

T221M

Biampable, Compact, Two-Way Floor Monitor Speaker System

- Constant-directivity 80° x 55° horn with 2-inch titanium driver
- High-output, 400-watt, 12-inch woofer
- Biamped or full-range operation—simple biamp instructions included inside the enclosure
- Rock-solid enclosure made with 12-ply curved plywood shell
- PRO™ circuit provides HF driver protection
- Professional Neutrik Speakon® connectors for biamp or full-range operation

Description

The Electro-Voice T221M is a 400-watt, two-way, high-efficiency floor monitor system. It combines professional-quality components, highlighted by the DH2T compression driver and 400-watt, high-output 12-inch woofer. The system may be biamplified or used full range with the internal passive crossover. Either way, the result is clear and articulate, high-quality sound.

The enclosure is constructed of a void-free 3/4-in. 12-ply curved plywood shell which is extremely rigid. The baffle and end pieces are made from 13-ply birch plywood. This high-strength enclosure is sprayed with a resilient, textured black finish for a truly professional appearance. The end-mounted, heavy-duty, recessed handle makes transportation easy and three rubber feet on the opposite end help keep the finish looking new.

The high-frequency section of the T221M utilizes a compact 80° x 55° constant-directivity horn driven by a wide-bandwidth, two-inch-titanium-diaphragm driver. The voice coil is coupled to the diaphragm with EV's exclusive Resonant Drive™ technology. This increases and smooths the high-frequency

response and reduces the amount of internal equalization required for flat frequency response.

EV's self-resetting PRO™ circuit is built into the crossover network to guard the compression driver from damage. If input power to the driver exceeds the nominal rating, the PRO™ circuit is activated, reducing the power delivered to the driver by 6 dB. The system will remain in this mode of operation until input power is reduced to a safe level.

The optimally vented bass section of the T221M is designed using Thiele-Small parameters for efficient performance to below 100 Hz. The high-output 12-inch woofer delivers outstanding performance. It features beryllium copper lead wires with a low-mass, edge-wound voice coil and high-temperature materials. The coil is driven by a massive, 15-lb magnetic structure.

Frequency Response

The combination of a 12-inch woofer, DH2T wide-bandwidth high-frequency driver and an equalized crossover results in the wide and smooth overall response shown in Figure 2. The T221M's axial frequency response was measured in Electro-Voice's large anechoic

chamber at a distance of 10 feet with a swept sine-wave input of 4 volts. Figure 2 has been averaged and corrected for 1 watt/1 meter, half-space operation.

Directivity

The polar response of the T221M speaker system at selected one-third-octave bandwidths is shown in Figure 1. These polar responses were measured in an anechoic environment at 20 feet using one-third-octave pink-noise inputs. The frequencies selected are fully representative of the polar response of the system. Beamwidth of the system utilizing the complete one-third-octave polar data is shown in Figure 1. R_0 and directivity index (D_i) are plotted in Figure 4.

Biamping

The T221M may be easily converted for biamp operation. To do this, first carefully remove the crossover. Notice the instructions on the circuit board and the four-wire "Molex" connector. The T221M comes from the factory in passive (full-range) mode. To convert the T221M to biamp operation, unplug the "Molex" connector from the header marked "PASSIVE MODE (FULL RANGE)" and plug it into the header labeled

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"BIAMP". The crossover is now in biamp mode. Carefully replace the crossover and screws. When the crossover is in biamp mode, there is an 18-microfarad capacitor in series with the high-frequency driver for protection against DC voltages or amplifier failure. This is not a crossover. It is however, protection against some forms of amplifier failure. An active crossover with a crossover frequency of 1,600 Hz (1.6 kHz) with slopes of 12 dB per octave or greater is required. Whenever possible, a crossover with 24-dB-per-octave slopes should be used.

Note: The PRO™ circuit is still protecting the high-frequency driver when the system is in biamp mode.

Connections

The T221M is equipped with Neutrik Speakon® NL4MPR connectors. Two connectors are installed in parallel, one mounted on each end of the enclosure allowing multiple T221M's to be used and "daisy-chained" together. These NL4FC connectors are used because they are locking, self-polarizing and capable of 30 amps rms continuously.

