedance



easily. The grille is composed of vibration-resistant steel for excellent driver protection, and it can be painted to blend into any environment. The enclosure can also be painted using ordinary paints. The driver can easily be serviced from the front of the enclosure.

APPLICATIONS

The PI115L and the PI series of products have been designed specifically with the permanent installation market in mind. Sports arenas, performing arts centers, auditoriums and large gymnasiums are all candidates for the PI115L and the entire PI line. The unique modular construction and optimized bass performance result in a system that can be used in almost any situation. The concert-sound pedigree of the PI series is evident by the ease of installation and by the selection of professional-grade components incorporated into the line. The PI115L, in its standard form, is intended for use indoors. Do not use outdoors.

FREQUENCY RESPONSE

The PI115L axial frequency response (see Figure 1) was measured in Electro-Voice's large anechoic chamber at a distance of 3 meters (10 feet) with a swept sine-wave input. It has been normalized for 1 watt/1 meter.

SUSPENDING PI115L ENCLOSURES

Suspending any 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. Electro-Voice strongly recommends that the PI115L be suspended with all current national, federal, state and local regulations. It is the responsibility of the installer to ensure the PI115L is safely installed in accordance with all such regulations. If the PI115L 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.

The PI series enclosures are suspended using the following approach, which has been approved by an independent structural engineer. Every enclosure incorporates eight independent suspension points, four on the top and four on the bottom. A minimum of four points must be used at all times to suspend the enclosure. The suspension points, which "tie" the top and sides of the enclosure together, are made of structural aluminum. Each suspension point mates to an Ancra 42546-10 locking fitting[2] (four of which are supplied with every enclosure), and each point has a break strength of 907 kg (2,000 lb) in any direction. A maximum of two enclosures can be "daisy-chained" together, allowing the construction of vertical arrays. If longer arrays are required, provision must be made to independently suspend each enclosure. The Ancra 42546-10 fitting incorporates a safety pin to prevent accidental release, and it should be engaged at all times.

TO FLY OR NOT TO FLY?

Low-frequency systems such as the PI115L are often located on the floor and close to walls. This is convenient and provides additional loading to increase efficiency. Because there is little directional information present in program material below approximately 150 Hz, the PI115L can be used in this manner to great effect.

Other situations, however, may benefit from the integral suspension system of the PI115L. Floor space may be limited in some installations; location of the low-frequency system with the mid-bass/high-frquency module may be desirable for some applications; or a flying configuration may be required to provide additional bass reinforcement with a flown, one-box system such as the PI6415 or PI9415.

In these instances, the PI115L has definite advantages. Its trapezoidal footprint and integral flying system allow it to be tightly arrayed and integrated into a flown system. To a large degree, the efficiency lost by removing the low-frequency module from the floor can be replaced by closely spacing multiple modules and "coupling" the woofers, thereby increasing the effective mouth area (see Use in Multiples section).

The PI115L's acoustic performance has been optimized for flying by trading-off some very-low-frequency extension (below around 40 Hz), and increasing the sensitivity between 50 and 100 Hz. This increase in sensitivity provides additional "punch" and "throw" which translates into superior flown performance.

USE IN MULTIPLES

PI115L's may be used in multiples to increase acoustic output. In the following discussion, it is assumed that all speaker cones are operating in unison (in phase) when a common signal is applied.

At relatively low frequencies (below about 150 Hz), use in multiples produces additional acoustic output. When two speaker systems are located side by side and a common signal is applied, a 6-dB increase in maximum acoustic output is possible.

This increase occurs because the woofer cones "mutually couple," acting as one cone with twice the area (therefore, twice the efficiency) and twice the power-handling capacity of a single cone. This "mutual coupling" occurs when the frequency is such that the center-to-center distance between the two woofers is less than about one-half wavelength.

The doubling of efficiency provides a 3-dB increase in sound pressure level; the second 3-dB increase comes from the doubling of power capacity. In addition, the increase in mouth area provides additional loading and directivity.