Full-range pin arrangements are:

- 1- = IN, FULL RANGE(-)
- 1+ = IN, FULL RANGE(+)
- 2- = Not used
- 2+ = Not used

Biamp pin arrangements are:

- 1- = IN, LOW FREQUENCY (-)
- 1+ = IN, LOW FREQUENCY (+)
- 2- = IN, HIGH FREQUENCY (-)
- 2+ = IN, HIGH FREQUENCY (+)

If you experience any difficulty in obtaining cables, connectors or wiring accessories, the following companies can be contacted:

Neutrik USA, Inc.

1600 Malone Street
Millville, NJ 08332

Pro Co Sound, Inc.

135 E. Kalamazoo Avenue
Kalamazoo, MI 49007

Whirlwind Music Distributors, Inc.

P.O. Box 1075
Rochester, NY 14603

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 T221M is designed to withstand the power test described in 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 an analyzer having the usual constant-percentage bandwidth (one-third octave), this shaping filter produces a spectrum whose 3-dB-down points are at 100 Hz and 1,200 Hz with a 3-dB-per-octave slope above 1,200 Hz. This shaped signal is sent to the power amplifier with the continuous power set at 400 watts into the 5.98-ohm EIA equivalent impedance (48.9 volts true rms). Amplifier clipping sets instantaneous peaks at 6 dB above the continuous power, or 1,600-watts peak (97.8 volts peak). This procedure provides a rigorous test of both thermal and mechanical failure modes.

Architects' and Engineers' Specifications

The loudspeaker system shall be a two-way, full-range design consisting of a 305-mm (12-inch) woofer in a vented enclosure, a high-frequency compression driver mounted on a 80° x 55° constant-directivity horn, and a passive crossover/equalizer network, which may be bypassed for use with an external low-level active dividing network with a corner frequency of 1,600 Hz. The loudspeaker shall meet the following performance criteria: frequency response of 100-16,000 Hz, -3 dB; full-range power handling of 400 watts long term and 1,600-watts short term with a shaped random-noise input per EIA Standard RS-426A; low-frequency power handling below 1,600 Hz in the biamp mode of 400-watts long term and 1,600-watts short term with a shaped random-noise input per EIA Standard RS-426A; high-frequency power handling above 1,600 Hz in the biamp mode of 60-watts long term and 240-watts short term with a shaped random-noise input per EIA Standard RS-426A; sensitivity of 101 dB SPL at 1 meter with a 1-watt, 300- to 3,000-Hz pink-noise input; 6-dB-down horizontal coverage angle of 55° ±5° in the 5,000- to 16,000-Hz range; 6-dB-down vertical coverage angle of 80° ±5° in the 5,000- to 16,000-Hz range; crossover frequency of 2,600 Hz (electrical); nominal impedance of 8 ohms; and minimum impedance of 6.7 ohms. Input connections shall be two paralleled Neutrik Speakon® NL4MPR connectors for full-range and biamp operation. The enclosure shall be constructed of curved plywood, covered with black textured paint and fitted with a 16-gauge black steel grille, rubber feet and a recessed carrying handle. Dimensions shall be 371 mm (14.62 in.) high x 594 mm (23.4 in.) wide x 406 mm (16.0 in.) deep. Net weight shall be 22.3 kg (49 lb). The loudspeaker system shall be the Electro-Voice T221M.

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WARRANTY (Limited)

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 or 800/234-6831). **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 Rights:**

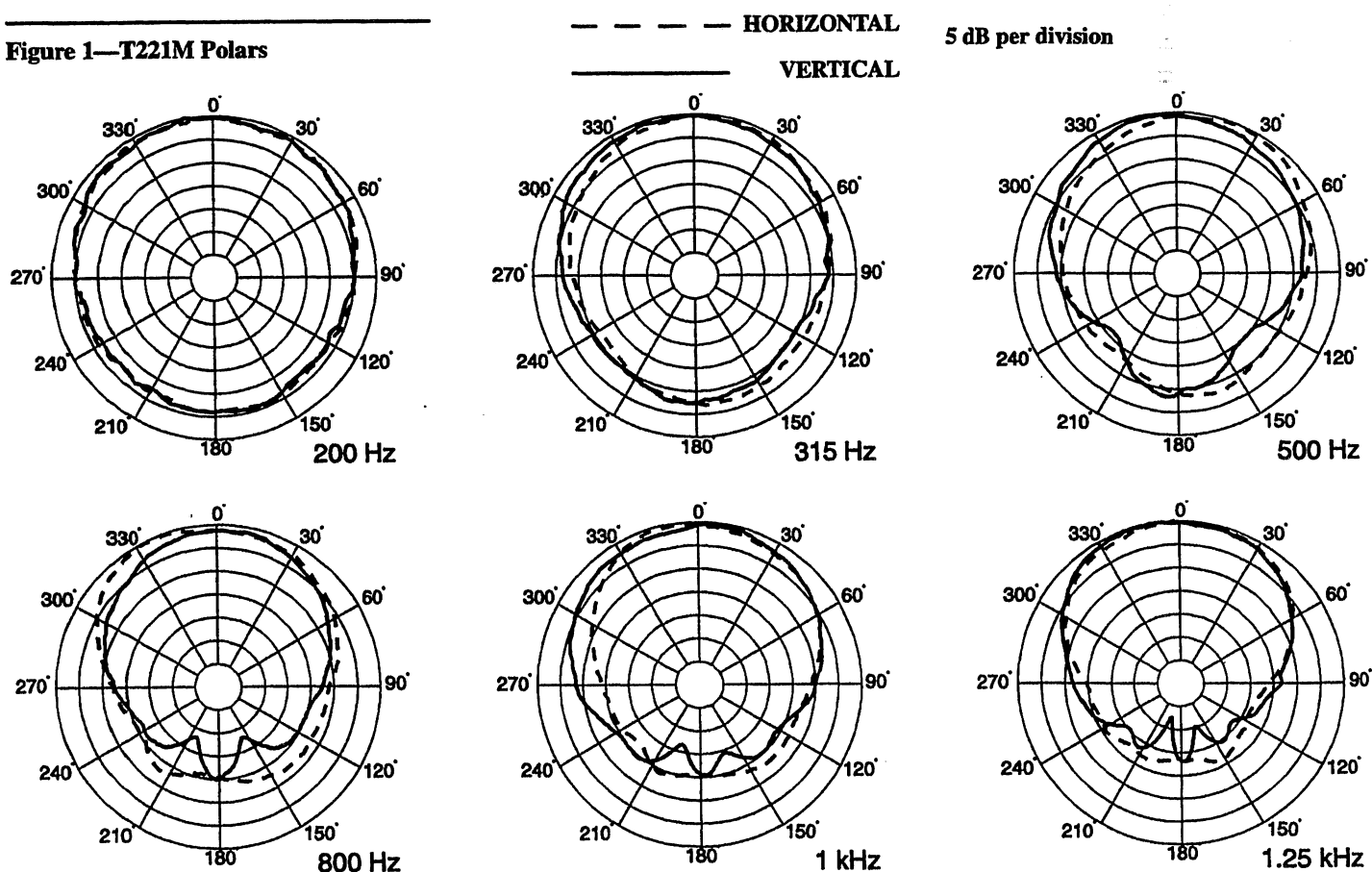
This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

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 (616/695-6831 or 800/234-6831).

Specifications subject to change without notice.