When the distance is greater than one-half wavelength (as would occur if two PI115L's were widely spaced), the level increase tends to be limited to the 3-dB power-handling increase.

CONNECTIONS

The woofer can be accessed via #10 screw terminals. A positive voltage applied to the positively marked terminal produces a positive acoustic pressure at the front of the system.

SUBPASSBAND SPEAKER PROTECTION

Below the enclosure tuning frequency, cone excursion increases rapidly with little increase in acoustic output. It is therefore highly recommended that subpassband protection be provided for the PI115L to protect the cone from overexcusion below box tuning frequency. A high-pass filter set at about 30 Hz (greater than 12-dB-per-octave) will provide adequate protection. An Electro-Voice XEQ-3 electronic crossover/equalizer will also provide protection when used with the 32-Hz high-pass filter provided. No further EQ or time delay is needed, but can be used at the discretion of the contractor.

DIRECTIVITY

The directional characteristics of the PI115L were measured in Electro-Voice's large anechoic chamber, with a test signal of one-third-octave filtered pink noise at the frequencies indicated. A full spherical measurement system, which is fully compatible with Mark IV Audio's AcoustaCADD™ computer-aided design program, was used. All directional information was measured at 6.1 meters (20 ft.).

Figure 5 illustrates the horizontal and vertical polar response.

Figure 2 illustrates 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 on-axis frequency response.

Figure 3 represents the total directivity of the PI115L. The directivity factor R_θ (Q) is the relative value, at a point, when compared to an ideal spherical response. The Directivity Index (D_i) is calculated by $D_i = 10 \log_{10} R_\theta$.

SERVICE

In the unlikely event the PI115L requires service, the woofer can be replaced or serviced from the front. A service data sheet is available from Electro-Voice.

POWER-HANDLING TEST

Electro-Voice components and systems are manufactured to exacting standards, ensuring 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 (ANSI/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 and when they become availiable. Extreme, in-house power tests, which push the performance boundaries of the woofers, are also performed and passed to ensure years of trouble-free service.

2. For additional information, contact Ancra International at 606/371-7272 or toll free (within the U.S. only) at 800/233-5138.

Specifically, the PI115L passesANSI/EIA RS-426-A 1980 with the following values:

R_{SR} = 6.7 ohms (1.15 x R_E)

$P_{E(MAX)}$ = 600 watts

Test voltage = 63.3 volts rms,
126.5 volts peak

The "peak" power-handling capacity of a woofer is determined by the peak test voltage amount. For the PI115L, a 126.5-volt peak test voltage translates into 2,400-watts 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 woofer will also perform accurately and reliably, even at these levels.

ARCHITECTS' AND ENGINEERS' SPECIFICATIONS

The loudspeaker shall be a horn-loaded type. The low frequencies shall be reproduced with a 600-watt (ANSI/EIA RS-426-A 1980) EVX-150A 38.1-cm (15-inch) woofer. The system will reproduce the frequencies from 40 to 200 Hz. The system shall be capable of producing average sound levels in excess of 128 dB at 1 meter in the long term, and short-term peaks of 134 dB.

The enclosure shall be constructed of painted, black multilayer plywood and have a metal grille which attaches with four screws. The enclosure shall have a trapezoidal footprint. The dimensions shall be 73.7 cm (29.0 in.) tall, 74.9 cm (29.5 in.) wide and 77.0 cm (30.3 in.) deep. The system shall weigh 44.5 kg (98 lb). The enclosure shall incorporate, as standard, a method of suspension which shall allow the safe and flexible suspension of itself and one other member of the PI series family using Ancra fitting 42546-10.

The loudspeaker system shall be the Electro-Voice PI115L.

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. **Incidental and Consequential Damages Excluded:** Product repair or replacement and return to the customer are 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.

Specifications subject to change without notice.

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