Figure 1—T221M Polars



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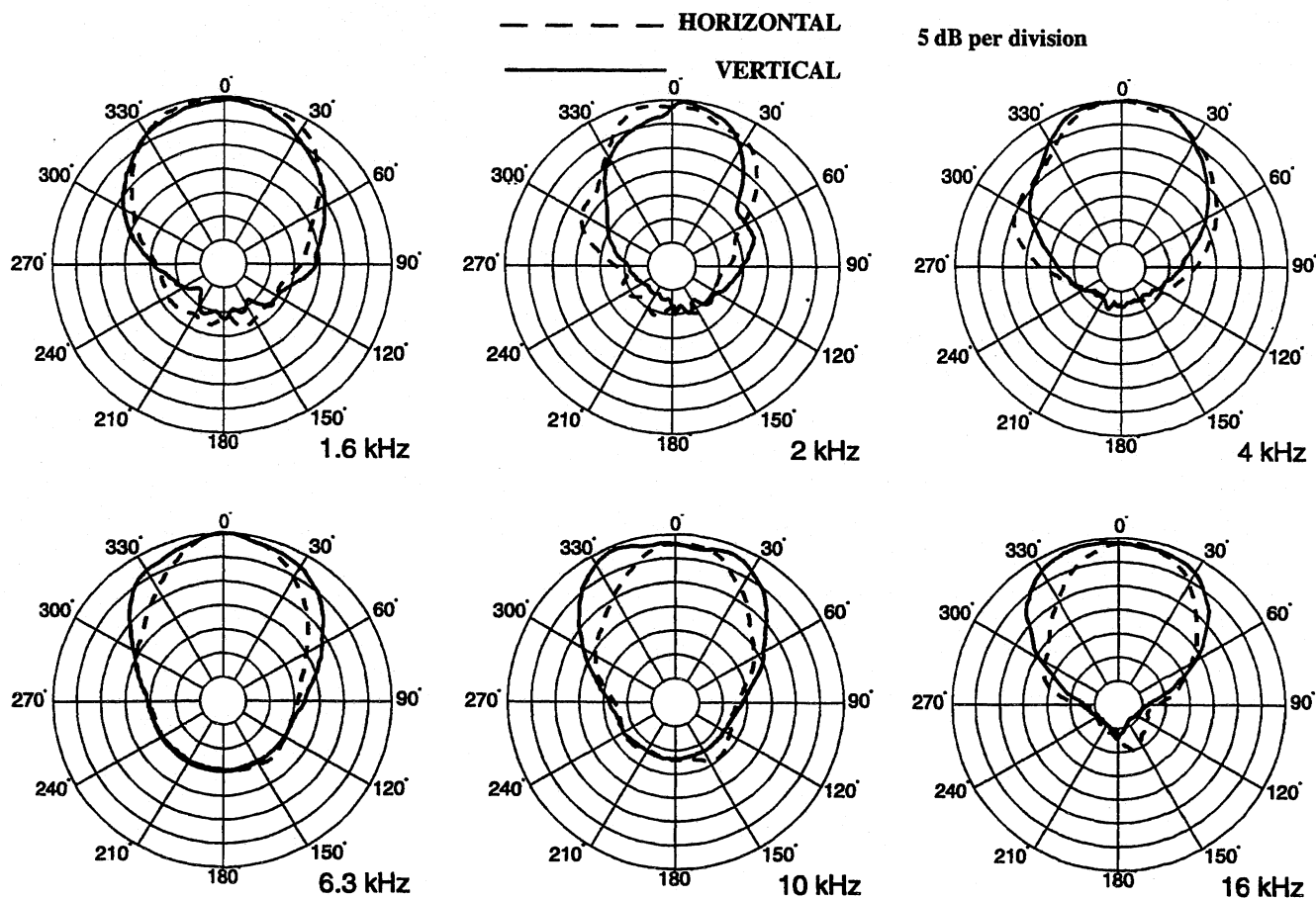


Figure 2—T221M axial frequency response, 1 watt, 1 meter

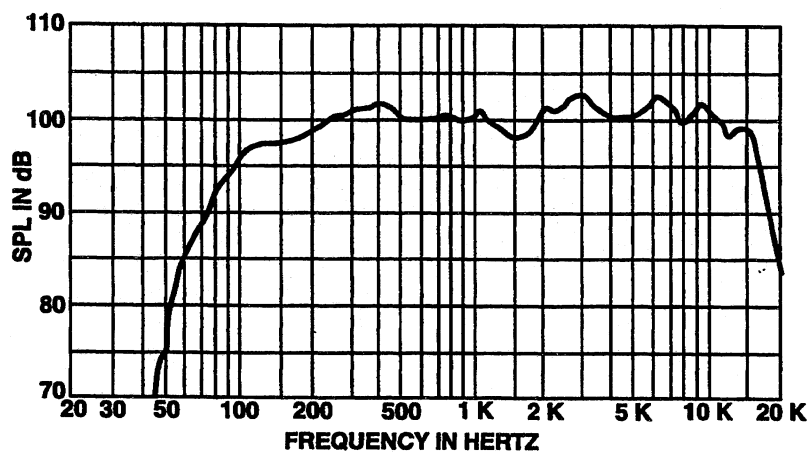
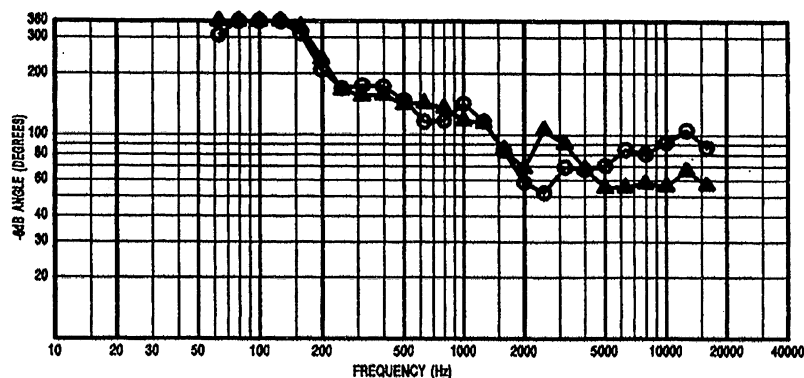


Figure 3—T221M Beamwidth



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Figure 4—T221M Directivity

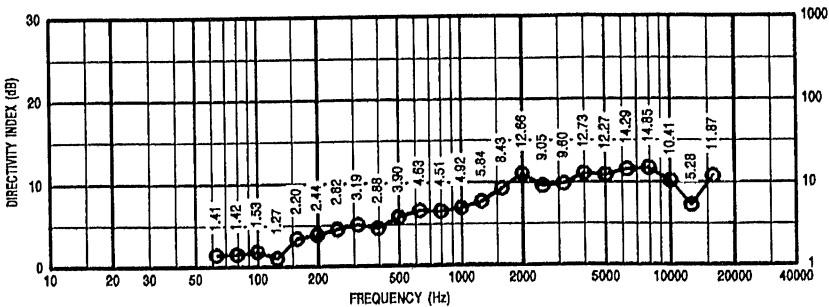


Figure 5—T221M distortion 10%, 40 W at 10 ft

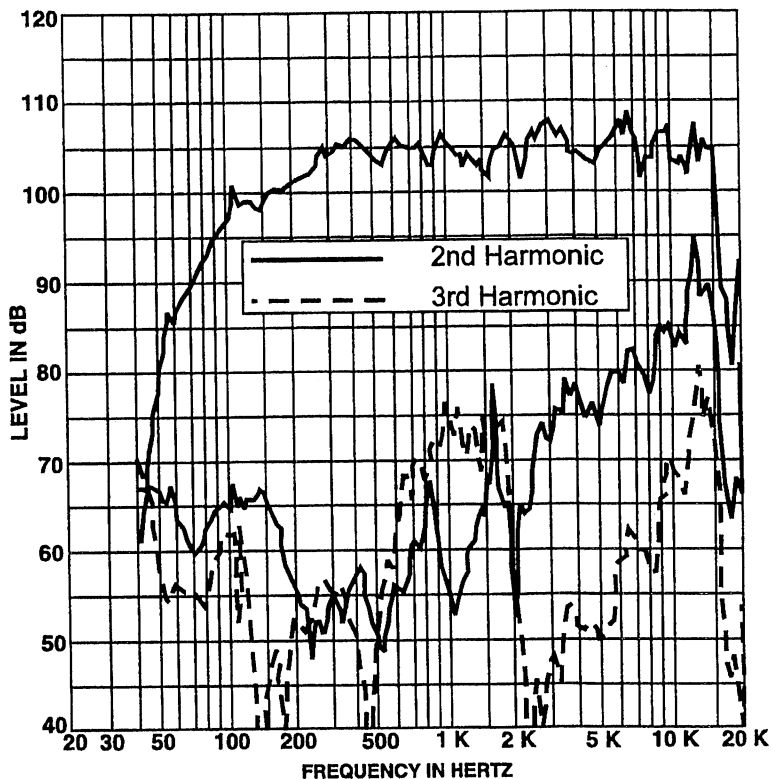
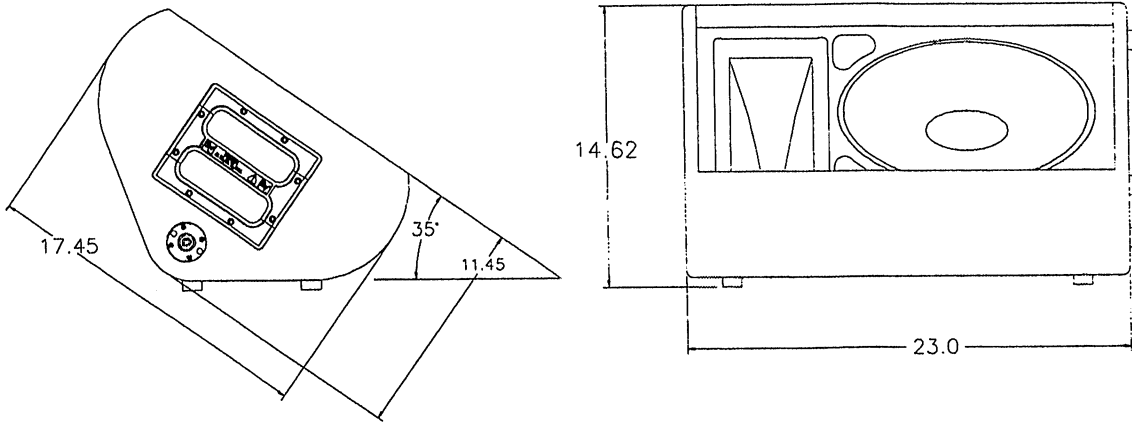


Figure 5—T221M Dimensions



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Specifications

Frequency Response, 1 Watt/1 Meter on Axis, Swept Sine-Wave Input, Half-Space Environment (see Figure 2):

100-16,000 Hz

Low-Frequency 3-dB-Down Point:

100 Hz

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

70 Hz

Half-Space Reference Efficiency:

5.7%

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

Full Range:

400 watts

Low Frequency:

400 watts

High Frequency:

60 watts

Maximum Woofer Acoustic Output:

22.8 watts

Sound Pressure Level at 1 Meter,

1 Watt Input, Anechoic Environment,

Band-Limited Pink-Noise Signal,

300-3,000 Hz:

101 dB

Dispersion Angle Included by 6-dB-Down Points on Polar Responses, Indicated One-Third-Octave Bands of Pink Noise,

5,000-16,000 Hz, Horizontal (see Figure 3):

55° ±5°

5,000-16,000 Hz, Vertical (see Figure 3):

80° ±5°

Directivity Factor R_q (Q), 800- to 16,000-Hz Median (see Figure 4):

9.7 (+5.1, -5.2)

Directivity Index D_i , 800- to 16,000-Hz Median (see Figure 4):

9.5 dB (+2 dB, -1.5 dB)

Distortion, 0.1 Full Power Input, Second Harmonic,

100 Hz:

2.6%

1,000 Hz:

1.0%

10,000 Hz:

7.9%

Third Harmonic,

100 Hz:

1.8%

1,000 Hz:

2.8%

10,000 Hz:

1.4%

Transducer Complement, High Frequency:

DH2T driver; HP85M horn

Low Frequency:

High-power woofer (12 in.)

Box-Tuning Frequency:

70 Hz

Crossover Frequency (electrical):

2,600 Hz

Crossover Slope:

12 dB per octave (low frequency)

18 dB per octave (high frequency)

Impedance,

Nominal:

8 ohms

Minimum:

6.7 ohms

Input Connections:

Two paralleled Neutrik Speakon®

NL4MPR connectors for full-range or biamp operation

Enclosure Materials and Colors:

Black-texture painted 12- and 13-ply plywood

Dimensions, overall (in floor monitor position),

Height:

371 mm (14.62 in.)

Width:

594 mm (23.4 in.)

Depth:

406 mm (16.0 in.)

Net Weight:

22.3 kg (49 lb)

Shipping Weight:

25.5 kg (56 lb)

Electro-Voice®

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

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